Supplemental Materials for "Process and Pitfalls of Online Teaching and Learning with Design Study "Lite" Methodology: A Retrospective Analysis"

Authors: Uzma Haque Syeda, Cody Dunne, and Michelle A. Borkin

ONLINE IMPLEMENTATIONS OF Design Study "Lite" Methodology (DSLM)

Pedagogical Implementation of DSLM	Without Service-Learning (S-L)	With Service-Learning
Semester	**Fall 2020**	**Spring 2021**
Level	Undergraduate	Undergraduate
Environment	Online	Online
Number of students	47	57
Number of projects	16	20
Collaborator(s)	Government, educational, nonprofit, for profit and research organizations	Nonprofit organization

Table 1: Details of the two online implementations of the Design Study "Lite" Methodology

We implemented Design Study "Lite" Methodology (DSLM) in two online semesters of undergraduate level data visualization courses in the Fall of 2020 and the Spring of 2021. The courses were taught by two different instructors. The first iteration in the Fall of 2020 implemented DSLM without Service-Learning unlike the previous in-person iterations of DSLM that implemented the framework in conjunction with Service-Learning (Syeda et al., 2020). Service-Learning (S-L) is an experiential learning model that aligns community service with classroom learning objectives to meet both pedagogical and community goals. The second iteration in the Spring of 2021 implemented DSLM in conjunction with S-L, like the previous in-person iterations. In this document, we will refer to the two semesters as DSLM without S-L (Fall 2020) and DSLM with S-L (Spring 2021). The first iteration (DSLM without S-L) had a total number of 47 students who completed a total of 16 design study projects in collaboration with 16 partners using DSLM. In the second iteration (DSLM with S-L), a total of 57 students completed 20 design study projects in collaboration with a nonprofit organization using DSLM. The detailed method of execution for each of the steps of the online DSLM implementations are provided below:
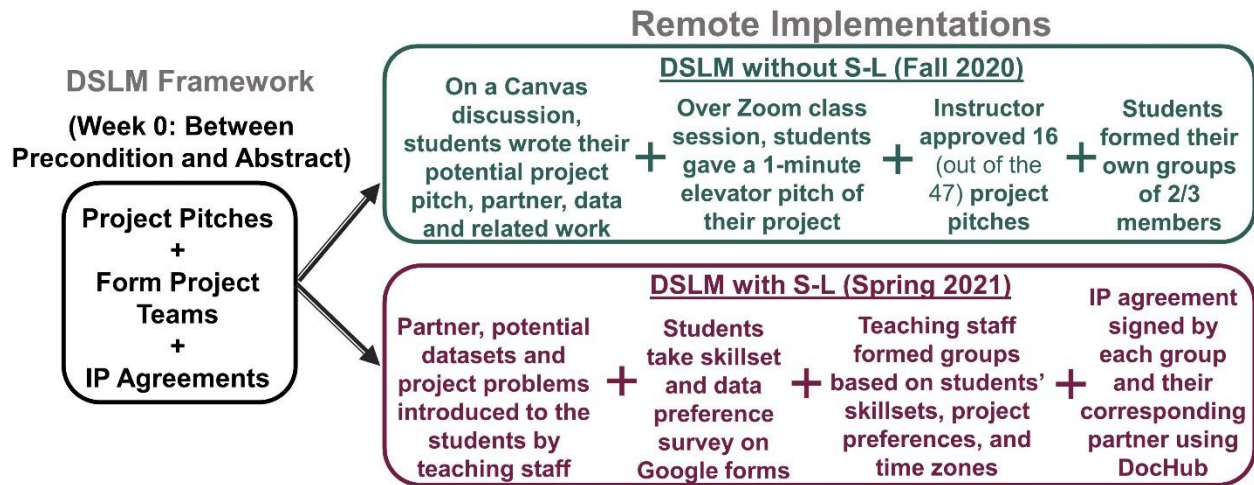
Before the Semester (Precondition stage)
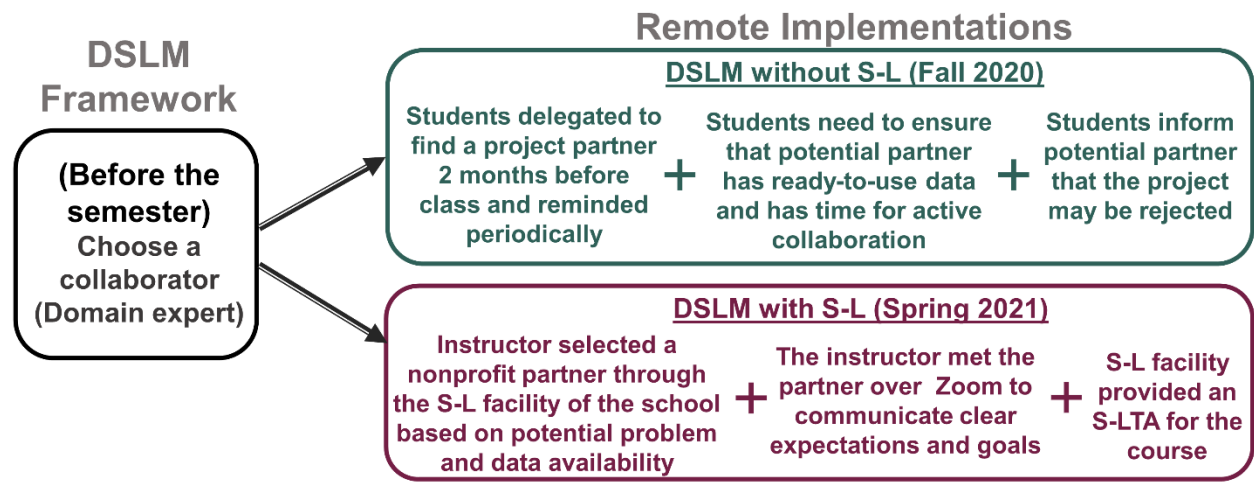
Fall 2020 (DSLM without S-L): Each student enrolled in the course was informed 2 months before the start of the class that they needed to identify a project problem and a corresponding project partner. The project problem could be anything relevant to the student's career, research, public, or personal interests that can be potentially solved by data visualization. Project partners were highly recommended to be from the nonprofit, government, education, and research sectors. The collaborating partner could be an individual, a group, or an organization, but the students needed to make sure that they have at least one point person from the collaborating organization who can actively support them during the duration of their project. This means that the partner is willing to invest the necessary time for interviews and follow-up feedback throughout the semester and can provide relatively clean, machine-readable, and ready-to-use data. Students were strictly cautioned against selecting a partner who does not have their data ready to use. Although students were allowed to gather and collect their own data, they were warned that this might need extra planning and that no extra credit will be given for additional data collection. Students were informed and were asked to inform their potential partners that all the project pitches will go through a screening process by the instructor, and only 1/3 of the total project pitches will be accepted as final projects. The students were periodically reminded of these requirements by the course instructor and were informed that the identification of a potential project area and corresponding partner and data will be the first project assignment for the class.

Spring 2021 (DSLM with S-L): In this implementation of DSLM, the instructor chose a nonprofit partner through the Service-Learning (S-L) facility of the school. This means that the Service-Learning facility of the school first identifies and winnows down a list of potential partners suitable for the course. From this list, the course instructor then further winnows down one or more partners based on the potential project problems and the availability of data. This selection process happens at least a month before the class starts. The process is elaborated by Syeda et al.\cite{syeda2020design}. The S-L facility of the school also provided for the class an extra S-L teaching assistant (S-LTA), whose responsibility is to orchestrate the S-L component (including the volunteer work associated with it) of the class. Upon selecting a collaborating nonprofit partner, the instructor and the S-LTA virtually met with the partner over Zoom to communicate clear expectations and goals of the course and discussed potential project questions.
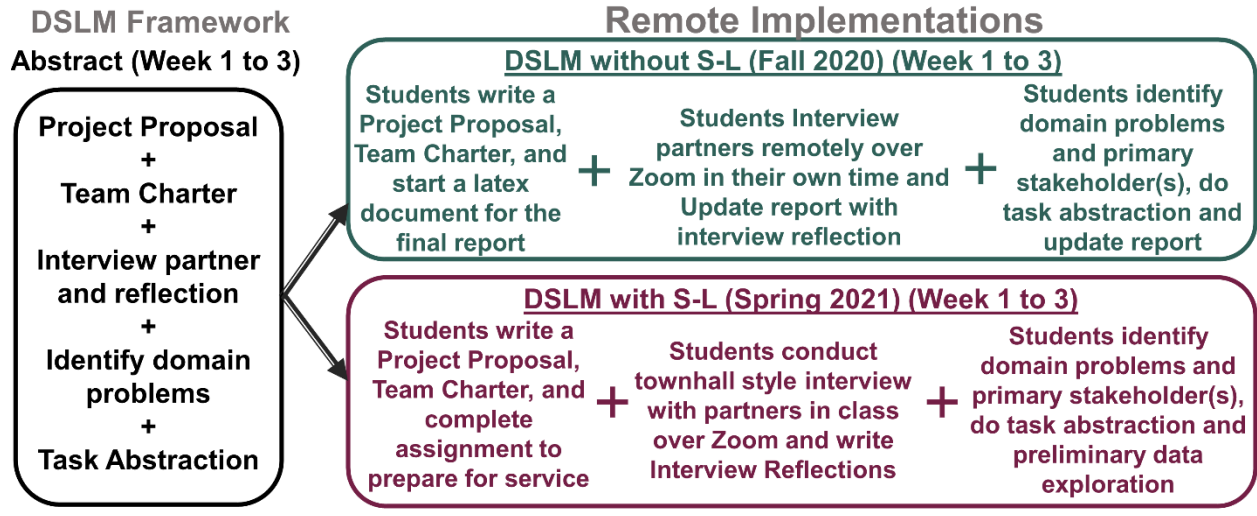
Between Precondition and Abstract Stage:

Remote Implementations

DSLM Framework

(Week 0: Between Precondition and Abstract)

Project Pitches
+
Form Project Teams
+
IP Agreements

DSLM without S-L (Fall 2020)

On a Canvas discussion, students wrote their potential project pitch, partner, data and related work

+

Over Zoom class session, students gave a 1-minute elevator pitch of their project

+

Instructor approved 16 (out of the 47) project pitches

+

Students formed their own groups of 2/3 members

DSLM with S-L (Spring 2021)

Partner, potential datasets and project problems introduced to the students by teaching staff

+

Students take skillset and data preference survey on Google forms

+

Teaching staff formed groups based on students' skillsets, project preferences, and time zones

+

IP agreement signed by each group and their corresponding partner using DocHub

Fall 2020 (DSLM without S-L): Before the abstract stage, some logistics need to be completed, and this is denoted as the stage between the precondition and abstract steps. In this stage, the students completed their first project assignment, which is to write their project pitches in a Canvas discussion forum for project pitches. Here the students were required to write about their project, the collaborator they are planning to work with, the data that they have from them, and a brief literature review on or transferable to their project topic. The instructor then selected 1/3 of the project pitches based on the feasibility and quality of the problem and the availability of data. Out of 47 project pitches, 16 were selected. For each project, the instructor and the TAs posted their feedback as comments on that particular post explaining why the project was accepted or rejected. After the submission, and during the class, each student took 1 minute to give an elevator pitch for their project over Zoom. Students whose pitches got rejected then commented on the accepted pitches on the Canvas discussion, expressing their interest to join the project. They then coalesced around ideas via the Canvas discussion posts to form their own project groups of 2 or 3 members.

Spring 2021 (DSLM with S-L): In this stage, the students were introduced to their partnering organization, the potential projects, and the 5 available datasets by the S-LTA during class, and the information was also shared in written form using Google docs. As part of their first assignment, the students were required to fill out two Google forms. The first inquiring about their background and skillsets in programming languages and visualization-related topics, and the second requiring them to rank their preferences regarding the partner's datasets. The S-LTA then formed student groups based on their background and skills and dataset/project preferences in a way that each student got to work with their first or second choice of datasets. Each group was then assigned a project problem associated with their preferred dataset. Upon forming the groups, an IP agreement was sent to the 20 groups using DocHub. Each member of a group received an email with a link to the agreement document, which they could then sign. This was done asynchronously and there was no order as to which member needs to sign first. All 20 agreements were then signed by one of the point persons of the partnering organization.

Abstract Stage

DSLM Framework Abstract (Week 1 to 3)	Remote Implementations

DSLM Framework
Abstract (Week 1 to 3)

> **Project Proposal**
> **+**
> **Team Charter**
> **+**
> **Interview partner and reflection**
> **+**
> **Identify domain problems**
> **+**
> **Task Abstraction**

Remote Implementations

DSLM without S-L (Fall 2020) (Week 1 to 3)

Students write a Project Proposal, Team Charter, and start a latex document for the final report

+

Students Interview partners remotely over Zoom in their own time and Update report with interview reflection

+

Students identify domain problems and primary stakeholder(s), do task abstraction and update report

DSLM with S-L (Spring 2021) (Week 1 to 3)

Students write a Project Proposal, Team Charter, and complete assignment to prepare for service

+

Students conduct townhall style interview with partners in class over Zoom and write Interview Reflections

+

Students identify domain problems and primary stakeholder(s), do task abstraction and preliminary data exploration

Fall 2020 (DSLM without S-L): In this step, each group was required to create a project proposal explaining what their project goal is, who they are partnering with, type of data they will be using, and the technologies they will use to complete the project. They were also required to prepare an agreed-upon team charter to manage expectations, logistics, and responsibilities of collaboration as a team. To do this, each group had to create a running latex document in the VGTC conference template, the same that they will use to write their final project paper, and add the following sections with brief write-ups: abstract, introduction, related work, partner, data, execution plan, preliminary work, references, and group charter.
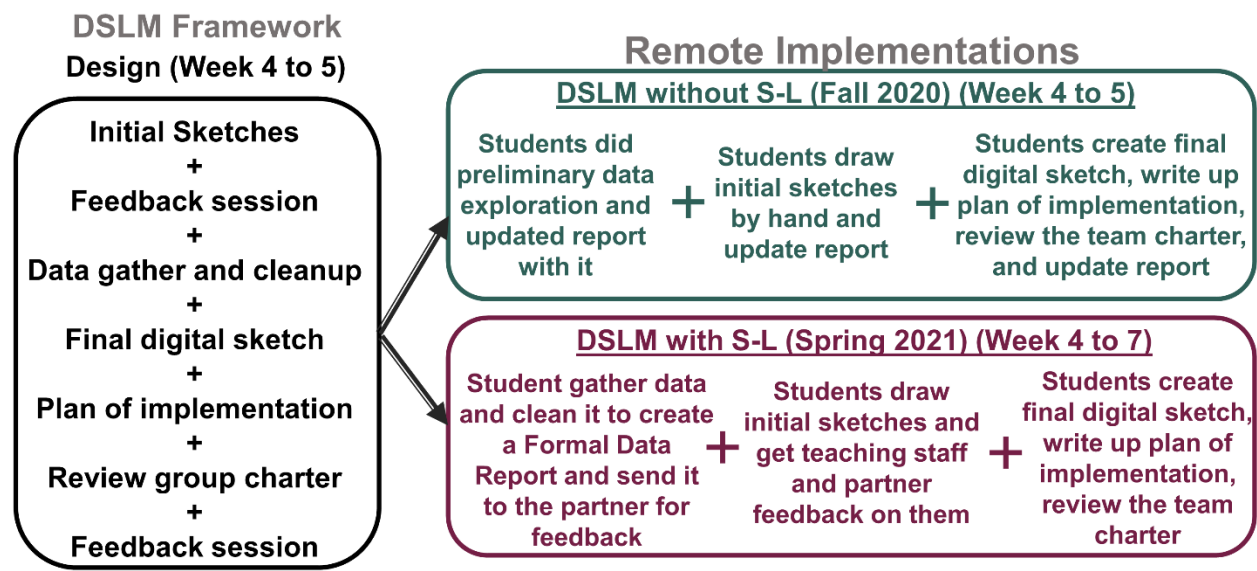
After this, and during the abstract stage, each group was then instructed to interview their domain collaborator virtually over Zoom, in their own time and convenience, but before the deadline of the next step: task analysis. The purpose of the interview was to understand the domain problem, the target user, the data, and the expectations of the partner more clearly. Using their interview notes, the students were then asked to update the partner section of their running latex document with insights from the interview. Using the interview notes and insights the students identified the target end user/primary stakeholder and completed their task analysis where they translated the domain problem into abstract visualization tasks. They then added a new section called task analysis in their running document.

Spring 2021 (DSLM with S-L): Similar to the other implementation, in this stage, the students write their project proposal and team charter. In addition to these, this implementation of DSLM also includes a new assignment in the abstract stage which is aimed to make sure that students practice professional and responsible conduct while they collaborate with community organizations. This is especially important for online DSLM implementations to alleviate the risks of "online disinhibition", which is the lowering of self-regulation in online settings resulting in potential unethical and insensitive conduct or language. For collaborations with nonprofit organizations, e.g., DSLM with a Service-Learning

implementation, there is also a risk of students perceiving their collaboration as helping those in need and their collaborators as weak and powerless.

After completing the above assignments, the students then interview their partner. In this course, one partner organization collaborated with 20 student projects. The organization had one primary point person, and two secondary point persons to guide the project groups. A townhall style interview was conducted in class, where two of the partner organization representatives joined the Zoom session of the class. Each group had the chance to ask their most important questions to the partner. Any additional questions were added in a shared Google document that the S-LTA then sent to the partner to be answered in written form. Few groups with more complex data conducted a second interview later with the two secondary point persons of the organization. Using their interview notes and additional answers from the partner, the students complete their task analysis and identified the primary stakeholder for their project. They also did a preliminary data exploration at this stage to make sure they did not have any more questions regarding the data that they need to ask their partner.

Design Stage

DSLM Framework
Design (Week 4 to 5)

Initial Sketches
+
Feedback session
+
Data gather and cleanup
+
Final digital sketch
+
Plan of implementation
+
Review group charter
+
Feedback session

Remote Implementations

DSLM without S-L (Fall 2020) (Week 4 to 5)

Students did preliminary data exploration and updated report with it
+
Students draw initial sketches by hand and update report
+
Students create final digital sketch, write up plan of implementation, review the team charter, and update report

DSLM with S-L (Spring 2021) (Week 4 to 7)

Student gather data and clean it to create a Formal Data Report and send it to the partner for feedback
+
Students draw initial sketches and get teaching staff and partner feedback on them
+
Students create final digital sketch, write up plan of implementation, review the team charter

Fall 2020 (DSLM without S-L): At this stage, the students did their preliminary data exploration and updated their running latex document with an Appendix section dedicated to data exploration and insights gained gained from exploring the data using tools like Tableau, and Altair. For every group, each member then hand draws 3 design sketches and as a team they select the best 3 sketches. Photographs of these hand drawn sketches can then be shared with the teaching staff and partners virtually for feedback. They upload pictures of their sketches in the Latex document under a section called design sketches to share it with the instructor. Finally, the groups create their final prototype's digital sketch, and share screenshot of this sketch in the Latex document. They also update the document with a

reviewed group charter, where they discuss how their group dynamics and communications amongst the members and with the partners are going. This is important specially in an online class as it helps the instructor to intervene if groups are facing communication related issues, which may be very common in a setting where they cannot build rapport with their team members as in an in-person class. The groups get feedback from the instructors as they grade these project milestones, however, partner feedback varied for each group and were not made mandatory.

Spring 2021 (DSLM with S-L): The design stage for the Spring 2021 semester contained almost the same steps as the Fall 2020 semester did, with a few exceptions. In this stage, the students do a data gather (if needed) and cleanup and then create a formal data report summarizing their data and the insights they gained from exploring the data using Tableau and share it with the teaching staff and the partners. Having a formal data report helps consolidate what data the students are focusing on and can help the partner to intervene and steer the students in the right direction if they are missing out important aspects of the data or are focusing on redundant or unnecessary data. For their hand-drawn sketches, they get three forms of feedback. First, the teaching staff virtually sits with each group for 15 minutes to give live feedback on their design sketches that they submitted as a PDF with pictures of their sketches. Second, these comments and feedback are also added in written form in their submission for them to refer to later. Finally, these sketches are sent to their partner for feedback and to make sure that everyone is in the same page. However, due to staff limitation from the partner's side, they were late to give feedback on the sketches, which caused the timeline of the design stage to be extended till the start of week 7 as shown in Figure above.
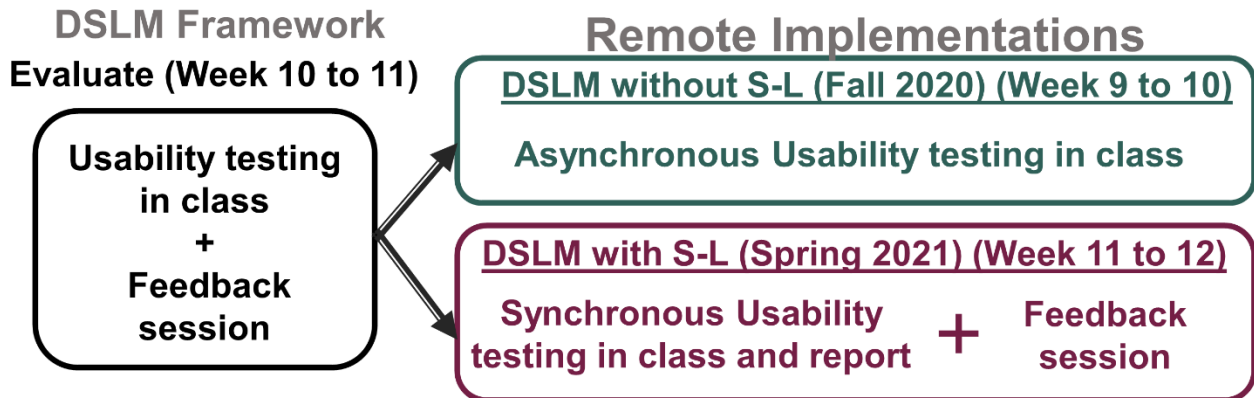
Build Stage
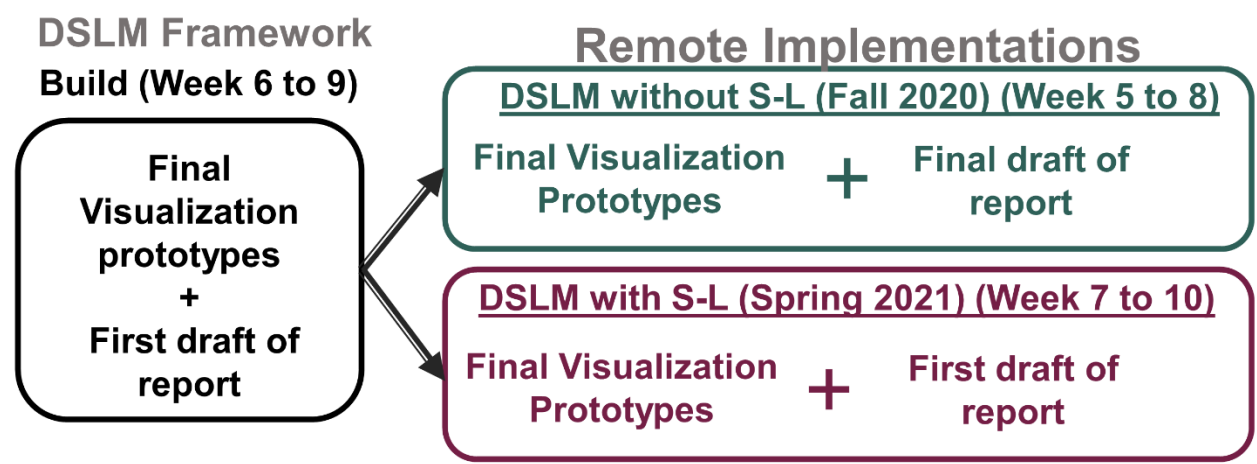
Fall 2020 (DSLM without S-L): The students were required to keep a running LaTeX document starting from week 1 (Abstract stage) and update it as they progressed through the project. In the build stage, the students finish the report and prepared their visualization prototype for usability testing.

Spring 2021 (DSLM with S-L): Besides the visualization prototype(s), the students also create their first draft of the report in the form of sections in a website containing the motivation, data, task analysis, data analysis, and design process. Students are encouraged to re-purpose or reuse their write-ups from previous relevant assignments.
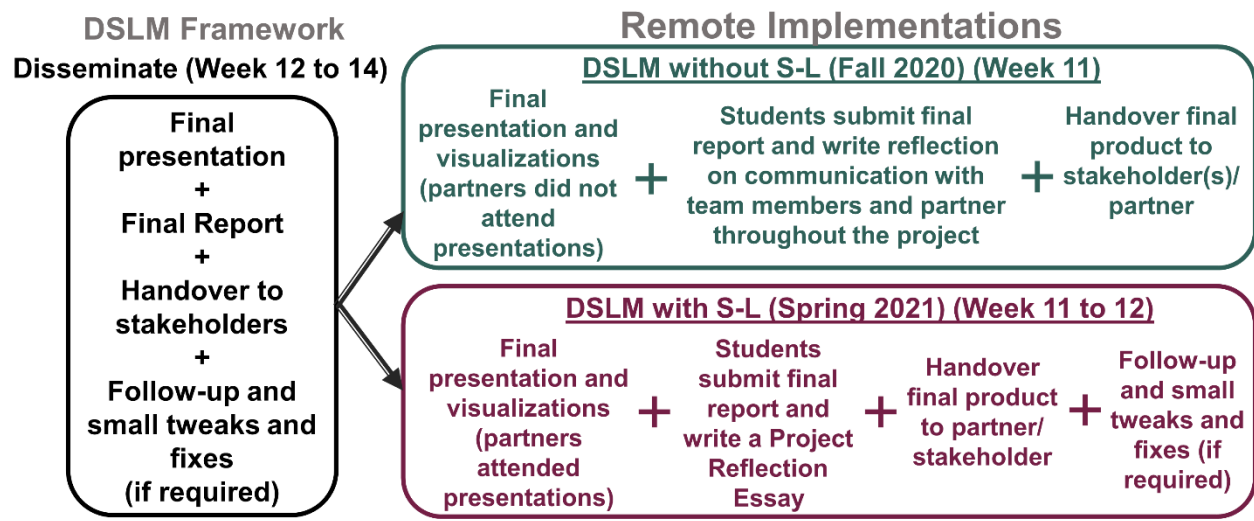
Evaluate Stage

DSLM Framework
Evaluate (Week 10 to 11)

Remote Implementations

Usability testing
in class
+
Feedback
session

DSLM without S-L (Fall 2020) (Week 9 to 10)

Asynchronous Usability testing in class

DSLM with S-L (Spring 2021) (Week 11 to 12)

Synchronous Usability testing in class and report **+** **Feedback session**

Fall 2020 (DSLM without S-L): The usability testing was done asynchronously using Canvas. All project teams shared their visualization link with the class as individual comments under a discussion forum in Canvas. Each student was responsible to use the visualization(s) and leave feedback for atleast 5 other groups. This way in an hour, all the student project groups received an approximate of 15 feedback.

Spring 2021 (DSLM with S-L): This implementation applied a synchronous usability testing in class using Zoom breakout rooms feature. It was accomplished in a round-robin manner where where the student members of each groups took turns to become the participant, note-taker and interviewer. 20 breakout rooms were created for each group by the teaching staff and there were 6 sessions in total. A Google Sheet indicated which group should join which breakout room and at the start of each session, the participants from each group came to the main room of the Zoom session, and then joined a different room to test their peers groups' visualizations. Each session lasted 15 minutes and then the TAs prompted the participants to return to their own group and the new set of participants to join the main room in Zoom and then repeat the process. At the end of the usability testing, the groups were required to summarize their notes and write a report on the feedback they got and the changes they want to make to their visualizations.

Disseminate Stage

DSLM Framework

Remote Implementations

Disseminate (Week 12 to 14)

Final presentation + Final Report + Handover to stakeholders + Follow-up and small tweaks and fixes (if required)

DSLM without S-L (Fall 2020) (Week 11)

Final presentation and visualizations (partners did not attend presentations) **+** Students submit final report and write reflection on communication with team members and partner throughout the project **+** Handover final product to stakeholder(s)/ partner

DSLM with S-L (Spring 2021) (Week 11 to 12)

Final presentation and visualizations (partners attended presentations) **+** Students submit final report and write a Project Reflection Essay **+** Handover final product to partner/ stakeholder **+** Follow-up and small tweaks and fixes (if required)

Fall 2020 (DSLM without S-L): At the disseminate stage, the students prepared their final visualization and report for handover to the partners. They also made a final project presentation that they presented in class using the screen sharing feature of Zoom. One of the group member shared their screens and the others unmuted on Zoom themselves when it was their turn to speak. They also created a demo-video and wrote a reflection regarding the communication aspect of the project. The reflection on communication provides valuable feedback for the instructor to work on aspects or concerns that need to be addressed in the future. The partners were contacted after the end of the semester for feedback.

Spring 2021 (DSLM with S-L): The same deliverables were also required by the students in this implementation, with the exception of a project reflection essay. The reflection essay was aimed to let the students reflect critically on their experience with the project and express their thoughts on what worked and what did not. Reflection is also an important component of Service-Learning as it helps students to look back at their experience with the design study and helps them connect/relate their service with their course materials. The point persons from the partnering organization were invited to the project presentations and their feedback was solicited regarding the final product. The presentations were held in 2 separate class times, although all students had to submit their final presentation slides at the same time. Requests of followup tweaks in the final visualizations by the partners were managed through communication between the instructor, partner and the students.

Information Visualization (DS 4200) Fall 2020 (DSLM without S-L)

Syllabus

Description

Link to Fall 2020 Course Website: https://northeastern.instructure.com/courses/18721

Introduces foundational principles, methods, and techniques of visualization to enable creation of effective information representations suitable for exploration and discovery. Covers the design and evaluation process of visualization creation, visual representations of data, relevant principles of human vision and perception, and basic interactivity principles. Studies data types and a wide range of visual data encodings and representations. Draws examples from physics, biology, health science, social science, geography, business, and economics. Emphasizes good programming practices for both static and interactive visualizations. Creates visualizations in Tableau as well as Python and open web-based authoring libraries. Requires programming in Python, JavaScript, HTML, and CSS. Requires extensive writing including documentation, explanations, and discussions of the findings from the data analyses and visualizations.

After completion of the course students should be able to:

- Assess the quality and effectiveness of a visualization heuristically as well as through standard evaluation techniques.
- Choose appropriate visualization methods for a given data type.
- Design an effective visualization by applying design and human perception principles.
- Implement a static or interactive visualization.
- Implement interactivity functions to enable data exploration and analysis.
- Implement web-based visualizations in D3/JavaScript/HTML/CSS.
- Create visualizations in Tableau.
- Write, present, and be knowledgeable about contemporary visualization topics.

Prerequisites

The only required prerequisite course is CS 2510 or DS 2000 (or exemption by permission of the instructor) — these courses introduce students to basic programming, algorithms, and data structures. Topics such as HCI, web development, databases, and data mining all are very useful for the course but not required prerequisites.

The assignments and projects in this course will expose students to a variety of programming languages including JavaScript (i.e., D3) and Python as well as tools including Tableau for visualization design and implementation. No prior experience with these tools, or web design in

general, is required. *However, students should be comfortable with learning new programming languages independently.*

Textbooks

Required

This course will utilize one free textbook that covers basic visualization theory and methodology.
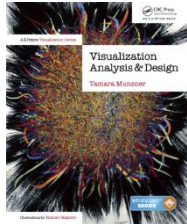
[Visualization Analysis and Design Links to an external site.](#)by Tamara Munzner *(** [Free PDF online Links to an external site.](#)via Northeastern).*

Recommended

Although not required, the following books are recommended as additional references to help expand on the visualization theory and skills discussed in class. These books will be cited and referred to during lecture as appropriate to help direct the student to the appropriate resource.

- [Design for Information Links to an external site.](#)by Isabel Meirelles
- [The Functional Art: An introduction to information graphics and visualization Links to an external site.](#)by Alberto Cairo
- [Information Visualization: Perception for Design Links to an external site.](#)by Colin Ware
- [Interactive Data Visualization for the Web (2nd edition) Links to an external site.](#)([website Links to an external site.](#)) by Scott Murray
- [The Visual Display of Quantitative Information Links to an external site.](#)by Edward Tufte

Required Supplies

We will do a lot of visualization sketching and design iteration in this course. You should always have the basics so you are able to participate effectively:

- At least five different colors of pens—e.g., Pilot G2 packs [31128 Links to an external site.](#)and [34405 Links to an external site.](#)—or pencils (with sharpener).
- Plenty of white or near-white drawing paper. E.g., Strathmore [25-005 Links to an external site.](#)or [400-2 Links to an external site.](#)drawing notebooks, [heavyweight white index cards Links to an external site.,](#) or even 8.5x11" printer paper.

We will usually specify paper vs. using digital tools for design sketching, as we have found that digital drawing tools tend to limit the breadth of student creativity and slow down design iteration.

We will also do programming and writing activities. You should always have:

- A laptop suitable for programming and it's charger.

If you do not have the required supplies when they are needed your participation grade for the day will be marked as 0.

Course Components

For any class, you should plan to spend approximately 3 hours outside of class for every hour of class time (i.e., 10 hours per week).

Lectures

Most classes will be split into two parts: lecture and in-class activity. The lecture component will cover foundational topics, and the remainder of the class will be devoted to an in-class activity to further explore topics and skills relevant to the course topics. Activities will include such exercises as programming tutorials, design critiques, journal paper discussions, in-class programming and data analysis, and student-led final project presentations. Lecture slides are available [here Links to an external site.](#), generally within a few days after class.

Class Participation

Students are expected to participate both in-class as well as online through the course's discussion group. A student's overall participation grade (see the Final Grade section below) will be composed of their in-class participation and reading quiz grades (see Readings section below). As the course is based heavily on in-class discussions and activities, student participation is essential to the course. Attendance in class is also required due to the heavy emphasis on in-class activities and a student's participation grade will be negatively affected by class absences and tardiness. Absences may be excused by the instructor with advance notice. Absences will only be approved after the fact in cases of medical necessity.

Readings

Assigned reading will be given to read in advance of each class, as well as part of some assignments, and will be listed in the [Course Schedule](#) online. Readings will be drawn from the required textbook as well as other freely available online material. To ensure students complete the assigned reading and retain the key concepts required to fully participate in-class, short reading quizzes will be given at the start of many classes. The grades of these quizzes will be counted toward each student's Participation grade. Quizzes will be given near the start of class and will not be available to tardy students. You will not know in advance when quizzes will happen or how many quizzes there will be total.

Homework

There will be regular homework assignments over the course of the semester. Each assignment will require the student to apply the concepts discussed in the readings and in-class lectures to both programming assignments for the actual building and implementation of static and interactive visualizations as well as short writing assignments (e.g., design critiques). *The homework assignments are an individual assessment and should not be completed in groups.*

Experiential Learning Final Project

Over the course of the semester students in the class will work together with real users to analyze and visualize their data. Throughout the semester there will be mandatory project deadlines and associated assignments. Some of the project assignments will be done individually, and others in small groups. The required project milestones and deliverables will be incorporated into, or sometimes replace, the weekly homework assignment.

The experiential learning project will give students exposure to real data, interaction with real users, and provide the opportunity to conduct novel data analysis and visualization. Students will be required to produce an interactive web-based visualization and associated website to host the visualization, a demo video, presentation, research paper, and other project deliverables.

Students will be expected to identify and propose their own experiential learning partners. More instructions will be provided in the initial project assignments.

See more details of the project in the [Project Overview](#).

Final Grade

Grades will be posted on Canvas with a running total grade weighted by assignment type as detailed on Canvas at the bottom or side of the [Course Schedule](#). Final letter grades will be based on this weighted total using this scheme:

Name:				Range:
A	100%	to	93%	
A-	< 93%	to	90%	
B+	< 90%	to	87%	
B	< 87%	to	83%	
B-	< 83%	to	80%	
C+	< 80%	to	77%	
C	< 77%	to	73%	

Name:			Range:
C-	< 73%	to	70%
D+	< 70%	to	67%
D	< 67%	to	63%
D-	< 63%	to	60%
F	< 60%	to	0%

There will be no rounding. E.g., 92.999% is still less than 93% and thus an A-. This is encourage fair grading by reducing the effect of emotional appeals to the instructor, which not all students would feel comfortable making.

In general, the term "reduction of one letter grade" refers only to the letter and not the +/-. E.g., an A would become a B and not an A-. Likewise for reductions of more than one letter grade.

Changes to the final course grade must be requested in an email to the instructor within one week of receiving the grade. The request should contain a technical explanation of why re-grading is necessary. If the instructor approves the request, all work including assignments, participation, and the project will be re-graded to determine the new grade. The new grade can potentially be lower than the original grade.

There will be no pass/fail grading this Fall, even if Northeastern switches to entirely online instruction!

For details about assignment grading rather than the final course grade, see Course Policies below.

Course Policies

Late Policy

All homework and project related due dates are final and provided in the course schedule. No assignments will be accepted for credit after the deadline. *Homework and project assignments are usually due at 11:59 pm Eastern Time on Tuesdays.*

If you have a verifiable medical condition or other special circumstances that interfere with your coursework please email the instructor as soon as possible to discuss your options.

If you have a major conference/journal paper deadline or conference presentation that interferes with your coursework email the instructor at least 3 weeks in advance to discuss your options. We will not provide late policy waivers for such cases with less notice.

Assignment Submission Instructions

On all assignments you are expected to follow the instructions exactly. If you don't, you may miss out on the associated learning targets. Accepting assignments in varied forms also adds grading challenges and reduces the time and thought we have for providing higher-level feedback on content to you and to other students. Permitting variances sets unrealistic expectations for you for future courses and for the real world where following seemingly pointless instructions often do in fact matter.

On any assignment where you must submit a link or file on Canvas, please ensure you submit the correct one. Some examples of incorrect submissions in the past: (1) We ask for a GitHub repository link and you give us a GitHub Page. (2) We ask for a link to a GitHub Classroom-generated repository in our organization and you give us a personal repository. (3) We ask for a link to a PDF and you give us a link to a Google Drive folder.

If you do not submit the correct link or file we will not search for the correct one and you will receive a 0. This is unfortunately necessary to ensure we have as much time as possible to provide feedback on assignments. Just recently we spent 15 minutes tracking down correct links and comparing two repositories for a single student's submission, which does not scale.

Assignment Regrading Policy

Re-grading requests must be made by an email to the primary TA within one week of receiving the grade. The request must include:

1. A link to your Submission Details page for the assignment ([Canvas documentation Links to an external site.](#)on how to get to it).
2. The details on what aspect you're requesting to be regraded.
3. A short (1-2 sentences) explanation of why re-grading is necessary.

The new grade can potentially be lower than the original grade.

Changes to the Syllabus, Schedule, and Grading

The course syllabus, schedule, grading schemes, and grading rubrics are working documents that are subject to change throughout the entirety of the semester. Refer back to the "Home" page at any time for the most up to date document. We will make our best efforts to communicate any meaningful changes promptly. In general, we'll ask ourselves "could this change create an unpleasant surprise for a student who read the syllabus?" If so, we'll announce the change.

🐛 Bonus Points for Bug Bounties 🐛

If you identify problems or points of confusion with the course assignments you may receive bonus points. In order to get the bonus you must:

- Report the bug at least 4 days prior to the due date of the assignment by email to the instructor.

- The email must:
  - Have the subject line prefixed by "DS 4200 F20 — Bug Bounty".
  - Provide a hyperlink to the assignment/web page/repo/document/file in question.
  - Include the problematic excerpt, detailed information about what is missing, or other problem details.
  - If applicable, suggest a fix including replacement text.

Points will be awarded by degree of severity as determined by the instructor. Generally expect:

-
  - As intended — issues we will not fix: +0 points
  - Minor — spelling/grammar/simple writing issues: +1 point
  - Major — points of moderate confusion that students could work around with some effort: +2 points
  - Severe — bugs that would block a large portion of students from completing the assignment: +3 points

Bonus amounts may vary at the instructors discretion.

Bonus points can increase the score of an assignment above the maximum and not just compensate for lost points.

We will never intentionally introduce bugs into the course materials.

Other Bonus Points

Some assignments will include other options for bonus points.

Communication Policy

Students can reach us by creating a new Canvas Discussion or sending an email.

All general course and assignment questions should be posted as a Canvas Discussion so all students can comment and see the answers. Students that email on issues of obviously of general interest will be referred to make a post on Canvas instead.

Emails are only appropriate for individual questions — e.g., medical leaves, regrading requests, meeting requests — or when otherwise directed. When emailing copy the instructor and both TAs, unless there are extenuating reasons to not include the TAs.

Include the relevant links! If you're emailing about a particular assignment, please include the URL of any relevant materials for us to help you. I.e., before submission send us a link to your GitHub repo — it's hard to debug code without seeing it — or other draft submission. After submission send us a link to your Submission Details page for the assignment ([Canvas documentation Links to an external site.](#)on how to get to it).

If you are asking a project-related question and already have a group, give us your group number too.

We will make their best efforts to respond within 24 hours, excluding weekends. See the teaching staff list above for more detail.

Classroom Electronics Policy

Students will be required to bring a laptop to class (see above). ~~However, students are prohibited from using electronics during class except when specifically instructed for in-class activities. (Not applicable during NUflex.)~~

Students are prohibited from using electronics for non-class purposes during class due to their distracting nature for the student as well as others. Example prohibitions include browsing Facebook, doing work for other courses, messaging friends, and watching sports.

Students are prohibited from using electronics during class for class-related purposes which are not relevant to the in-class activity. E.g., no working on out-of-class assignments during class.

Students who are observed violating the electronics policy will be asked to leave for the day and they will be marked as absent and any quiz or in-class assignment scores for the day will be 0.

Any exceptions to the electronics policy, e.g., for medical monitoring, must be approved by the instructor in advance.

Recording Privacy Policy

We will not be recording the course sessions in general — it will be conducted synchronously.

This course, or parts of this course, may be recorded for educational purposes. These recordings will be made available only to students enrolled in the course, instructor, and any teaching assistants assigned to the course.

The instructor will announce any recordings when they begin. Any student may opt-out of being recorded by sending a message on the General channel on Teams. Any questions or comments the student makes for the remainder of the class session should also be conducted on Teams so the student isn't recorded.

Only students who have arranged an accommodation with the Disability Resource Center may use mechanical or electronic transcribing, recording, or communication devices in the physical or virtual classroom. Students with disabilities who believe they may need such an accommodation may contact the Disabilities Resource Center.

Do not record or otherwise share the classroom video calls yourself.

The Commonwealth of Massachusetts's wiretapping law requires "two-party consent". It is a felony to secretly record a conversation, whether the conversation is in person or taking place by telephone or another electronic medium. [See Mass. Gen. Laws ch.272,§ 99.]

Academic Integrity Policy

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

In this course you are expected to do each assignment independently unless otherwise instructed.

Plagiarism of any kind will not be tolerated, including but not limited to copying text, source code, images, video, visualization designs, and slides.

We will review your submissions against existing publications, designs, course submissions, and source repositories to ensure academic integrity. We maintain a repository of deliverables from previous instantiations of this and related courses to compare submissions against.

For more information, please refer to the Academic Integrity Web page Links to an external site..

Here are some key points to keep in mind:

- Acknowledge where code, text, images, designs, etc. come from.
- If you look at code online but you are supposed to write something yourself, you can't copy the code, either by copy and paste or by writing manually. Just copying and manually renaming variables is definitely cheating. You can get the idea but not the code.
- Anything copied from bl.ocks.org Links to an external site., Observable Links to an external site., or Stack Overflow Links to an external site.must be acknowledged. It is not considered just D3 documentation.
- *Copying *anything* without proper acknowledgement, even just one sentence or figure, is considered plagiarism.*
- *Paraphrasing text closely without citation is plagiarism!*
- *In your writing, citing the source alone is not enough — you must also surround any copied text with double quotes ("").*
- Individual work is just that: individual. No code should be exchanged (via whiteboard, email, or over the phone). You probably shouldn't even discuss the assignment with others (but that isn't a strict rule).
- You have teammates for the group project. Thus you have no reason to collaborate with classmates outside of your team.
- If you are stuck; ask for help. Cheating is never the viable solution.
- Lying about participating in service counts as an academic integrity violation. And they tell us attendance anyway, so why would you?
- Why the heck are you in university if you aren't trying to learn? You don't learn by cheating (and frankly it can seriously ruin your career far easier than failing a class).

- The *minimum* consequence for an academic integrity violation is a score of 0 on the assignment and reduction of the final letter grade by one (e.g., A to B) (whichever is worse) and reporting to OSCCR and Khoury College. Repeat violations will result in failing the course.

Regret clause. If you commit some act that violates the academic integrity policy but bring it to the attention of the instructor within 72 hours, we may still give you a 0 grade for the relevant work submitted, but will not report the violation to OSCCR except in cases of repeated violations.

Title IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance. Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including students, faculty and staff of all gender identities. If you or someone you know has been a survivor of a Prohibited Offense, *confidential* support and guidance can be found through [University Health and Counseling Services Links to an external site.](staff) and the [Center for Spiritual Dialogue and Service clergy members Links to an external site.](). By law, those employees are not required to report allegations of sex or gender-based discrimination to the University. Alleged violations can be reported non-confidentially to the Title IX Coordinator within *The Office for Gender Equity and Compliance* at: titleix@northeastern.edu and/or through NUPD (Emergency 617.373.3333; Non-Emergency 617.373.2121). Reporting Prohibited Offenses to NUPD does NOT commit the victim/affected party to future legal action.

Faculty members are considered "responsible employees" at Northeastern University, meaning they are required to report all allegations of sex or gender-based discrimination to the Title IX Coordinator.

In case of an emergency, please call 911.

Project Overview and Assignments:

Project Overview

The goal of the final project is to expose students to the real-world research and design process of doing an in-depth visualization design and implementation. As part of the project each group of ~3 students will need to work with real datasets, complete a task analysis, conduct a fact-finding interview, design and implement an interactive web-based visualization, solicit and incorporate feedback, and communicate the final project and results through a webpage, write a research paper, demo video, and in-class presentation. We will be following the Design Study

"Lite" Methodology advocated by [Borkin et al. (2017) Links to an external site.](#), [Syeda et al. (2020) Links to an external site.](#).

You will spend much of the course working on this visualization project in the service of real users. It is up to you to identify and propose these partners to us, so start thinking now! Who do you know that would benefit from an interactive, web-based data visualization? Acceptable partners include non-profits, governments, and professors & researchers inc. student researchers. A company partner may do in a pinch but the focus is on helping those who don't have the means to help themselves as well. *Just make sure they already have clean data in a machine-readable format, like CSV or JSON, that they are willing to post publicly online!* It can take a really long time for them to go through data cleaning and any privacy implications, and you don't want to wait on that.

Aside from the final project deadline itself, there will be a series of intermediate assignment deadlines incorporated in order to keep students on-track with the workload. Separate documents will be posted and provided to students with additional information and requirements for each assignment deadline. These assignments are worth a substantial portion of the student's final grade.

A detailed rubric will be provided for each assignment rather than a rubric for the project as a whole.

Detailed Requirements

Don't worry if you don't understand all these terms! They will be covered during the course. If you have any questions, please ask in class or post a Discussion on Canvas.

Visualization

The interactive web-based visualization must meet these criteria:

- *Technology*

    -
        o Be created using D3.
        o Not use dashboard generation tools for the final product. E.g., no Tableau Web Player, R Shiny, Plotly Dash.
        o Be able to run on your web page.
        o The visualization is responsive, appropriately resizing to changes in the browser dimensions.
        o Be usable with the latest versions of both Firefox and Chrome.
        o Your code passes the W3 validator.
        o There are no errors in the browser console in Firefox or Chrome.

- The visualization should update within 1 second (ideal target 100ms) of any user interaction, even if to only display partial results, and remain responsive to user inputs during any calculations.
  - You may need to use parallelization, e.g., Web Workers and advanced rendering, e.g., WebGL to achieve this, and/or choose smaller datasets. Try to avoid needing these if at all possible by using smaller datasets.
  - Your visualization will be evaluated on a desktop PC with these specifications: CPU: Intel Core i7-6700K @ 4GHz (4 cores, 8 threads). RAM: 32GB. GPU: NVIDIA GeForce GTX 1080. Network: Wired. Browser: Firefox latest version. OS: Windows 10 Professional. Other running software: Minimal.
- Be stored in a GitHub repository and hosted on your web page using GitHub Pages.
- Each team member must make meaningful commits to the GitHub repository. Every member can contribute differently, but they must all contribute to the code.

- *Programming*

  -
  - The basic template isn't seriously modified. *The template will be provided as part of Project 6 — Sprint 1 & Paper Outline when you begin coding.*
  - You have clear, well-commented, and well-structured code.
  - Comments provide information not present in the code itself and can help organize the code.
  - Proper and consistent indentation. Code inside a block is indented more than outside it.
  - Function and variable names are descriptive of what it does or references and in camel-case (or another consistent scheme).
  - let and const are used instead of var.
  - Semicolons always terminate expressions when possible.
  - Code organized in short, reusable functions and there is little to no code duplication.
  - Functions avoid side effects and global variables.
  - console.log and any other debugging code is removed.

- *Design*

  -
  - Be a bespoke (custom-designed) visualization — not from an off-the-shelf library and the entire design must not be copied from an existing visualization. Individual visualization components may be copied from elsewhere (with attribution).

- o Representation of data is thoughtful combination of useful existing techniques OR is bold and original.
- o Include a minimum of two different views with different visual encodings (this is an inherent requirement for the brushing and linking). How many views and visual encodings employed will depend on the data and tasks.
- o Use an appropriate form of color encoding (i.e., needs to demonstrate that students know how to appropriately use and encode data values with color).
- o Use consistent encodings across views.
- o The visualization must include the following two interactivity concepts: brushing and linking, and details-on-demand. (If you have any doubt about how/if to include these based on your task analysis, please ask the teaching staff).
- o Demonstrate a mature visual and interaction design, with evidence for iterative improvement.
- o Include appropriate legends and explanatory text. Annotations would be amazing but are not required.

- *Effective*

  - o Demonstrate appropriate and effective use of basic visual encodings: spatial layout, color, size, shape…
  - o Provide a fair representation of the underlying data.
  - o Be aesthetically pleasing and clear.
  - o Have few to no usability issues.

- *Data*

  - o Use data set(s) with substance and depth. There is no min/max size requirement.
  - o Present compelling data and convey useful information.

Your web page

Must include the following written sections (our expectations are listed in italics in the template — you can remove this text and formatting):

- **Title:** Just a sentence, followed by a list of group members and the class information per the provided template.
- **Abstract:** Summary of user needs, motivating questions, and solution in simple English (not an academic abstract).
- **The interactive visualization:** Included as part of this page.
- **Demo Video:** Embedded MP4 demo video using the HTML5 `<video>` tag.

- **Research Paper:** Locally hosted PDF of the paper.
- **Acknowledgements:** List here where any code, packages/libraries, text, images, designs, slides, etc. that you leverage come from. *Please see the Academic Integrity Policy on the Homepage / Syllabus for further details.*
- Additional non-required sections may be added to the website to thoroughly explain/frame the final project.

Demo video

Each group will prepare a short demonstration video of their interactive visualization.

- *Submission Requirements*

    - It must be 1–2 minutes long (It can go a little bit longer).
    - The video must include a title slide listing, in this order:
        - The name of the project, i.e., Project Group #: Topic with your group number '#' and topic.
        - The full names of the group members

- *Content*

    - The video should include a video screengrab (e.g., with Camtasia) of their visualization in-action.
    - The video should clearly step the viewer through how to use the tool in enough detail to understand encodings, data, interactions.
    - The video must include audio narration which is clear, loud enough, and contributes to the explanation.
    - The video must include annotations to highlight areas of interest.
    - Overall, the video should be enough for the viewer to understand the software and demonstrate the major components.

- *Format*

    - The video should be encoded with the H.264/MPEG-4 AVC codec. You can use Handbrake Links to an external site. to convert between formats.
    - The video should be high enough resolution (≥ 1920x1080 — 1080p) and 16x9 aspect ratio with few to no compression artifacts (e.g., text and thin lines should be clearly readable). Letterboxed or upscaled video does not meet the requirements.
    - It must be embedded on your web page using the HTML5 `<video>` tag.

In-class presentation

Each group will prepare a short in-class presentation.

- The presentation should be ~7 minutes in duration (cannot exceed 11 minutes including Q&A).
- Pending time constraints, each group will have ~4 minutes after their allotted presentation time to answer questions from the audience and receive feedback. Additional feedback will be provided by the instructional staff afterwards in writing.
- Each member of the group must speak for approximately equal portions of the presentation.
- The presentation must include either a live-demo of the visualization, or a pre-recorded video demonstration of the visualization (e.g., the same demo video you submitted but with no audio — narration must be live). **Demo video option highly recommended.
- The presentation must be created using Google Slides and should not require any local files. I.e., any member of your team or the teaching staff should be able to run all your presentation materials. ~~We will use the classroom PC, so make sure you do not require any local files. (Not applicable during COVID-19.)~~ Presentations will be conducted synchronously over Zoom, so using Google Slides ensures that if you are unable to share your screen the teaching staff can instead.

Written Report

Each group will prepare a written research paper to accompany their visualization.

The specific type of paper we will be writing is called a *design study*. See Syeda et al. (2020) Links to an external site., Sedlmair et al. (2012) Links to an external site., and Lam et al. (2017) Links to an external site.for high-level overviews. Below, you can see examples of previous student design studies.

- We require the following sections:
    - Abstract
    - Introduction
    - Related Work
    - Partner
    - Data
    - Task Analysis
    - Execution and Design Process
    - Visualization Design: Visual encoding and interaction description and justifications.
    - Discussion
    - Conclusion
    - Acknowledgements

- o References
- o Appendices: Required appendices for intermediate / supplementary work.
- o Additional sections may be added to the paper to thoroughly explain/frame the final project.

- The paper should be composed as if it were to be submitted to the VIS 2021 conference short papers track
  - o Teams that produce strong papers may be encouraged to polish and submit their work to VIS ~2021-07-13 or another appropriate venue, which could result in an academic publication. From our most recent PhD-level course, 4 out of 8 teams were encouraged to submit to VIS, 3 of those did so, and 2 of those were accepted!
  - o See the previous VIS 2020 CFP Links to an external site.for details. VIS is the premier venue for visualization research.
  - o The report should be composed utilizing the template for VGTC **conferences**. The LaTeX template is available on Overleaf Links to an external site. — our recommended approach for collaborative paper writing — but both LaTeX or Word are available from IEEE Links to an external site..
  - o The page limit is 4 pages, excluding references.

Other requirements

- Student groups will work with a partner of their choice. Academic researchers are acceptable partners as long as they are not in the class.
- The data / visualization should address an interesting question relevant to the partner or their users.

Project 1 — Initial Idea Pitches & Related Work

Aim of the assignment:

Each student must come up with a course project idea to post on Canvas and pitch in-class on W 2020-09-30. The idea should be as fully-formed as possible so as to better (1) receive meaningful feedback early from the other students and teaching staff and (2) assist in project group formation. We want to you to get started on the projects as soon as possible so as to increase your odds of completing something substantial, meaningful, and novel during the course.

Background information:

Please review the [Project Overview](#) document and our in-class project discussions for a refresher on what we expect from your projects. The requirements listed there must be met unless you have approval from the instructor to do a differentiated project.

Please also check out any comments other people leave on this discussion post for some ideas.

Instructions:

1. Identify an area you are interested in.

Ideally your project will be relevant to your research, career, public, or personal interests. Find an area to focus your exploration. Ensure that there are real challenges in this area that could be aided with data visualization.

2. Identify a partner.
Find a partner working in your chosen area. It can be an individual, a group, or an organization — but you should have one individual partner you can depend on.

Any of the following partner's would be acceptable, but this list is non-exhaustive:

- An academic or industry researcher at any level including faculty, scientists, post-docs, or PhD students.
- A non-profit organization.
- A government body.
- A campus organization.
- A for-profit company (adds intellectual property and publishing challenges — only select as a last resort).

Ensure that they have the time and commitment necessary to meet with you several times throughout the semester, especially at the beginning for an interview, and to give you any data/materials you need. *Ensure that they know that your project pitch may not actually become a course project. Only ~1/3 of the pitches will turn into projects.*

3. Identify a dataset.
Find the data you will visualize that will help your partner solve their problems and matches the project innovation.

The data should already exists in a clean, machine-readable, and available-to-you form. If you don't have easy access to clean data you will not be able to make good progress.

If you generate/collect your own data, you should have a "back-up plan" in case the data generation/collection fails. You also will not receive additional credit for generating/collecting your data.

You should not accept timeliness promises from people providing your data. Only trust that you will have the data that you already have in-hand. E.g., these situations are notorious for taking way longer than expected or completely failing to work:

- "It will be ready soon" as it needs de-identification, cleaning, data entry, or algorithm development.
- "It won't take long" to get the necessary legal/managerial approval to release the data to you. Note that a small organization or startup can actually be trusted more to move quickly but anything large is probably a non-starter.

4. Find related work.
Search for academic literature and state-of-the-art tools related to the problems you're trying to solve with your project.

- Identify at least 4 good references.
- Focus primarily on current, relevant, peer-reviewed literature from high-quality visualization research venues Links to an external site.such as IEEE VIS (InfoVis, VAST, SciVis), TVCG, CHI, EuroVis, and CGF.
- The work most relevant to your project may be a technique applied in a different domain but that would be transferable to yours.

5. Write your pitch as a top-level reply to this discussion.
Being as complete as possible, write up a description of your project in detail. Ensure that you cover each of the points above in sufficient detail that the teaching staff and other students can understand what you want to do and provide feedback. Make sure to discuss the relevance of the related work, don't just cite it.

If there is additional background information that would be relevant please include them. E.g., tools you'd use, sketches, images, examples of existing solutions.

There is a limit of 400 words.

6. Prepare a 1-minute elevator pitch to give in-class.

Each student will have 1 minute to pitch their idea and 1 minute for questions.

Note that due to the time limitations we won't be able to use slides on the projector. However, you are welcome to use notes for yourself ~~and to bring physical visual aids like posters (Not during COVID-19)~~. You can also refer interested students to your Canvas post for more detail.

Make sure to say your name clearly at the beginning and end of your pitch. This will help students interested in your project find you on Canvas later.

You will present in ~~reverse alphabetic order by last name~~ the chronological order of posts in this discussion.

Submission instructions:

- Post a top-level reply to this discussion on Canvas.
- Present in-class on W 2020-09-30.

Project 2 — Proposal, Related Work, & Group Charter

- **Due** Oct 6, 2020 by 11:59pm,
- **Points** 10

Aim of the assignment:

Organize yourself into groups for the course project and propose what you want to work on for the semester. The proposal should be as complete as possible so you can receive meaningful feedback early. We want to you to get started on the projects as soon as possible so as to increase your odds of completing something substantial, meaningful, and novel during the course.

Each group will also create a group charter to help manage your expectations of each other and set up the logistics of collaboration. The group will write and agree upon their charter together.

Background information:

Please review the Project Overview document and our in-class project discussions for a refresher on what we expect from your projects. The requirements listed there must be met unless you have approval from the instructor to do a differentiated project.

Also refer to the guidance on selecting projects and partners in Project 1 — Initial Idea Pitches & Related Work.

You will have time in-class on M 2020-10-05 *to organize yourselves into groups and work on this*, but we encourage you to reach out promptly after the pitches to start making progress.

Instructions:

1. Identify the project and group

After the pitches in-class on W 2020-09-30 decide what project you want to pursue and who you will do it with.

Refer to the posts in Project 1 — Initial Idea Pitches & Related Work and your notes from the in-class pitches. Ideally your project will be relevant to your research, career, public, or personal interests. Find an area to focus your exploration. Ensure that there are real challenges in this area that could be aided with data visualization.

- Coalesce into project groups of ~3 members.
    - *> 3 members: Extremely unlikely to be approved.*
    - 3 members: Ideal
    - *2 members: Unlikely to be approved.*
    - *1 member: Will not be approved.*
- Claim one of the Project Groups we have created on Canvas.
    - *One person* needs to claim a group which you will use for submitting assignments together. This will be the *group leader* on Canvas. Follow the instructions in the Canvas documentation Links to an external site.about how to join a group. Pick the lowest indexed group available. E.g., if `Project Group 01 — `already has members pick `Project Group 02 — `.
    - *The group leader* should then rename the group Links to an external site.to have a short but descriptive suffix while keeping the `Project Group ## — ` prefix, where ## was the original integer there. E.g., `Project Group 07 — Painting Provenance Vis`.
    - Every group member should then join the group Links to an external site.. You are only allowed to be a member of one group but can switch initially.

2. Write your proposal

Take your ideas from Project 1 — Initial Idea Pitches & Related Work and flush them out into a proper proposal.

- Formatting instructions:
  - Use the same VGTC **conference** template you will be using for the final project writeups.
    - You have a few template options:
      - The LaTeX template is available on Overleaf Links to an external site., our recommended approach for collaborative paper writing. Note that a free account lets you collaborate by link sharing Links to an external site., but a paid student account at $8/mo Links to an external site.gets you more advanced collaboration and other features. Only the person creating the project on Overleaf needs to have the paid account to get the associated features.
      - Both LaTeX or Word templates are available from the publisher Links to an external site..
    - You can see one of our published course projects Links to an external site.as an example for how we expect it to be formatted.
  - Use a reasonable title and include all group members at the top.
  - Ensure all your references have hyperlinked DOIs that are clickable. For the LaTeX template, you can do this by ensuring the DOI is in the BibTeX and at the end of template.tex comment this line
    `\bibliographystyle{abbrv-doi}`
    and uncomment this one:
    `\bibliographystyle{abbrv-doi-hyperref}`
  - You are limited to *1 page* but you can have *unlimited pages for:*
    - the references (just the reference list, not the Related Work section),
    - images (not just of text ☺), and
    - the group charter.

- Write these sections in this order:
  - **Abstract**
    This should be a high-level overview ~80 words.
  - **Introduction**
    Briefly describe the project topic and motivation.
  - **Related Work**
    Identify at least 10 good references (6 beyond the pitch).

- Focus primarily on current, relevant, peer-reviewed literature from high-quality visualization research venues Links to an external site.such as IEEE VIS (InfoVis, VAST, SciVis), TVCG, CHI, EuroVis, and CGF.
- The work most relevant to your project may be a technique applied in a different domain but that would be transferable to yours.
- Cite and describe the relevance of these papers. *You do not need to understand these papers in depth (yet).*

- **Partner**
  Describe your partner. You will need to interview them as part of the project, but they should be available to help you understand the problem, domain, and data.
- **Data**
  Explicitly identify what data you will be using for your project, or what data you will be generating/collecting. Hyperlink to it if possible.
- **Execution Plan & Preliminary Work**
  Describe what you plan to do and what technologies you'll need. Also detail any preliminary work that exists. Note that *you need not have done preliminary work*, but if you have include details and images here.
- **References**
  Automatically generated from BibTeX for your citations or manual citations using Word.
- **Group Charter**
  See the content instructions below. Insert this after the References section on a new page. E.g., in LaTeX:
  `\bibliography{template}`
  `\clearpage`
  `\section{Group Charter}`

3. Write a group charter

Please write up your group charter in the same document (see above) and address these key questions. Feel free to add/address more than these guiding questions!

- *Group Purpose:* State the reasons for this group's formation and the group's purposes. Who are your stakeholders / intended users, and what are their expectations of and for the group? (You don't need to reiterate details in the proposal, just anything additional.)
- *Group Goals:* What are the group's project, process, and quality goals? To what level of performance are group members willing to commit, and what course grade are you collectively aiming for? Articulating these goals will make a difference in your group's performance.

- *Group Member Roles/Responsibilities:* While some group responsibilities are shared by all members, collaborative groups work best when members also have unique roles and responsibilities. These could be technical and/or project management related, e.g., group leader, meeting facilitator, documentation coordinator, information manager, point person for sponsor/advisor communications, etc. Consider these assignments carefully.
  Each group is required to identify a "communications director" in the group. This group member will be *the only person* responsible for all email communications between the group and the partner person/organization as well as between the group and us on final project related matters.
- *Ground Rules:* How and when will this group meet? What are the norms and ground rules the group will agree to? How will you conduct discussions and make decisions? How will you handle dissenting views among members? How will you hold each other accountable for living by these rules and for task completion? What kind of participation and level of commitment do you expect from one another?
- *Potential Barriers and Coping Strategies:* What barriers to effective group work might potentially arise in the course of completing your project and other group obligations, and how will you handle them if they materialize? What problems with group dynamics have you experienced in the past, and how will you handle them if they come up again?
  Throughout your project assignments, if you feel like a member is not fulfilling their responsibilities, or a member is unavailable or drops out of the course, please contact us *as soon as possible*. We can't fix things easily at the end of the course, but we could help course-correct early.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to add or change highlighted **in red**.
    - **Abstract**
    - **Introduction**
    - **Related Work**
    - **Partner**
    - **Data**
    - **Execution Plan & Preliminary Work**
    - **References**
    - **Group Charter**

-
- Submit the PDF by uploading it to this assignment on Canvas.

Project 3 — Interview & Task Analysis

- **Due** Oct 20, 2020 by 11:59pm
- **Points** 10

Aim of the assignment:

In this assignment you will learn about conducting interviews and performing task analyses. You will also better understand the motivating questions and tasks of your target user. This information will help guide you in the design of your visualization and the analysis of your data.

Background information:

Please review the [Project Overview](#) document and our in-class project discussions for a refresher on what we expect from your projects. The requirements listed there must be met unless you have approval from the instructor to do a differentiated project.

Also refer to the guidance on selecting projects and partners in Project 1 — Initial Idea Pitches & Related Work.

Instructions:

1. Interview your project partner

- Each final project group needs to interview their individual partner or a representative of their partner organization. The goal of the interview is to learn about the partner's target users, their mission, the data they will be analyzing, the user motives for analyzing the data, the possible insights the user is looking for in the data, and what data analysis and visualization work the partner or their users have already completed. The answers to these questions and your interview notes will be the basis for second part of this assignment in which you will need to extract and categorize tasks for your visualization.
  Your group should conduct the interview with your partner ~~in person (not during COVID 19)~~ via video call well before the assignment deadline so you have time to complete the task analysis and abstraction (below). *If you are unable to arrange to meet with your partner in time please contact the Service-Learning TA and Instructor ASAP.*
- As soon as you have a scheduled interview meeting with your partner, email the main TA (David) the name and email address of your interviewee.
- For the interview we recommend having a designated interview leader as well as a designated note taker. Make sure to do some pre-reading about your partner and come prepared with some questions. After your interview review your notes as a group. *Make sure you focus on learning about the goals and tasks of the target end users, who may be different from the partner themselves!*
- In the same document you submitted to Project 2 — Proposal, Related Work, & Group Charter *each person on the team* should update the **Partner** section, writing their own paragraph to reflect these points:
  - How did the interview go?
  - What did you learn?
  - What were you surprised by during the interview?
  - Has the interview changed your motivating questions?
- In a new **Appendix A: Interview** section in the document include a scanned (or smart-phone photographed) copy of your group's notes.

2. Task analysis and abstraction
Here you will characterize the tasks for your project.

- Create a new **Task Analysis** section right after the **Data** section in the same document you submitted to Project 2 — Proposal, Related Work, & Group Charter.
- Construct a "Tasks" table for your high-level user goals following this outline and using the task taxonomy in Munzner's VAD book, Chapter 3. These are pictured in Figure 3.2 (PDF) Links to an external site..

Here is example LaTeX code to get started. Using LaTeX table edit tools Links to an external site.can help you edit easily.

```
\begin{table*}[t]
\centering
\begin{tabular}{lllll}
\textbf{Task ID \#} & \textbf{Domain Task} & \begin{tabular}[c]{@{}l@{}}\textbf{Analytic Task}\\\textbf{(low-level,
"query")}\end{tabular} & \begin{tabular}[c]{@{}l@{}}\textbf{Search Task}\\\textbf{(mid-level)}\end{tabular} & \be
gin{tabular}[c]{@{}l@{}}\textbf{Analyze Task}\\\textbf{(high-level)}\end{tabular} \\
1 & Examining a phylogenetic tree, which species are classified as mammals? & Filter & Locate & Present \\
... & ... & ... & ... & ...
\end{tabular}
\caption{Domain task and abstract tasks.}
\end{table*}
```

- First fill-in the "Domain" task column which represents all the tasks your user wants to accomplish with the data/visualization. Make sure to rank the tasks from most to least important, top to bottom.
- Next translate these domain tasks into computer science terminology by identifying what low-, mid-, and/or high-level tasks it represents. Make sure to fill in each cell of the table! The original paper (Brehmer and Munzner, 2013 Links to an external site.) specifies that "Complete task descriptions … must include nodes from all three parts of this typology."
- Reviewing your tasks, will your visualization be primarily developed for which type of consumption: "discover" (i.e., exploratory visualization), "present" (i.e., communicative visualization), or "enjoy: (i.e., entertainment/art visualization)? Write a few sentences (3-4) and justify your choice.
- Along these lines, who will be the primary consumer of your visualization (e.g., scientists, partner/organization members, volunteers, funding agencies, public, etc.)? Write ~2 sentences.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to add or change highlighted **in red**.
    - **Abstract**
    - **Introduction**
    - **Related Work**
    - **Partner**
    - **Data**
    - **Task Analysis**
    - **Execution Plan & Preliminary Work**
    - **References**

- o **Group Charter**
- o **Appendix A: Interview**
- Submit the PDF by uploading it to this assignment on Canvas.
- Note that there is no page limit any more.

Project 4 — Data Collection & Exploration, Sketches

- **Due** Oct 27, 2020 by 11:59pm
- **Points** 8

Aim of the assignment:

In this assignment you will (1) perform a preliminary data exploration to understand what kind of features the data for your project will have and (2) create preliminary sketches of what visualizations you may want to create for your project. Through this practice, you will learn more about doing data exploration and design sketching.

Background information:

Data exploration is an important step in any visualization project to make sure you understand all of your data, know what type of data you are working with, look for missing data or errors (i.e., dirty data), and start to identify interesting patterns or trends. Things are rarely as simple as you expect.

Sketching and design iteration is also an important step, in which you think through possible solutions based on your task analysis and real or example data exploration. Before selecting a visualization to build it is important to iteratively explore a large design space. Moreover, by

creating sketches individually rather than together you help encourage creativity and avoid premature design selection. Furthermore, working by hand on paper allows you much more freedom of expression and creativity than electronic tools support. Using electronic tools can artificially limit your design space to what your tools easily support and reduce how many iterations you do.

Please review the Project Overview document and our in-class project discussions for a refresher on what we expect from your projects. The requirements listed there must be met unless you have approval from the instructor to do a differentiated project.

Instructions:

Follow the instructions below, including the specified material in the same document you've been writing for Project 2 — Proposal, Related Work, & Group Charter and Project 3 — Interview & Task Analysis.

1. Data exploration:

In a new **Appendix B: Data Exploration** section at the end of the document (after the references and any previous Appendices) write your answers to the below prompts, using the first italic part of the prompt as subsection names.

- *Data types:* Review the data and answer the following:
    - What type of data is in each column? [categorical, ordinal, or quantitative]
    - Write a few sentences (3–5) summarizing overall what data you are working with and how the data was collected/generated (e.g., survey, statistical, internal revenue, etc.).

- *Potential issues:* While reviewing the data, look for missing data, variables you are confused about, missing metadata, etc.
    - *If you are confused about the data, email your users/partner organization contact ASAP to get answers to your questions.*

- *Insights:* Load your data into Tableau, Altair, or another relevant visual data exploration tool we approve. Make sure each variable is categorized appropriately, e.g., as a measure or dimension in Tableau. Start exploring! You can do this individually and then meet-up as a group to review your preliminary insights and thoughts, or you can do it sitting down together from start-to-finish.

    As a group, write a couple paragraphs (~8 sentences) summarizing your data exploration experience and preliminary insights.
    - What trends and patterns do you see? Did anything surprise you during the exploration?
    - Did you identify any further errors or messy/confusing data past what you noted in *Potential issues*? *If so, sort it out ASAP if possible!*

- *Screenshots:* Take screenshots or export image files of at least 3 interesting plots you generated as part of your data exploration and include them as a figure. Write 3-4 sentences for each visualization in the figure caption to explain:
    - What data, or subset of data, you were exploring.
    - What visual encoding(s) you used and why.
    - What trend or pattern (or lack of trend/pattern!) does the visualization show.

2. Individual design sketching (broadening)

Each member of the group should individually create three distinct sketches for what they think might be a good visualization option for the final project.

- *These sketches should be made by hand using pen/pencil/marker on white paper and using no electronics*, just like we do in the in-class redesign exercises. You will not be graded on artistic skill.

In a new **Appendix C: Design Sketches** section at the end of the document (after the references and any previous Appendices) include a photo or scan of each of the sketches as a figure with the caption explaining:

- The artist's name.
- A couple sentences about why you chose those particular marks/channels and encoding(s) for your design.
- What tasks in your task table (Task Analysis section) the visualization addresses.

3. Group selection & motivation (winnowing)

As a group, discuss the sketches and identify your 3 favorites.

In **Appendix C: Design Sketches:**

- Mark each selected favorite clearly with `Favorite` at the beginning of the caption.
- Write 2–3 paragraphs indicating why you chose the favorites, explaining them further, and motivating them in the context of your previous assignments. These explanations must make clear why this particular visualization is appropriate for the given data and tasks grounded in the theory we have learned in class.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to add or change highlighted **in red**.
    - **Abstract**
    - **Introduction**
    - **Related Work**

- o **Partner**
- o **Data**
- o **Task Analysis**
- o **Execution Plan & Preliminary Work**
- o **References**
- o **Group Charter**
- o **Appendix A: Interview**
- o **Appendix B: Data Exploration**
- o **Appendix C: Design Sketches**

- Submit the PDF by uploading it to this assignment on Canvas.
- Note that there is no page limit any more.

Project 5 — Final "Interactive" Visualization Sketch, Implementation Plan, & Group Charter

- **Due** Nov 3, 2020 by 11:59pm
- **Points** 12

Aim of the assignment:

Now that your group has explored your data and sorted through your preliminary sketches, it is time to winnow further and create your final sketch! Unlike previous assignments, *this should be done with electronic tools.*

Background information:

As you create your final visualization, please reference your previous deliverables. In particular, review your target user tasks & goals, your previous visualization sketches, and your data exploration.

Instructions:

Follow the instructions below, including the specified material in the same document you've been writing for previous project assignments.

1. Digital Sketches

Working off-of your group's favorite preliminary sketches, create the final cohesive sketches for your final project.

- Instead of a pen-and-paper sketch, these sketches should be created digitally on the computer. Feel free to use any software (e.g., Powerpoint, Keynote, Illustrator, InkScape) and hardware (e.g., touchscreen stylus, graphics tablet) you like to create the sketches. *They should be polished, professional, and complete.*
- You can include images exported from existing visualization tools like Tableau and Altair.
- The sketches should demonstrate the interactive components of the visualizations as well. For example, see [this sketch from Borkin et al. (2011) Links to an external site.](#).
- This visualization must meet the requirements specified in the [Project Overview](#) document, e.g., bespoke, minimum two different views with different visual encodings, appropriate color, consistent encodings, brushing & linking, details on demand, legends and explanation.

In a new **Appendix D: Digital Sketches** section at the end of the document (after the references and any previous Appendices):

- Include your sketches.
- *W*rite ~200 words which summarizes:
    - What tasks in your task table (Task Analysis section) does the visualization addresses? Are there new ones you should add?
    - Which tasks you chose to prioritize for your design and how your design helps the user complete these tasks.
    - Has anything else changed from your previous plans?

2. Execution Plan:

Revise your **Execution Plan** section according to your new sketches, making sure it contains the following information:

- Make a list of all the visual encodings (visualizations/plots/charts) you will need to create for your final project.
- Make a list of all the interactions and interactive components (e.g., brush/link, zoom, highlighting, filtering, etc.) you will need to implement in your final project.
- Annotate and organize which items are required/necessary for your final project, and which items are "nice to have" items. (This will help you prioritize your execution plan.)
- Please also include a short paragraph summarizing how you plan to implement your visualization and whether you will be using any particular libraries or APIs.
- If your project requires server-side components — e.g., to run a model and provide a REST API for the results — make sure to list the requirements here.

3. Group charter:

Now that your group has had a couple weeks to work together, please meet as a group and re-visit your group charter.

Add a new section to your group charter addressing the following points in at least a few sentences:

- Have you all been abiding by your agreed-upon guidelines?
- Do you all feel comfortable with the group roles?
- Are there any problems you need to troubleshoot, and how can you address them?

If necessary, write an amended group charter to address any problems.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to add or change highlighted **in red**.
    - **Abstract**
    - **Introduction**
    - **Related Work**
    - **Partner**
    - **Data**
    - **Task Analysis**
    - **Execution Plan & Preliminary Work**
    - **References**
    - **Group Charter**
    - **Appendix A: Interview**
    - **Appendix B: Data Exploration**
    - **Appendix C: Design Sketches**
    - **Appendix D: Digital Sketches**
- Submit the PDF by uploading it to this assignment on Canvas.

Project 6 — Sprint 1

- **Due** Nov 10, 2020 by 11:59pm
- **Points** 8

Aim of the assignment:

Now that your group has planned the implementation for your visualization, it is now time to start programming!

Background information:

Your project must meet the requirements specified in the [Project Overview](#) document. Make sure you review and address any feedback you receive.

Instructions:

1. Templates

- **Do not seriously modify the basic templates (paper or website)**, e.g., don't reorder the sections, change the fonts, change the margins, etc. without checking with the teaching staff. We want everything consistent and clean.
- If you find any problems with the template please post a discussion on Canvas and the teaching staff will assist.

2. GitHub Classroom setup

- **GitHub Classroom invitation link:**
  - https://classroom.github.com/g/JHpn2veW Links to an external site.

- You can join an existing group if someone on your group has created one already. If not, you need to create it. Ensure it is titled 'Group ## — Topic' with '##' replaced by your group number and 'Topic' replaced by your topic. It should match your group name on Canvas. More details on [how to join a group are here Links to an external site.](#).
- Your repository will be automatically created by prefixing the assignment name to your group name.
- The template gives you a good starting point for your project. I.e., you don't have to reinvent the basic CSS layout, responsive resizing, formatting, etc. details.
- Make sure to follow our general instructions and policies for GitHub Classroom assignments like this one:

3. Implement

- Based on your **Execution Plan & Preliminary Work** and **Appendix D: Digital Sketches**, begin programming! As you go fill in the web page and your paper using the templates. At a minimum by the due date of this assignment (progress past what is described below is encouraged) you should have the following in the repository:

  1. Data uploaded.
  2. At least one static initial visualization coded in D3 included loading real data.
  3. You followed any further instructions in the `README.md` file.

4. Paper Writing

- Add a clickable hyperlink to your GitHub Classroom-generated repository (not your GitHub Page) at the end of the paper abstract.
- Create a new section titled **Visualization Design** in the same document you've been writing, right after **Execution Plan & Preliminary Work**.
- Feel free to begin populating this section with your design choices, but it isn't necessary yet.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to add or change highlighted **in red**.
  - **Abstract**
  - **Introduction**
  - **Related Work**
  - **Partner**

- o **Data**
- o **Task Analysis**
- o **Execution Plan & Preliminary Work**
- o **Visualization Design**
- o **References**
- o **Group Charter**
- o **Appendix A: Interview**
- o **Appendix B: Data Exploration**
- o **Appendix C: Design Sketches**
- o **Appendix D: Digital Sketches**
- Submit the PDF by uploading it to this assignment on Canvas.

Project 7 — Sprint 2 & Paper Draft

- **Due** Nov 17, 2020 by 11:59pm
- **Points** 12

Aim of the assignment:

Make substantial progress on your project visualization, especially with getting your additional visualizations prepared.

Background information:

Your project must meet the requirements specified in the Project Overview document. Make sure you review and address any feedback you receive.

Instructions:

1. Templates

- **Do not seriously modify the basic templates (paper or website)**, e.g., don't reorder the sections, change the fonts, change the margins, etc. without checking with the teaching staff. We want everything consistent and clean.
- If you find any problems with the template please post a discussion on Canvas and the teaching staff will assist.

2. Implement

Continue working in your GitHub repository from Project 6 — Sprint 1.

Based on your **Execution Plan & Preliminary Work** and **Appendix D: Digital Sketches**, continue programming! As you go fill in the web page and your paper using the templates.

- At a minimum by the due date of this assignment (progress past what is described below is encouraged) you should have the following in the repository:
  - All the deliverables from previous sprints.
  - All your visualizations coded in D3 included loading real data. They may be static rather than interactive. *Only 2 is ok.*
- Further progress is encouraged, especially beginning to implement brushing and linking. Refer to [Assignment 8 — Brushing and Linking in D3](#) for an example on how to do that.

Submission instructions:

- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows. Edit particular sections as needed.
  - **Abstract**
  - **Introduction**
  - **Related Work**
  - **Partner**
  - **Data**
  - **Task Analysis**
  - **Execution Plan & Preliminary Work**
  - **Visualization Design**
  - **References**
  - **Group Charter**
  - **Appendix A: Interview**
  - **Appendix B: Data Exploration**
  - **Appendix C: Design Sketches**
  - **Appendix D: Digital Sketches**
- Submit the PDF by uploading it to this assignment on Canvas.

Project 8 — Sprint 3 & Prep for Usability Testing

- **Due** Nov 24, 2020 by 11:59pm
- **Points** 16

Aim of the assignment:

Have a complete draft of your project visualization, with all expected visualizations and interactivity implemented.

Background information:

Your project must meet the requirements specified in the [Project Overview](#) document. Make sure you review and address any feedback you receive.

Instructions:

1. Templates

- **Do not seriously modify the basic templates (paper or website)**, e.g., don't reorder the sections, change the fonts, change the margins, etc. without checking with the teaching staff. We want everything consistent and clean.
- If you find any problems with the template please post a discussion on Canvas and the teaching staff will assist.

2. Implement

Continue working in your GitHub repository from [Project 6 — Sprint 1](#).

Based on your execution plan, continue programming and filling in sections using the template.

- At a minimum by the due date of this assignment you should have the following in the repository:
  - All the deliverables from previous sprints.
  - All your visualizations coded in D3 included loading real data.

o Interactivity works as required **including brushing and linking**.
- Further progress is encouraged.

2. Prepare for usability testing

The next assignment will be about performing an usability test of your project. Members of other groups will be testing your project, and give you comments and suggestions about it. Therefore, your project should be ready to be tested by somebody else by the due date.

- Post a link to your online project page in a top level comment in [this discussion](#).
- Make sure the state of your project is not too confusing. If you need to write explanations to explain details that are still incomplete, do so in the same comment where you post the link.

Submission instructions:

- Submit a comment [in the discussion](#) containing the URL of your webpage.
- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows. Edit particular sections as needed.
    o **Abstract**
    o **Introduction**
    o **Related Work**
    o **Partner**
    o **Data**
    o **Task Analysis**
    o **Execution Plan & Preliminary Work**
    o **Visualization Design**
    o **References**
    o **Group Charter**
    o **Appendix A: Interview**
    o **Appendix B: Data Exploration**
    o **Appendix C: Design Sketches**
    o **Appendix D: Digital Sketches**
- Submit the PDF by uploading it to this assignment on Canvas.

Project 9 — Presentation and Video

- **Due** Dec 6, 2020 by 11:59pm
- **Points** 32

Aim of the assignment:
Have a complete draft of your project visualization, with all expected visualizations and interactivity implemented.

Background information:

Your project must meet the requirements specified in the Project Overview document. Make sure you review and address any feedback you receive.

Instructions:

1. Templates

- **Do not seriously modify the basic templates (paper or website)**, e.g., don't reorder the sections, change the fonts, change the margins, etc. without checking with the teaching staff. We want everything consistent and clean.
- If you find any problems with the template please post a discussion on Canvas and the teaching staff will assist.

2. Implement

Continue working in your GitHub repository from Project 6 — Sprint 1, doing anything necessary to prepare for your presentation in class.

Based on your execution plan, continue programming and filling in sections using the template. Your project should be close to completion when you submit this assignment.

3. Write

Revise the full text of your PDF (excluding the Group Charter section and the appendix) so that, instead of the PDF of a work in progress, it becomes the final report of your project.

- Focus especially on the **Visualization Design** section, adding details about the current state of your project, with appropriate justifications for your choices and if you ended up changing elements.
- Describe both the appearance of your visualizations and how the interaction works.
- Update the **Introduction** and **Abstract** accordingly, summarizing the work you did after writing them.
- Make sure to include at least one screenshot of the current state of the visualization.

3. Reflect

In a new **Appendix E: Reflections**, each of you should write a paragraph prefixed with your name describing the communication process throughout the project. What methods of communication have you been relying on (with your group, with your community partner)? What has been going well regarding communication with your partner? What could be improved upon?

4. Video

Record a short demonstration video of your interactive visualization. The requirements here are copied from the [Project Overview](#) document:

- *Submission Requirements*

    - It must be 1–2 minutes long (It can go a little bit longer).
    - The video must include a title slide listing, in this order:
        - The name of the project, i.e., Project Group #: Topic with your group number '#' and topic.
        - The full names of the group members.
        - The text DS 4200 Fall 2020 — Prof. Cody Dunne, Northeastern University

- *Content*

    - The video should include a video screengrab (e.g., with Camtasia) of the visualization in-action.
    - The video should clearly step the viewer through how to use the tool in enough detail to understand encodings, data, interactions.
    - The video must include audio narration which is clear, loud enough, and contributes to the explanation.
    - The video must include annotations to highlight areas of interest.

- Overall, the video should be enough for the viewer to understand the software and demonstrate the major components.

- *Format*

  o The video should be encoded with the H.264/MPEG-4 AVC codec.
  o The video should be high enough resolution (≥ 1920x1080 — 1080p) and 16x9 aspect ratio with few to no compression artifacts (e.g., text and thin lines should be clearly readable). Letterboxed or upscaled video does not meet the requirements.
  o It must be embedded on your web page using the HTML5 `<video>` tag.

5. Presentation

Prepare a presentation to give in class. The requirements here are copied from the Project Overview document:

- The presentation should be ~7 minutes in duration (cannot exceed 11 minutes including Q&A).
- Pending time constraints, each group will have ~4 minutes after their allotted presentation time to answer questions from the audience and receive feedback. Additional feedback will be provided by the instructional staff afterwards in writing.
- Each member of the group must speak for approximately equal portions of the presentation.
- The presentation must include either a live-demo of the visualization, or a pre-recorded video demonstration of the visualization (e.g., the same demo video you submitted but with no audio — narration must be live). **Demo video option highly recommended.
- The presentation must be created using Google Slides and should not require any local files. I.e., any member of your team or the teaching staff should be able to run all your presentation materials. ~~We will use the classroom PC, so make sure you do not require any local files. (Not applicable during COVID-19.)~~ Presentations will be conducted synchronously over Zoom, so using Google Slides ensures that if you are unable to share your screen the teaching staff can instead.

Additionally:

- In a new **Appendix F: Slides** add a link to your slideshow. Also add a link to the slides on your web page.
- Be explicit about the contribution of the work, and highlight the key features of the tool.

- Introduction must be attention-getting, lay out the talk well, and establish a framework for the rest of the presentation. Conclude by summarizing the presentation.
- All team members must have the same amount of time to present (no team member ≥ 1.5X another).
- We will be presenting using Zoom. Have one of your team prepared to share their screen when your team is called on to present. We strongly recommend you share the entire screen rather than just one application. This helps prevent issues with videos, live demos, etc. not getting displayed.

Submission instructions:

- Embed the video in your webpage using the HTML5 <video> tag.
- Create a PDF from your document and ensure it contains everything required above. The structure of sections should be like follows, with key parts to change highlighted **in red**.
    - **Abstract**
    - **Introduction**
    - **Related Work**
    - **Partner**
    - **Data**
    - **Task Analysis**
    - **Execution Plan & Preliminary Work**
    - **Visualization Design**
    - **References**
    - **Group Charter**
    - **Appendix A: Interview**
    - **Appendix B: Data Exploration**
    - **Appendix C: Design Sketches**
    - **Appendix D: Digital Sketches**
    - **Appendix E: Reflections**
    - **Appendix F: Slides**
- Submit the PDF by uploading it to this assignment on Canvas.

Project 10 — Final Project Deliverables and Sharing with Partners

- **Due** Dec 15, 2020 by 11:59pm
- **Points** 8

Aim of the assignment:

This is the final assignment of the course. The aim of this assignment is to have a polished final visualization and report that complies with the requirements specified in the [Project Overview](#) document. We want to make sure that:

1. You have made a positive change in the community by creating a web page and visualization that your project partner can actually use to their benefit.
2. You have a polished product you can add to your portfolio to share with future employers.

Background information:

You have received project feedback from the teaching staff, during usability testing, and on your presentations. Use this as much as you can to improve your submission.

Instructions:

1. Templates

- **Do not seriously modify the basic templates (paper or website)**, e.g., don't reorder the sections, change the fonts, change the margins, etc. without checking with the teaching staff. We want everything consistent and clean.
- If you find any problems with the template please post a discussion on Canvas and the teaching staff will assist.

2. Implement / Upload / Clean

Continue working in your GitHub repository from [Project 6 — Sprint 1](), doing anything necessary to finalize your visualization code.

Based on your plans and feedback work to finalize the code, text, video, and any other materials for your web site. Ensure everything is usable! We are going to deduct points for bugs & usability issues.

Please make sure that:

- All data scraping / munging / analysis code is uploaded to the repo.
- Any backend server code is uploaded to the repo.
- Your `README.md` is updated with any relevant details particular to how to run and use your project code and any supplemental code you added.
- Your repo is up-to-date, clean, and well-organized.

2. Write
Based on all the work you did up to this point, rework your PDF so that it is a final, polished report of your project.

Your final PDF must be maximum 4 pages long, excluding the references and any appendices. We won't be grading the appendices this time and any content over the 4 page limit won't be graded. However, please do keep your appendices for now so everything is in one place in case you want to use it in the future or submit the paper for publication.

You will need to add from scratch from scratch a few sections: **Discussion**, **Conclusion**, and **Acknowledgements**. You will also need to do a fair bit of modification of existing writing to make a new **Execution & Design Process** section that replaces ~~Execution Plan & Preliminary Work~~.

The following is a list of required sections and the criteria that each should reflect.

Abstract	A summary of the content of the paper touching on the main subject, what your project is, and what are your findings. Make sure you have your project your GitHub Repo URL hyperlinked at the end of the abstract.
Introduction	A clear focus, and a developed explanation of the problem, and a reasonable response is proposed. The introduction must clearly state what is the contribution of the project. Link to any supplemental material, i.e., your GitHub Page, the demo video, and the slides.

Related work	Go through your related work section and update them reflecting on the final state of the project. Did you end up changing your project throughout the course? Did you end up adding visualizations that weren't planned when you wrote down this section? Add related work as necessary, focusing on visualization publications. Also include: how is your project related to the previous work? What gaps does it fill? Is there anything improved over the related work?
Partner	A short description of who your partner has been, what were their needs and motivations. Up to this point, a sizeable part of your PDFs has been e description of your interview with your project partner. Summarize that to provide space, merge together the comments by each one of the group members, and avoid generic comments such as "The interview went well."
Data	Summary of data, data types, and data preprocessing. Data sources match the problem statement and are appropriate. Descriptions are very explicit so someone could read your page and properly reproduce your results.
Task Analysis	Includes summary of task table. Clearly describes domain tasks, processes, goals and abstract tasks for domain problems.
Execution & Design Process	Includes sketches and design choices to justify final visualization. There is evidence of iterative improvement. Includes a logical discussion of design choices grounded in theory from course. Discusses feedback from usability testing.
Visualization Design	Final visualization screenshots (PNG images), design justifications, UI walk-through.

Discussion	This section discusses the findings that your project allowed you to have, the lessons learned and the takeaways. Can include limitations and future work.
Conclusion	Includes a short summary of work completed and areas for improvement/future-work. Meaningfully wraps up project and has good future directions.
Acknowledgements	Acknowledge any key contributions from people outside the project.
References	The references.
Appendices	Please keep at the end your Group Charter and Appendices A–E (Interview, Data Exploration, Design Sketches, Digital Sketches, Reflections). You may draw material from any of these for the main body.

3. Submission Instructions

- Have your communications director email your community partner and CC your group mates + TAs + Prof. Dunne. Your email should include the following:
  - Thank the partner for their help this semester and provide them with links to your final materials:
    - GitHub Page
    - GitHub Repository
    - Paper PDF
    - Video (ideally in your repo)
    - Slides (PDF exported to your repo)
  - Name a contact person on your team that your community partner can reach out to over the coming months if they have any **minor** follow-up questions. This is to help ensure that they are able to use your product. However, you are not required to do additional work for them after the class ends.
- Submit your paper PDF by uploading it to this assignment on Canvas.

It was a pleasure having you all in class. We hope you learned a lot!

Please make sure to submit your TRACE evaluations and stay safe out there!

Information Visualization (DS 4200) Spring 2021 (DSLM with S-L)

Course Syllabus

Description

Note: The course is not publicly available.

Introduces foundational principles, methods, and techniques of visualization to enable creation of effective information representations suitable for exploration and discovery. Covers the design and evaluation process of visualization creation, visual representations of data, relevant principles of human vision and perception, and basic interactivity principles. Studies data types and a wide range of visual data encodings and representations. Draws examples from physics, biology, health science, social science, geography, business, and economics. Emphasizes good programming practices for both static and interactive visualizations. Creates visualizations in Excel and Tableau as well as Python and open web-based authoring libraries. Requires programming in Python, JavaScript, HTML, and CSS. Requires extensive writing including documentation, explanations, and discussions of the findings from the data analyses and the visualizations.

After completion of the course students should be able to:

- Choose appropriate visualization methods for a given data type

- Assess the quality and effectiveness of a visualization

- Design an effective visualization using design and human perception principles

- Implement a static or interactive visualization

- Apply and implement basic interactivity functions to enable data exploration

- Implement web-based visualizations in JavaScript/HTML/CSS or Python

- Create visualizations in Excel and Tableau

- Present and be knowledgeable about contemporary visualization topics

- Effectively communicate technical material in written form

- Effectively communicate technical material in oral presentation form

- Constructively critique and assess a visualization in written form

NUPath and other Attributes: With Service Learning, NUpath Analyzing/Using Data, NU Core Experiential Learning, NUpath Integration Experience, NUpath Writing Intensive.

Prerequisites

The only required prerequisite course is CS 2510 or CS 2500. Topics such as databases, HCI, and data mining (e.g., DS4100) all are very useful for the course but not required prerequisites. Students should be comfortable with learning new programming languages.

Note: The assignments and projects in this course will expose students to a variety of programming languages including Javascript (i.e., D3) and Python as well as tools including Tableau for visualization design and implementation. *No prior experience with these tools, or web design in general, is required however very helpful.*

Textbooks

This course will utilize two required textbooks: one to cover basic visualization theory and methodology, and one to cover basic perceptual theory as applied to visualizations.
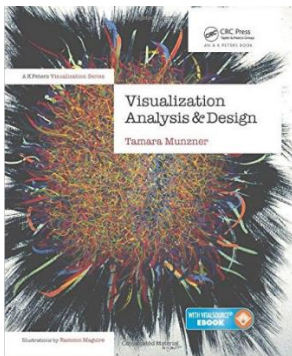
[Visualization Analysis and Design](#) by Tamara Munzner

(**Available for free [online through the library](#).)
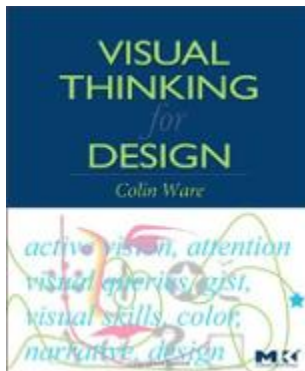
[Visual Thinking for Design](#) by Colin Ware

Supplies

We will do a lot of visualization sketching and design iteration in this course. You should always have the basics so you are able to participate effectively for in-class activities and assignments:

- At least five different colors of pens—e.g., Pilot G2 packs 31128 (Links to an external site.) and 34405 (Links to an external site.)—or pencils (with sharpener).

- Plenty of white or near-white drawing paper. E.g., Strathmore 25-005 (Links to an external site.) or 400-2 (Links to an external site.) drawing notebooks, heavyweight white index cards (Links to an external site.), or even 8.5x11" printer paper.

- Small pieces of paper such as post-it notes or plain white index cards. (Cut pieces of regular paper are fine, too.)

We will usually specify paper vs. using digital tools for design sketching, as we have found that digital drawing tools tend to limit the breadth of student creativity and slow down design iteration.

We will also do programming and writing activities. You should always have:

- A laptop suitable for programming and it's charger.

If you do not have the required supplies when they are needed your participation grade for the day will be marked as 0.

If you are unable to acquire these required supplies due to hardship or circumstance, please reach out to the Instructor to discuss (m.borkin@northeastern.edu).

Course Components

Lectures

Each class will be split into two parts: lecture and class activity. The lecture component will be ~45-60 minutes in duration covering foundational topics, and the remainder of the class will be devoted to an in-class activity to further explore topics and skills relevant to the course topics. Activities will include such exercises as programming tutorials, design critiques, journal paper discussions, in-class mini-hacks, and student-led final project update presentations.

Class Participation

Students are expected to participate both in-class as well as online through the course's discussion boards. A student's participation grade (see Grading section below) will be composed of their in-class participation as well as online activity.

Readings

Assigned reading will be given to read in advance of each lecture and listed in the Course Schedule online. Readings will be drawn from the required textbooks as well as online supplemental material. To ensure students complete the assigned reading and retain the key concepts required to fully participate in-class, short reading pop-quizzes will be given at the start of many classes. The grades of these quizzes will be counted toward each student's Participation grade. Quizzes will be given near the start of class and will not be available to tardy students. You will not know in advance when quizzes will happen or how many quizzes there will be total.

Homework

There will be weekly homework assignments over the course of the semester. Each assignment will require the student to apply the concepts discussed in the readings and in-class lectures to both programming assignments for the actual building and implementation of static and interactive

visualizations as well as short writing assignments (e.g., design critiques). <u>The homework assignments are an individual assessment and should not be completed in groups.</u>

Final Project

For the term-long final project, students will work in groups of ~3 people to create an interactive visualization incorporating the concepts discussed in the course. Throughout the semester there will be mandatory final project progress deadlines. The required final project milestones and deliverables will be incorporated into, or sometimes replace, the weekly homework assignment. As part of the final project, in addition to the final interactive web-based visualization, students will be required to produce a website to host the visualization, a demo video, and an in-class short presentation.

The final projects will revolve around working with data from and interacting with community non-profit organizations in Boston through partnership with the Northeastern University Center of Community Service in a Service-Learning curriculum.

Grading

Grades will be broken down as follows:

- Homework Assignments (45%)

- Class Participation (15%)

- Final Project (40%)

SAIL

This course will incorporate the key elements of SAIL, an experiential learning model developed at Northeastern University. SAIL starts with the idea that learning happens everywhere, in every imaginable context. Not just in class and on co-op, but throughout your everyday life. A student's ability to learn from every experience helps them to move more easily among lanes—coursework, jobs, tasks, cultures—and transfer skills to new challenges in today's fast-paced world.

SAIL is composed of 5 learning dimensions which include Intellectual Agility (learners develop the ability to use knowledge, behaviors, skills, and experiences flexibly in new and unique situations to innovatively contribute to their field), Global Mindset (Learners develop knowledge, skills, and behaviors to live, work, and communicate with people whose backgrounds, experiences, and perspectives are different from their own as well as to consider the global impact of their decisions.), Social Consciousness and Commitment (Learners develop the confidence, skills, and values to effectively recognize the needs of individuals, communities, and societies and make a commitment to constructively engage in social action.), Professional and Personal Effectiveness (Learners develop the confidence, skills, behaviors, and values to effectively discern life goals, form relationships, and shape their personal and professional identities to achieve fulfillment.), and Well-being (Learners develop knowledge, skills, and behaviors necessary to live balanced and fulfilling lives.). Each of these dimensions and supporting skills will be incorporated into this course. To learn more about SAIL, set-up an account, and register for this course's SAIL profile, please visit: https://sail.northeastern.edu/about/

NUFlex

This course will be delivered using the Hybrid NUflex learning modality with the instructor teaching remotely. The instructor will join virtually in the class at the scheduled class time using Zoom with some students in the classroom and others joining remotely. Students will be able to ask questions, discuss, and interact with the instructor and other students in real time. Remember that on scheduled days in the classroom, students will need to practice healthy distancing and wear a face mask or face covering. The instructor will also be available for virtual office hours and appointments. Please refer to the Canvas course page for updated information on Zoom links and office hour times.

This course, or parts of this course, may be recorded for educational purposes. These recordings will be made available only to students enrolled in the course, instructor of record, and any teaching assistants assigned to the course.

Course Policies

Late Policy
All homework and project related due dates are final and provided in the course schedule. No assignments will be accepted for credit after the deadline.

If you have a verifiable medical condition or other special circumstances that interfere with your coursework please email the Instructor (m.borkin@northeastern.edu) as soon as possible.

If you have a major conference/journal paper deadline, conference presentation that interferes with your coursework, email the instructor at least 3 weeks in advance to discuss your options. We will not provide late policy waivers for such cases with less notice.

Disability Accommodations

If a student has a disability which needs accommodations in the course (e.g., accessible learning materials, extended time testing, etc.), please file a disability accommodation request with the Northeastern University Disability Resource Center. Upon approval through the DRC, please provide the instructor (m.borkin@northeastern.edu) with a copy of the official professor notification letter and set-up an appointment with the instructor to discuss accommodations for the semester.

Academic Integrity Policy
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

For more information, please refer to the Academic Integrity Web page.

COVID-19 & Health Protocols

The university has put into place a robust plan to make the campus healthy and safe for all --- but students must do their part. For students on campus and attending class in-person, you must continue to wear a mask in class and socially distance. Students must get tested every three days at the Cabot Testing Center. Do not come to class if you feel sick.

In summary:

1. Gatherings on or off campus must conform to healthy practices as outlined by university and Massachusetts state guidance. If a student hosts or attends an inappropriate party or gathering, you run the very real risk of immediate removal from the community.

2. Wear a mask indoors and outdoors as you maintain a 6-foot distance from everyone.

3. Get tested every three days using the COVID-19 Test Scheduler (Covid19-testing.northeastern.edu.) The university may require more frequent testing as the semester progresses. It's quick, easy and will help the university to quickly identify and care for anyone who tests positive. The course teaching staff will not be told the identity of anyone who tests positive, and students do not need to share that information with the instructor or anyone else unless they want to. If a student receives a positive test result, they will be contacted by a member of the university's telehealth team who will provide next steps.

4. Students should do a Daily Wellness Check (https://wellness-check.northeastern.edu), wash hands well and regularly, and disinfect high-touch surfaces and spaces.

5. TAs or IAs in the classroom will be wearing a face covering or mask and expect that students will do the same in class. If a student comes to class without a mask, they will be asked to go and get one on campus. Students can get a mask at the Visitor Center or at the Curry Student Center Help Desk. If a student refuses to wear a mask in class, we won't be able to continue the class. If a student is not sitting six feet apart from your classmate, they will be asked to do so. Students are not able to eat or drink in class (except water). If a student tests positive, they will need to enter isolation as directed by the university's telehealth team. It is expected that the student will not come in-person to class and that they will follow the guidance from the university telehealth team to isolate and get appropriate healthcare if needed.

6. Staying safe is a responsibility that we all must take seriously. Keep in mind the "Protect the Pack" theme. Remember that our individual actions will help everyone stay safe this spring.

DS4200 - Final Project Overview (DRAFT 1/11, subject to minor revision)

For the final project, students will work in groups of ~3 people to create an interactive visualization incorporating the concepts discussed in the course. Throughout the semester there will be final project assignments included as part of the homework assignments. In addition to the final interactive visualization, students will also be required to produce a webpage to host and explain their visualization design process, demo video, and in-class short presentation. The final project (i.e., "final project" components of the homework assignments plus final deliverables) is worth 40% of the student's final grade.

The goal of the final project is to expose students to the real-world research and design process of doing an in-depth visualization design and implementation. As part of the project each group will need to

work with real datasets, complete a task analysis, conduct a fact-finding interview, create a report for partners summarizing their data insights, design and implement an interactive web-based visualization, solicit and incorporate feedback, and then communicate the final project and results through a webpage, demo video, and in-class presentation.

Aside from the final project deadline itself, there will be a series of intermediate deadlines incorporated into the weekly homework assignments in order to keep students on-track with the workload. Separate documents will be posted and provided to students with additional information and requirements for each assignment deadline.

Final Project Visualization Process & Design components:

- Group formation and charter

- Interview with Service-Learning Partner

- Task Analysis

- Data exploration and analysis

- Data Analysis report (i.e., static graphs with accompanying prose)

- Visualization design sketches

- Preliminary Prototype

- Usability evaluation/feedback

- Final Interactive web-based Visualization

Project Components:

- Data Analysis report

- Interactive web-based visualization

- Webpage to host and explain visualization

- Demo video

- In-class Presentation

Requirements for the final project web-based visualization:

- The visualization must be interactive.

- The visualization must be created with D3 and run in a web browser.

- The visualization must somehow include a form of color encoding (i.e., needs to demonstrate that students know how to appropriately use and encode data values with color).

- The visualization must include the following two interactivity concepts: brushing and linking, and details-on-demand. (If you have any doubt about how/if to include these based on your task analysis, please ask the teaching staff.)

- The visualization must include a minimum of two different visual encodings (i.e., this is an inherent requirement for the brushing and linking). How many views and visual encodings employed will depend on the data and tasks.

Webpage:

- Each group will prepare a webpage to host their final visualization.

- The webpage should include the following written sections: "Motivation" (i.e., summary of service learning partner and motivating questions), "Data" (i.e., summary of data and data types), "Task Analysis" (i.e., summary of interview and task table), "Design Process" (i.e., sketches and design choices to justify final visualization), "Final Visualization" (i.e., final visualization, design justifications, packages utilized for coding, and UI walk-through), "Data Analysis" (i.e., summary of interesting results), and "Conclusion" (i.e., short summary of work completed and areas for improvement/future-work). Additional non-required sections may be added to the website to thoroughly explain/frame the final project.

Demo Video:

- Each group will prepare a short (1-2 minutes) demo video of their interactive final visualization.

- The video should include a video screengrab of their visualization in-action and explain what the visualization represents and how to use it.

- The video must include audio narration.

- Please place your final video in a new folder called "Presentation and Video" in your final project group directory and place your presentation document in this folder.

In-class Presentation:

- Each group will prepare a short in-class presentation.

- (The presentation duration will be determined at a later date based on course enrollment.)

- Each member of the group must speak for a portion of the presentation.

- The presentation must include either a live-demo of the visualization, or a pre-recorded video demonstration of the visualization (e.g., demo video but with no audio, narration must be live). **Demo video option highly recommended.

- The presentation must be created using Google Presentations. Create a new folder called "Presentation and Video" in your final project group directory and place your presentation document in this folder.

- Pending time constraints, each group will have ~2 minutes after their allotted presentation time to answer questions from the audience.

Other requirements for the final project:

- Student groups will work with a Service-Learning partner.

- The data / visualization should address an interesting question chosen by the Service-Learning partner.

- Students must complete a volunteer experience (~3-4 hours) with their community partner and compose a reflection essay afterwards as part of their design process.

As with all homework and assignments in the course, the Northeastern University Academic Integrity policy applies.

Final Project Assignments:

DS4200 Assignment 1a

Total points (5 points)

Due: Tuesday 2/2 by 1:35pm (i.e., start of class)

In this first part of the assignment, you will complete a number of required steps for the Service-Learning based final project, including being prepared for our in-class "town hall" style interview with our community partner in class on Tuesday 2/2.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Part 1: MPF Consent form (1 points - Final Project)

As we will be using proprietary and confidential information from the Massachusetts Promise Fellowship as part of the Final Project, all students need to sign a confidentiality agreement. Please read the following Agreement and submit it by following the instructions in the linked agreement/form:

https://neu.co1.qualtrics.com/jfe/form/SV_b9JUnBt4lgXPyWq Links to an external site.

Part 2: IP agreement (1 points - Final Project)

You will receive an email asking you and your project team members to sign an IP (intellectual property) Agreement. All team members are required to sign the document (1 document per project group). In short summary, the legal agreement states that all students own the IP they create as part of their final project and "gift" a copy of the final project and all associated components to MPF (our community partner) at the end of the semester. Thus this agreement enables the student to, e.g., include the visualization in their portfolio or use the code in the

future for other projects, and the partner to have a copy to use in the organization or on their website.   If you are unsure how to sign the agreement, please reach out to the S-LTA for help and information.

Part 3: Final Project Preliminary Interview questions (3 points - Final Project)

Each final project group will have the opportunity to participate in a group "town hall" style interview during class and ask our community partner specific interview questions. The goal of the in-class interview is to learn about the organization, the organization's mission, the data you will be analyzing, the organization's motives for analyzing the data, the possible insights the organization is looking for in the data, and what data analysis and visualization work have they already completed. The answers to these questions and your interview notes will be the basis for next week's assignment in which you will need to extract and categorize tasks for your final project visualization. If after the in-class interview your group has further follow-up questions, reach out to the S-LTA for insight or assistance in arranging additional email or video-call communication with our community partner.

For the in-class interview question-asking opportunity, we recommend having a designated interview leader to ask the question(s) when given the opportunity as well as at least one designated note taker. Make sure to do some pre-reading about our organization on their website (see the "Service-Learning" Module on Canvas).

Instructions: As a group, come-up with a prioritized list of questions (at least 3) that you would like to ask our community partner. Make sure to review your project topic and data prior to the interview, and reach out to our S-LTA to answer any questions you may have.

Submission Instructions: Submit through this Assignment 1a on Canvas a PDF with your group's prioritized list of questions. Make sure to explicitly write your group number and all group member names on the document.

DS4200 Assignment 1b

Total points (8 points)

Due: Friday 2/5 by 1:35pm (i.e., start of class)

In this second part of the assignment, you will reflect on what you learned during the in-class interview with our community partner and create your "team charter" for your final project group.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: Submit a <u>single</u> PDF for your Assignment 1b submission which includes write-ups for both Part 1 and Part 2. (Make sure to explicitly write your group number and all group member names on Part 2.)

Part 1: Final Project Preliminary Interview reflection (3 points - Final Project)

After the in-class "town hall" interview with our community partner, as a group reflect and discuss what you learned. <u>Each</u> person in the team should write a paragraph or two describing the interview experience, what they learned, and what things surprised them during the interview. (There paragraph should be at least 200 words.)

Part 2: Team Charter (5 points - Final Project)

Each final project group needs to create a "team charter". The group will write and agree upon their charter together. The charter is meant to make sure everyone in the group is in sync and understands what they expect of each other. Here are some key questions to address in your charter (feel free to add/address more than these guiding questions!):

1. *Team Purpose: State the reasons for this team's formation and the team's purposes. Who are your stakeholders, and what are their expectations of and for the team?*

2. *Team Goals: What are the team's project, process, and quality goals? To what level of performance are team members willing to commit, and what course grade are you collectively aiming for? Articulating these goals will make a difference in your team's performance.*

3. *Team Member Roles/Responsibilities: While some team responsibilities are shared by all members, collaborative teams work best when members also have unique roles and responsibilities. These could be technical and/or project management related, e.g., team leader, meeting facilitator, documentation coordinator, information manager, point person for sponsor/advisor communications, etc. Consider these assignments carefully.*

NOTE: Each group is required to identify a "communications director**" in the team. This team member will be responsible for all email communications between the group and the S-LTA and partner organization as well as between the group and the teaching staff on final project related matters.

4. *Ground Rules: How and when will this team meet? What are the norms and ground rules the team will agree to? How will you conduct discussions and make decisions? How will you handle dissenting views among members? How will you hold each other accountable for living by these rules and for task completion? What kind of participation and level of commitment do you expect from one another?*

5. *Potential Barriers and Coping Strategies: What barriers to effective teamwork might potentially arise in the course of completing your senior project and other team obligations, and how will you handle them if they materialize? What problems with team dynamics have you experienced in the past, and how will you handle them if they come up again?*

DS4200 Assignment 2a

Total points (36 points)

~~Due: Friday 2/12 by 1:35pm (i.e., start of class)~~

~~Due: Sunday 2/14 by 1:35pm~~

<mark>Due: Tuesday 2/16 by 1:35pm</mark>

In this first part of Assignment 2, you will complete a number of required steps for the Service-Learning based final project, including a virtual walking tour, training in professionalism, and the "task analysis" for your final project.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each** team member should upload their own submission to Canvas for Assignment 2a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Part 1: Service-Learning "Walking Tour" (8 points - Final Project, completed individually by each team member)

When normally in person, the Service-Learning Program at Northeastern runs a "walking tour" of the local community to talk about Service-Learning and highlight local organizations NU courses are collaborating with. In lieu of the normally required in-person tour, the S-L office has put together some recorded walking tour bits to watch at home.

Please watch each video (4 videos) linked below and then answer the designated questions for each. Please write-up your responses and include them as part of your Assignment 2a submission PDF.

1. **Jamaica Plain Community Tour (4:35 mins):**https://www.youtube.com/watch?v=m95QLk1GYkc

[Links to an external site.](#)   **Task:** The JP tour highlights 11 community assets. Name 6 of them and a 1 line description of what they stand for.

2. **Roxbury Community Tour (5:09 mins):**https://www.youtube.com/watch?v=nekfRDdwxVo

[Links to an external site.](#)   **Task:** The Roxbury virtual tour highlights 16 community assets. Can you name 10 of them and what they stand for?

3. **Fenway Community Tour (5:46 mins):**[https://youtu.be/HLTb908fQoILinks to an](https://youtu.be/HLTb908fQoI)

[external site.](#)

Task: The Fenway virtual tour highlights 7 community assets. Can you name 4 of them and what they stand for?

4. **South End Community Tour (5:01 mins):**https://www.youtube.com/watch?v=RCYF8Yoh-UM

[▶]

Task: The South End tour highlights 5 community assets. Name 2 of them and what they are known for.

Part 2: Preparing for Service (8 points - Final Project, completed individually by each team member)

Making sure that you are prepared for your service is a crucial part of you being successful in the service you will be involved in. The three aspects of preparing for service are: professional behavior, cultural competency and responsible engagement and preparedness. Let us elaborate a little bit.

1. Professional Behavior
Being professional is just as important in a service or volunteer capacity as it is in a work capacity. You need to be prepared to be professional in how you communicate with your community partners and how you behave at their service site. Having professional behavior is crucial in order for you to effectively help meet a community partner's goals.

Please watch this video:
https://www.youtube.com/watch?v=BGrzlgfk_Bc&list=PLyYCBWJH3zNTlw1KwFw7hpAmhqTlsT

[▶]

Task: List the 7 pro-tips shared in the video.

2. Preparedness for a Specific Site/Project
Making sure that you understand your community partners' goals, the history of the community and partner, and know how your service relates to the learning objectives of the coursework (If you are not sure --> Ask Questions.)

3. Cultural Competency and Responsible Engagement
For you to enter a community collaboration respectfully, you should understand the social contexts surrounding your community partner's mission. You should understand why a certain partners' goals exist and always be cognizant of any power or privilege you have and actively address the implicit biases as you work in collaboration with your community partner.

It is also very important to approach your project/service with an asset-based community development perspective and not a deficit-based mentality. Watch the video below and answer the questions following it to learn and reflect on what these terms mean.

Asset-Based Community Development:https://www.youtube.com/watch?v=DBFCbzxxyWwLinks to an external site.

▷

Task: Define in your own words, what you understand by:

Asset-Based Community Development

Deficit-Based Perspective:

Now, take a minute and look over Barbie's most recent Instagram post from her service trip over to Africa.

Task: What are your thoughts on Barbie's post?

Barbie's post isn't appropriate for a number of different reasons. Barbie is centering herself in

her service and is using it mainly to bolster her own ego and image as she tries to save Africa. Barbie is also not cognizant of the difference in culture and context, calling their hospital, a community asset, barely a hospital, and patronizing the population she's working with.

As an S-L student and member of the community, you should be aware that the language you use, as well as the way you treat those you work with, have larger implications and deeper roots than you may initially realize!

Part 3: Final Project Task Analysis (20 points - Final Project, complete as a group)

In this part of the assignment, each final project group will review their interview notes (plus any additional/supplemental information if provided by your partner organization). The goal of this exercise is to identify your organization's motivating questions and tasks for the data. This information will help guide you in the design of your visualization and the analysis of your data.

INSTRUCTIONS:

1. Review your interview notes and look for keywords (i.e., words that keep repeating throughout your interview) - write these in a list.
2. Review your interview notes and look for keyphrases (i.e., phrases/concepts that keep repeating throughout your interview) - write these in a list.
3. Review your other notes and materials from MPF (see "Service-Learning" Module on Canvas) - write down any other key phrases or keywords in a list.
4. Using the interview notes, your personal reflections from the interview experience, your keywords, and your keyphrases all as guides, construct your "Tasks" table outlined below. First fill-in the "Domain" task column which represents all the tasks your partner organization wants to accomplish with the data/visualization for your designated project. Use your notes and lists from #1-3 to identify your domain tasks. Next translate these domain tasks into computer science terminology by identifying what low, mid, and/or high-level tasks it represents. Please see the slides from Lecture 7 for definitions, examples, and guidance. **Recommendation: use some of the Ideation exercise strategies we practiced in class to help identify common tasks and themes. Please see Lecture 7 for details.

Table structure:

Index (ID #)	"Domain" Task	Analytic Task (Low-level, "Query")	Search Task (Mid-level)	Analyze Task (High-level)

1	Examining a phylogenetic tree, which species are classified as mammals?	Filter	Locate	Present
...	...	...	...	...

5. Reviewing your tasks, what is it that your visualization will be primarily developed for? In other words, which type of consumption will be targeted with your visualization(s): "discover" (i.e., exploratory visualization), "present" (i.e., communicative visualization), or "enjoy" (i.e., entertainment/art visualization)? Along these lines, identify who will be the primary consumer of your visualization (e.g., partner organization members, volunteers, funding agencies, public, etc.)?

These two questions are heavily interconnected with each other. To make sure that you deliver a successful visualization to your partner, you have to reflect on and identify who the stakeholder of your particular project is. On a high-level you are all working for the Massachusetts Promise Fellowship organization, but if you notice carefully, not all project deliverables are expected to serve the same purpose. Some are intended to be used in a grant proposal, some are intended to be presented to the public, some to funders, some to prospective volunteers or collaborating host sites, while others for the staff of the organization to dive into and explore what strategies are working, how they can improve and many more decision making purposes. Therefore, reflect on the particular problem that you are going to address and identify who are going to be the primary stakeholder/consumer of your visualization. **Remember, changing the stakeholder can drastically change the task analysis and the final visualization.**

Combine your answers/table from #1-5 as part of a single PDF with your Assignment 2a submission and submit through Canvas following the instructions at the top of this assignment.

DS4200 Assignment 3a

Total points (20 points)

Due: Friday 2/19 by 1:35pm (i.e., start of class)

In this part of the assignment you will begin your data analysis and exploration for your final project with a data exploration in Tableau.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 3a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Preliminary Data Exploration (20 points - Final Project)

In this part of the assignment you will explore as a group the data from associated with your assigned topic from Massachusetts Promise Fellowship. This is an important step to make sure you understand all of your data, know what type of data you are working with, look for missing data or errors (i.e., dirty data), and start to identify interesting patterns or trends.

INSTRUCTIONS:

1. Review the excel documents associated with your project (see project assignments document Links to an external site.) from our partner organization and answer the following,
    I. What type of data (see Lecture 3) is in each column? [categorical, ordinal, or quantitative]
    II. Write a few sentences summarizing overall what data you are working with and how your partner organization collected/generated the data (e.g., survey, statistical, internal revenue, etc.).
2. While reviewing the data, look for missing data, variables you are confused about, etc.

- If you see missing data, incomplete data, misformated data, etc., send a note to S-LTA Uzma (syeda.u@husky.neu.edu) to make sure you know how to fix it or have MPF send you updated cleaner data.

- If you are confused about the data or what is in a particular column, email S-LTA Uzma (syeda.u@husky.neu.edu) who can reach out to MPF to make sure you have your questions answered.

3. Load your data into Tableau! Make sure to categorize in Tableau each variable appropriately to ensure plots work correctly.

4. Start exploring your data! You can do this individually and then meet-up as a group to review your preliminary insights and thoughts, or you can do it sitting down together from start-to-finish.

5. As a group, write a couple paragraphs summarizing your data exploration experience, and preliminary insights:

I. What trends and patterns do you see? Did anything surprise you during the exploration?

II. Did you identify any further errors or messy/confusing data past what you noted in #2? [If so email S-LTA Uzma (syeda.u@husky.neu.edu) ASAP!]

III. Review your task table from Assignment 2a. Are you able to start answering any of these questions or addressing the domain tasks with the data? Or do you feel like you are missing necessary data (in which case email S-LTA Uzma (syeda.u@husky.neu.edu))? Please respond in a few sentences.

IV. Take screenshots (or export image files) of at least **3** interesting insightful plots you generated as part of your data exploration. Write a couple sentences for each visualization to explain a) what data, or subset of data, you were exploring, b) what visual encoding(s) you used and **why** (justify!), and c) what trend or pattern (or lack of trend/pattern!) does the visualization show.

Submit your answers as a PDF document and upload as your **group** submission to Assignment 3a.

DS4200 Assignment 4

Total points (50 points)

Due: Friday 2/26 by 1:35pm (i.e., start of class)

In this assignment you will prepare a formal professional data analysis report for Massachusetts Promise Fellowship in which you present a summary of the data, trends, observations, and insights you have collected for the data assigned to you for your final project. (This is exactly what consultants do in the real world!)

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 4. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Data Report (50 points - Final Project)

Last week you worked to make sure you understand all of your data, know what type of data you are working with, look for missing data or errors (i.e., dirty data), and start to identify interesting patterns or trends. You will continue this work this week and create a formal "data report" to give to Massachusetts Promise Fellowship.

INSTRUCTIONS:

Building off of the work you completed in last week's assignment, create a formal "data report" in which you summarize your data and provide insights.

Your report should use this google doc template Links to an external site.and at minimum include the following sections/discussions:

- Project Summary: 1-2 paragraph summary of your project
- Data: 1-2 paragraph summary of your data, plus subsections (many paragraphs) to discuss,
    - The data subsets that you are using in your project to address the prompt given to you and why you choose the particular subset of data
    - The data clean-up process and challenges encountered including reflections on the challenges you faced trying to extract, gather and

clean the data. This will give MPF a better sense of how they should store their data in the future to avoid these analysis and cleanup challenges.
- o The data types your dataset contains
- Observations and Insights: multiple paragraphs with at minimum 5 visualizations to support the text describing your data exploration and the insights you gleamed from your data analysis
- Task Analysis: A copy of your task analysis description and abstraction table to give the community partner a better understanding of what you are anticipating your final visualization(s) to be like and what tasks you will be focusing on. This way, they can point out if they want any additional tasks/ remove any tasks that are not of interest to them.
- Conclusion: a concluding paragraph which summarizes your findings, and describes your next steps in the project (i.e., to begin sketching designs for an interactive web-based visualization).

<u>Additional Notes:</u>

- We strongly recommend using Tableau, but you can use any tools you wish to do additional data analysis and plotting.
- In addition to visualizations (graphs/plots/maps), you are welcome to include additional photos, illustrations, or diagrams if needed to support your work.
- All visualizations should be polished! (See Lecture 2; don't forget to always have a graph title, axis labels, etc.)

DS4200 Assignment 5a

Total points (20 points)

Due: Friday 3/5 **by 9:00am**

In this part of the assignment you will create your first round of sketches to ideate visual encoding ideas for your final project interactive visualization. During the March 5 one-on-one project feedback sessions with the teaching staff you will present and discuss these ideas with the staff.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 4a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Preliminary Visualization Sketches (20 points - Final Project)

[5 points / team member's 3 sketches with justifications; 1 point for re-ordered tasks; 4 points for justification of 3 favorite sketches]

In this part of the assignment you will create preliminary sketches of what plot(s) you may want to create for your final project visualization based on your task analysis (Assignment 2) and data exploration (Assignments 3 and 4).

As a refresher, your web-based final project visualization will need to meet the requirements presented in the syllabus so keep these in mind as you sketch:

Excerpt from Course Syllabus:

Requirements for the final project web-based visualization:

- The visualization must be interactive.
- The visualization must be created with D3 and run in a web browser.
- The visualization must somehow include a form of color encoding (i.e., needs to demonstrate that students know how to appropriately use and encode data values with color).
- The visualization must include the following two interactivity concepts: brushing and linking, and details-on-demand. (If you have any doubt about how/if to include these based on your task analysis, please ask the teaching staff.)

- The visualization must include a minimum of two different visual encodings (i.e., this is an inherent requirement for the brushing and linking). How many views and visual encodings employed will depend on the data and tasks.

INSTRUCTIONS:

1. Based on your experiences with Assignments 3 and 4, and additional information gathered from Uzma / MPF, go back to the Task Analysis table in Assignment 2 and rank the tasks from most to least important based on your partner organization's apparent priorities. **Include this now re-ordered table as part of this submission PDF.

2. **Each member** of the group should independently create **3** distinct sketches for what they think might be a good visualization option for their final product. These sketches should be made by hand on pen/pencil and paper, just like we do in the in-class redesign exercises. You will not be graded on artistic skill :) Write your name on the sketch so we can make sure each team member made 3 sketches. Make sure to write a couple sentences for each sketch explaining why you chose those particular marks/channels and encoding(s) for your design, and what tasks in your task table it addresses.

3. Take a photo (or scan) of each sketch with justification and incorporate them all into your submission PDF.

4. As a project group, discuss all the sketches and identify your **three** favorite sketches. Please indicate, either in a separate list in your PDF submission or annotated in the visualization scans/photos, which are your group's three favorites and why.

5. Upload your submission for this Assignment 4a by **9am 3/5**, and be prepared to discuss with the teaching staff your new re-ordered task table and three favorite visualization sketches (#4). Please also bring any questions or concerns you have about satisfying the visualization requirements for the final project.

DS4200 Assignment 6a

Total points (26 points)

Due: Tuesday 3/16 by 1:35pm (i.e., start of class)

In this part of the assignment you will create a final polished sketch for your final project interactive visualization, and touch-base with your group to reflect on your team dynamics and Group Charter.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 6a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Part 1: Polished Visualization Sketch (24 points - Final Project)

[20 points for the sketch itself, and 4 points for the additional written components]

Now that your group has explored your data, sorted through your preliminary sketches, and received feedback during the in-person feedback session, it is time to create a final polished sketch!

Working off-of your group's favorite preliminary sketches, as well as teaching staff feedback, create a final cohesive sketch for your final project. Instead of a pen-and-paper sketch, this **sketch should be created digitally** on the computer. Feel free to use any software to create the sketch (e.g., Powerpoint, Keynote, Illustrator, etc.). The sketch should also demonstrate the **interactive components** of the visualizations (example interactive sketch, as shown in Lecture 13, is in the Assignment 6 module). As this is a "polished" high fidelity sketch, you will be graded on clarity and cleanliness of your design. Make sure to add annotations to your sketch to make it clear to the reader the different components/interactions of your visualization.

**Make sure to review the "Requirements for the final project visualization" section of the Final Project Overview document in the course Syllabus to ensure that your visualization satisfies all the technical requirements.

As part of your 6a submission PDF, please include the following written components:

- A paragraph in which you summarize which tasks you chose to prioritize for your design and how your design (including interactive components) helps the user complete these tasks.

- A couple sentences stating why you chose your particular visual encoding / design out of all your many original sketches.
- A sentence or two to share with which computer program(s) you used to made your final interactive sketch.

<u>Submission instructions</u>: Include your final sketch PDF as well as required write-up components as part of your Assignment 6a submission PDF.

Part 2: Group Charter re-visit (2 points - Final Project)

Now that your group has had a few weeks to work together, please meet as a group and re-visit your group charter. Have you all been abiding by your agreed-upon guidelines? Do you all feel comfortable with the group roles? Has everyone been contributing equally and appropriately to the project workload?

Please write a few sentences summarizing your group's discussion and include it as part of your Assignment 6a submission PDF. If your group decides to amend or edit the original group charter, please include in your submission PDF a fresh copy for our records, too.

DS4200 Assignment 7a

Total points (20 points)

Due: Friday 3/26 by 1:35pm (i.e., start of class)

In this part of the assignment you will finally begin to create your actual final project final visualization!

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 7a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Part 1 (Complete before Part 2!): To-do list (2 points - Final Project)

Based on your final interactive sketch,

1. Make a list of all the visual encodings (plots) you will need to create for your final project.
2. Make a list of all the interactions and interactive components (e.g., brush/link, zoom, highlighting, filtering, etc.) you will need to implement in your final project.
3. Annotate which items are required/necessary for your final project, and which items are "nice to have" items. (This will help you prioritize your to-do list.)

Submission Instructions: Include a copy of these lists in your Assignment 7a Submission PDF.

Part 2: Final Project Implementation (18 points - Final Project)

[3 points for updated webpage content; 15 points for static plots]

Now that your group has explored your data and created a final sketch, it is now time to start implementing your visualization!

Working off-of your group's final "interactive" sketch and to-do list, start coding! At a minimum by the due date of this assignment (progress past what is described below is fine/encouraged of course) you should have the following:

- Update your project webpage to have first-draft text for the following required sections:
    - "**Motivation**" (i.e., summary of service learning partner and motivating questions),
    - "**Data**" (i.e., summary of data and data types),
    - "**Task Analysis**" (i.e., summary of interview and task table),
    - "**Data Analysis**" (i.e., summary of interesting results), and
    - "**Design Process**" (i.e., sketches and design choices to justify final visualization).

**You may (are encouraged to) copy-and-paste text and graphics directly from your previous homework submissions.

- Create **static versions of all your plots**. (They do not need to be interactive nor totally perfect/final, but should load your data and display it in the visual encodings of your choice.)

Reminder: you are more than welcome to use any of the sample code in the homework or online as starting points but make sure to cite the original code(s) you are using as starting points.

Submission Instructions: Include in your submission PDF a link to your project's Khoury Github repository and link to the project webpage. **Make sure the links are also hyperlinks.

Assignment 8a Heads-up: On the next assignment, due Friday 4/2, you will need to have first-draft versions of all your interactivity (e.g., brushing and linking) working for the in-class usability testing on 4/2. During the usability testing your fellow classmates will use your visualization and provide feedback. (You will then have on Assignment 9 from 4/2-4/13 to finish and perfect your final project!)

DS4200 Assignment 8a

Total points (20 points)

Due: ~~Friday 4/2 by 1:35pm (i.e., start of class)~~

In this part of the assignment you will continue to work on your final project visualization, and add interactivity for a working beta release of your visualization for in-class usability testing.

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Submission instructions: **Each team** should upload **1 group submission** to Canvas for Assignment 8a. Place all required responses to all parts of this assignment in a single PDF. Do not forget to write your name, group ID, and course number in your PDF.

Final Project Implementation (20 points - Final Project)

In this step of the final project implementation, you will turn your first-draft static visualizations (Assignment 7a) into a functional interactive visualization.

Working off of your "interactive" sketch (Assignment 6a) as a guide, implement at minimum the required **interactivity** features for your final project visualization (e.g., brushing and linking, details on demand, etc.).

Note: it is not expected that your final project visualization/website will be perfect and polished, and it is ok if there are still some known bugs. However, the visualization needs to be interactive and functional/polished enough to get useful feedback from your classmates when they use your website in the usability evaluation.

Reminder: you are more than welcome to use any of the sample code in the homework or online as starting points but make sure to cite the original code(s) you are using as starting points.

To assist with grading, in addition to providing a link to your github repo and website, your group must create a **short demo video** (screen grab) of your newly interactive webpage. (There are a number of good [free screen capture software tools Links to an external site.](#)available, but the easiest in my opinion is to use Zoom and record the meeting while you do screen sharing. The recorded meeting video file is perfectly acceptable for this part of the assignment.)

Submission Instructions: Include in your submission PDF a link to your project's Khoury Github

repository, link to the project webpage (Make sure the links are also hyperlinks!), and a link to your Assignment 8a Demo Video in your Github repository.

DS4200 Assignment 9

Total points (200 points)

Part 1 (Visualization/Website) due Wednesday 4/14 by 5pm

Part 2 (Presentation/Video) due Friday 4/16 by 1:35pm (i.e., start of class)

In this assignment you finish your final project!

Grading Notes:

- *All points in this part of the assignment count towards your "Final Project" grade.*

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Part 1: Final Project Visualization & Website (150 points - Final Project)

[120 points for the visualization; 30 points for the website itself]

Pick-up where you left off on the last assignment and finish your final project visualization!

(The final project visualization and website requirements can be found in the Syllabus.)

Submission Instructions: Upload to Canvas a PDF submission for Assignment 9 with a link to your website and your github repo. **Make sure the links are hyperlinks.

Part 2: Final Project Demo Video & Presentation (50 points - Final Project)

[20 points for the video; 30 points for the presentation]

By the start of class on 4/16 you must complete a short (1-2 minute) demo video of your project, and be prepared to give a short in-class presentation (~8 minutes, everyone in the group must speak).

**For the presentation, everyone is required to use google slides.

Per the Syllabus, the video and presentation requirements are:

Demo Video:

- Each group will prepare a short (1-2 minutes) demo video of their interactive final visualization.
- The video should include a video screengrab of their visualization in-action and explain what the visualization represents and how to use it.
- The video must include audio narration.
- Name your video file using your group ID.

In-class Presentation:

- Each group will prepare a short in-class presentation.
- Each group will be given 6 minutes to present.
- Each member of the group must speak for a portion of the presentation.
- The presentation must include either a live-demo of the visualization, or a pre-recorded video demonstration of the visualization (e.g., demo video but with no audio, narration must be live). **Demo video option highly recommended.
- The presentation must be created using Google Presentations.
- Pending time constraints, each group will have an additional ~3 minutes after their allotted presentation time to answer questions from the audience.
- The presentation should include a brief introduction to the group's specific motivating question and MPF dataset(s) used, visualization design and creation process (briefly), and a walk-through/demo of the final visualization.

For the presentation, you will be graded on the overall polish of your presentation including your presentation slides and overall structure (make sure to practice!), as well as the above bullet-point requirements.

Submission Instructions: Please upload your Project Presentation and Demo Video to this google drive folder Links to an external site.. **Make sure to name your file by your project group ID.

Note: Not all project groups will be able to present on Friday (will draw virtual numbers out of a hat at the start of class on Friday to determine presentation order). Groups cannot edit their presentations or demo videos after the Friday submission deadline, i.e., everyone's submissions are due at the same time.

Usability Testing

Please upload your usability study document as a PDF. This assignment is a part of the final project.

Include your project ID and team members names in the document.

We encourage groups to complete this ASAP while the usability testing experience is fresh in your minds (i.e., during the last part of class), and require the submission by this "Usability Testing" document by **Wednesday 3:15 pm** (i.e., within 24 hours after class)

DS4200 Assignment 10

Total points (28 points)

Parts 1-3 due Tuesday 4/27 @ 1:35pm

In this final assignment, you will reflect on your final project experience and then complete two surveys based on your Service-Learning experience and your final project. Finally, you will submit your final project deliverables to the community partner.

Grading Notes:

- *You will be graded on the quality of your writing in all assignments. Points will be deducted for grammar and spelling mistakes.*

- *Points will be deducted in all assignments for not following the submission instructions.*

Part 1: Critical Reflection Essay on the Final Project (20 points)
In this part of the Assignment, you will write an essay reflecting critically on your experience with the final project component of the class. Reflection is an important part of a Service-Learning course and is one of the things that separates it from a volunteer experience. The reflection process gives meaning to the experience and helps to acknowledge how this experience is part of a larger effort in the community. Reflection can also create a sense of accomplishment and appreciation for the hard work and service provided to the community.

What is Critical Reflection and How to do it?
A critical reflection is carefully considering how events and experiences have led to personal growth and how you might think or act differently in the future as a result.
A critical reflection is not just a summary of what happened or a report of how you felt during an experience. For a reflection to be critical, you must make connections between what happened and what you have learned from that experience and how that contributed to your personal growth, and how you will apply this learning in the future. One model for critical reflection is the 3 stage process that answers 3 questions: **WHAT, SO WHAT** and **WHAT NOW?**

WHAT? : What happened in a particular situation? Replay the event in your mind as though it were happening in front of you on a movie screen. What do you see? Be as objective as possible. Try not to attach any judgments at this stage.

SO WHAT? : Analyze the experience more deeply. What was important about the situation for you? How does this experience connect to the course concepts? What did you learn?

WHAT NOW?: This stage is about applying what you have learned. How have you changed or grown because of this experience? How will you think or act differently in future situations because of this experience? What are you going to do next?

This is not a linear model but rather iterative. You can think about these points back and forth to formalize your reflection.

In these guiding questions, the "experience" is your full final project experience and you should reflect on the full semester from when you learned about the S-L project through the in-class interview with Lauren and Emily to all the final project assignments accomplished as part of the course.

Essay Instructions:
Each student should write an essay critically reflecting on their final project experience. The essay must contain at least **400 words**.

Your essay must contain reflection about the following:

- What your overall experience was while working on the final project

- What were the biggest challenges you faced?

- How did you overcome those challenges?

- What were the good things about this experience?

- What did you learn from this experience(s)?
- How have you changed or grown because of this experience?
- How does this experience relate to your course concepts?
- How will you think or act differently in future situations because of this experience? In other words, if you were to do something similar or repeat this experience, what would you do similarly and differently?
- How does this experience influence your steps going forward?

Remember to provide specific examples, explain the significance of what happened, and relate your experiences to course concepts. Finally, be sure to explain what you have learned and how you will apply this learning in future situations.

Submission instructions: Submit a PDF for your Assignment 10 (Part 1) through Canvas which includes your essay. (Make sure to explicitly write your name and group number in your PDF.)

Part 2: Final Project Survey (5 points)
Complete the following survey to help inform the DS4200 teaching staff of your experience with the final project:

https://forms.gle/rFesmqfwE1Pu8frD6Links to an external site.

Part 3: Service-Learning Student Evaluation (3 points)

Complete the following survey, created by the Service-Learning program, about your experience with the Service-Learning component (i.e., group project) of this course:

https://www.surveymonkey.com/r/8PL5Q9V Links to an external site.

Part 4: Final Project "Bundle" For Community Partner (Final Project)

**Note that this part of the assignment will not be graded, however your grade for the semester will not be submitted to the registrar until your group has successfully completed this step (i.e., you will have an "Incomplete" for the course until this step is completed).

In this last part, each final project group will assemble all of their final project materials and share them with their community partner.

Please follow the instructions below to assemble three zipped directory files and share them with us via the relevant Google Drive link.

Submission instructions:

Upload all requested materials below to this google drive link Links to an external site.(create a folder for your group by your group ID).

Instructions:

Please assemble the following three zipped directory files and upload them to the appropriate Google Drive link:

- Final presentation materials (***presentation.zip***):
    - o Your demo movie.
    - o A PDF version of your final project presentation slides.
    - o A PDF print-out of your webpage(s) OR a nicely formatted text document with all of your write-ups from the website assembled.
- Final interactive visualization / website (***visualization.zip***):
    - o A zip of your full github directory (i.e., interactive visualization and website).
    - o An instructions.txt file (i.e., README) that explains to a non-technical expert how to run your visualization locally on a computer (i.e., you will probably need to include instructions for running a local server). You cannot assume the community partner is tech savvy, so you should name your README file something easy to understand "instructions" and give very clear step-by-step instructions of how to view your website. Also describe what the different files are included.
- Data analysis and exploration (***analysis.zip***):
    - o A copy of your Assignment 4 analysis report.
    - o Copies of all the original data provided to you by your community partner.

- o Copies of the data after you cleaned it up.
- o Copies of any relevant Tableau files you used for exploring the data.
- **A composed letter** as PDF which thanks the partner for their help this semester, and provides them with a short high-level overview of the files you are sharing as well as short summary of your project topic. In the letter each group should also identify a contact person on your team that your community partner can reach out to over the coming months if they have any follow-up questions.