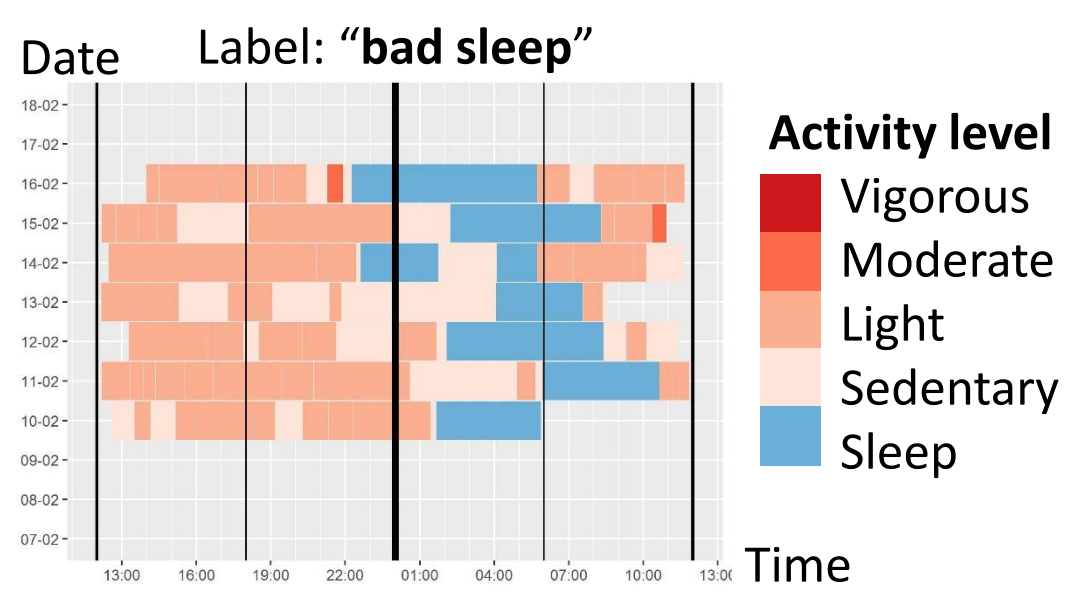
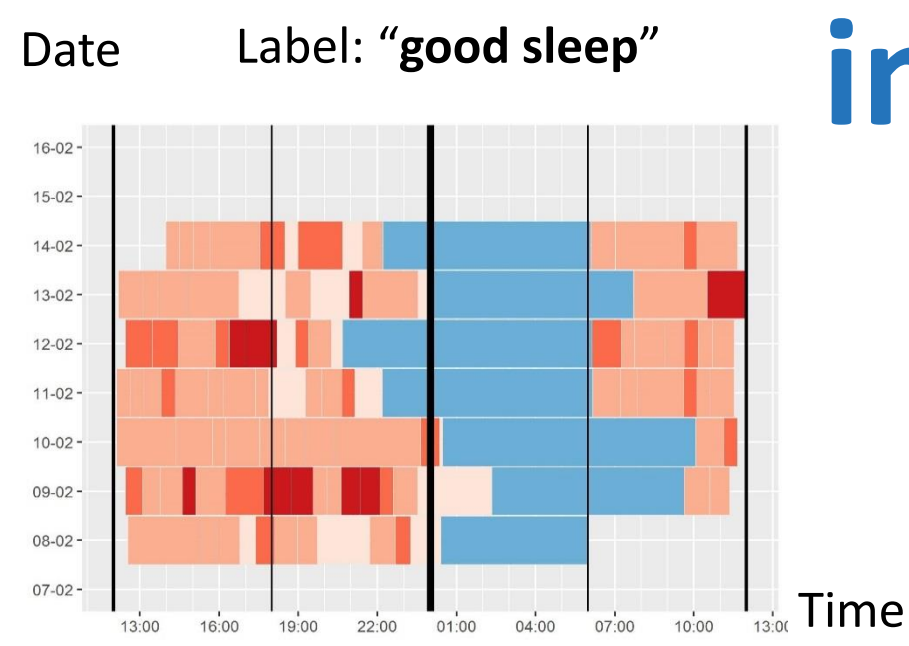


Toward Interactive Labeling with Voronoi Treemaps

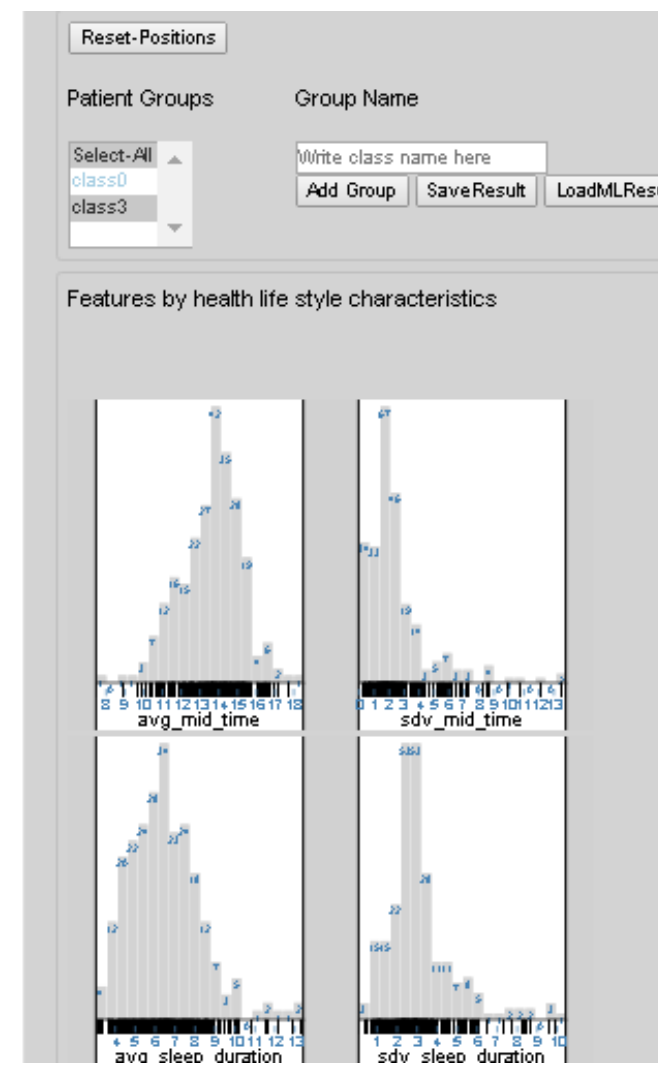
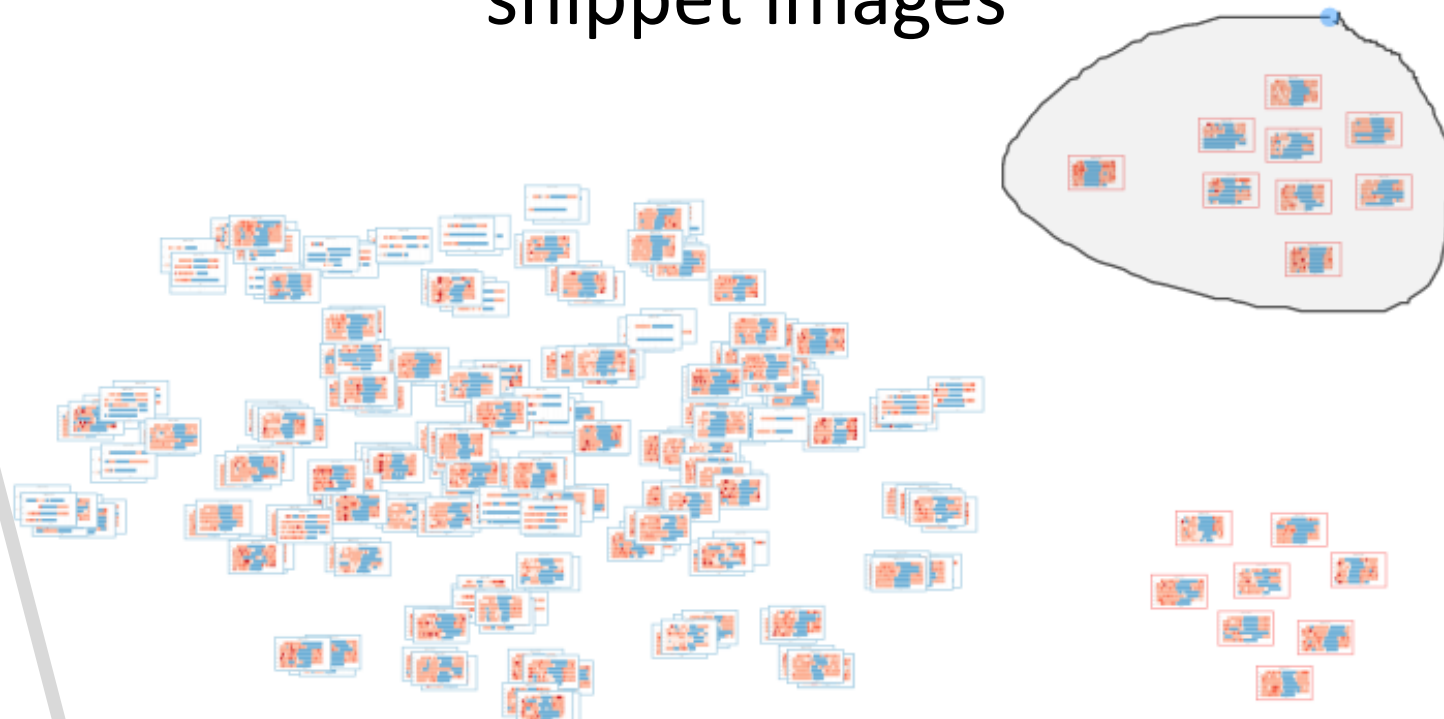
aabuthawabeh@hbku.edu.qa
maupetit@hbku.edu.qa



Each snippet image represents the physical activity of a patient



Grouping by Lasso and drag&drop of snippet images



Base layout interface

Annotation and analysis of the feature distribution of the selected group in the side panel

Interactive visualization for user to create groups of data and annotate them. [1]

For getting better understanding of a complex domain.

Visual Interactive Labeling

For training automatic classifiers

We study the design of a new interface based on a Voronoi treemap [2] to create, move, split and merge groups of data represented as snippet images.

(A) Images rapidly overlap, stacking up and cluttering

(B) Groups take convoluted shapes due to lasso selection

Clinician user feedback

(C) Long time is necessary for tidying up the layout.

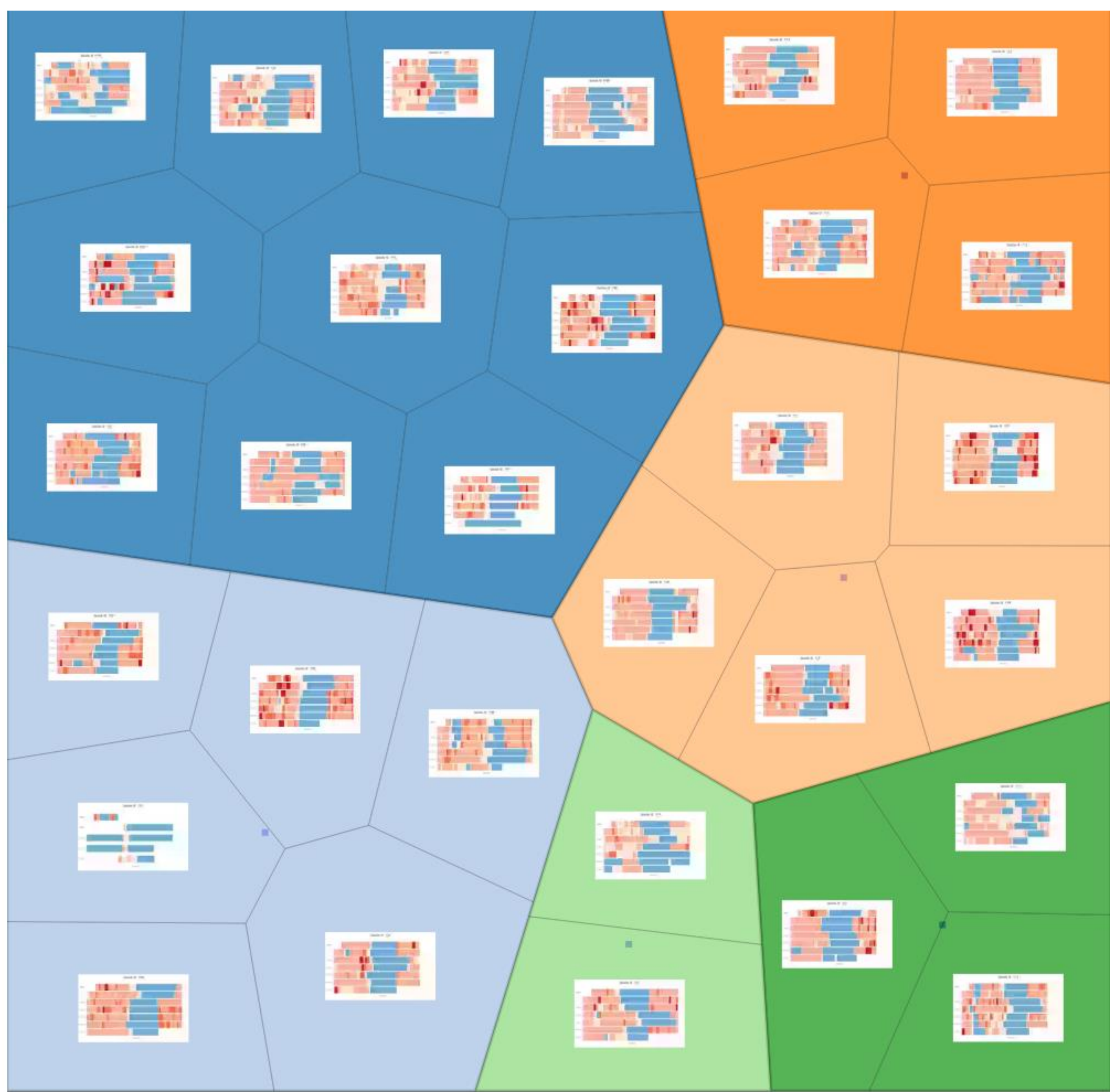
(D) Moving several items from one group to another is cumbersome, needs re-annotating these items.

(A,B,C) use auto-spreading

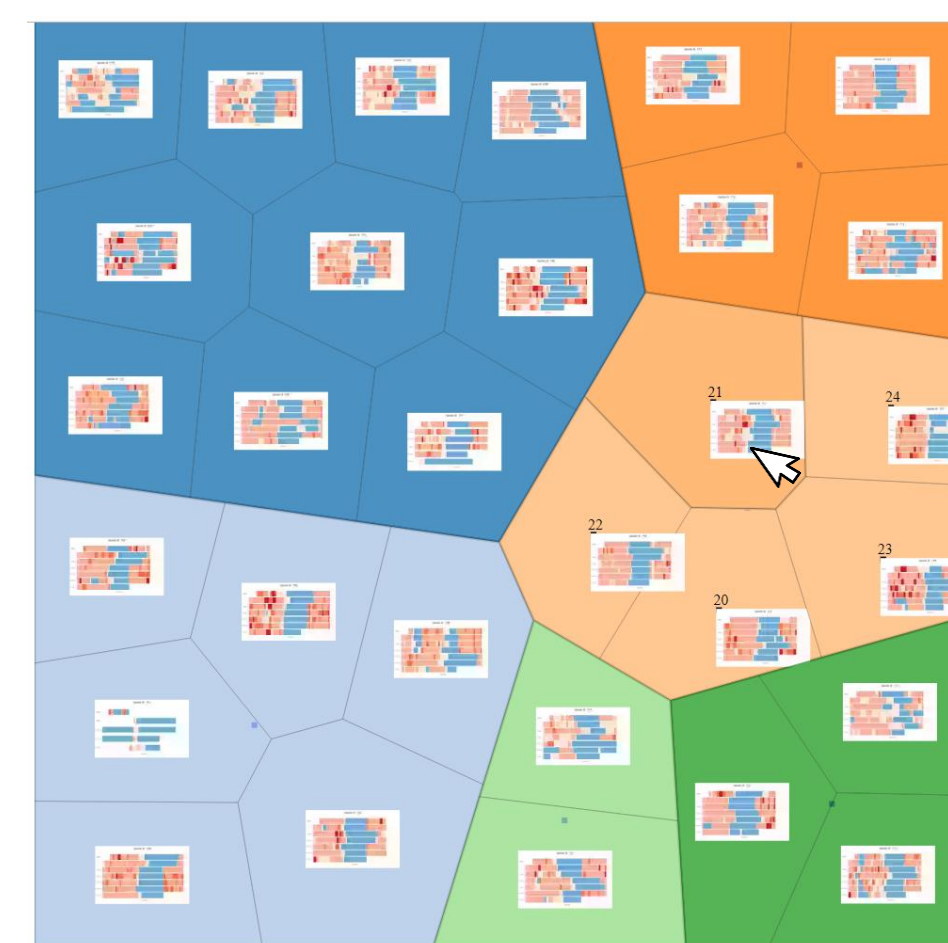
Design solutions

(D) use grouping and annotation by proximity

Interactive Voronoi Treemap

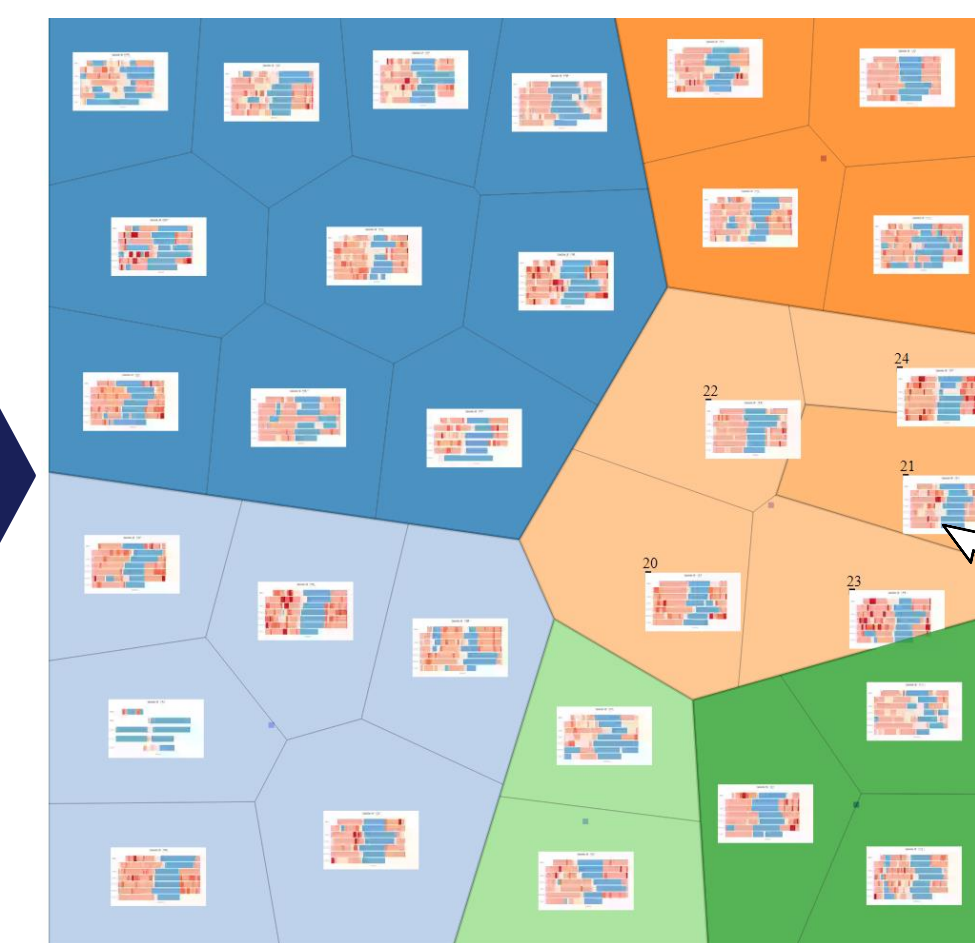


Move data within group



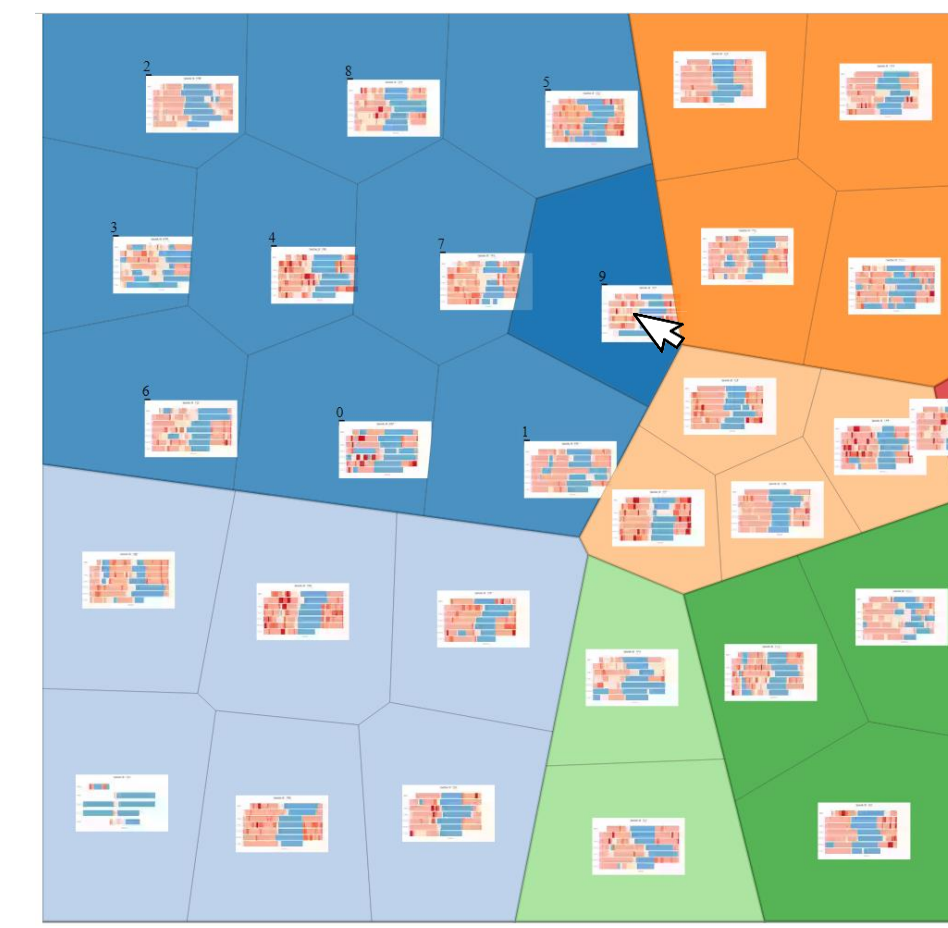
by drag&drop

Create group



by drag&drop outside

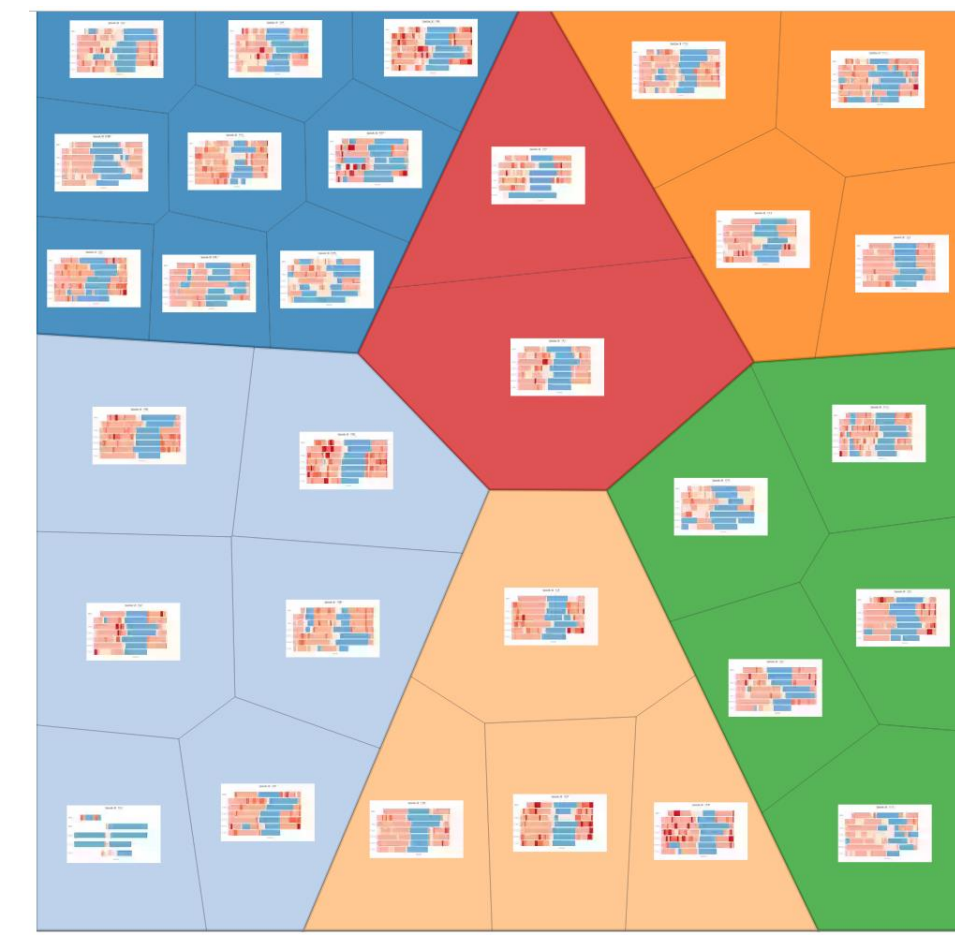
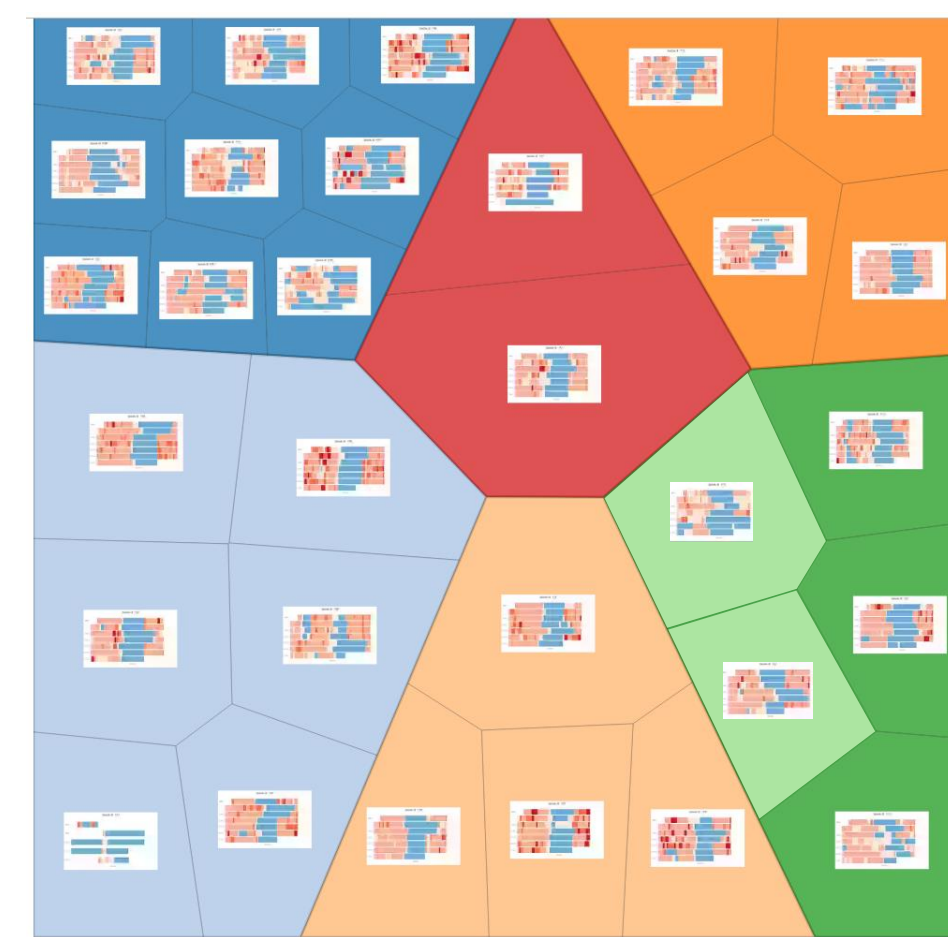
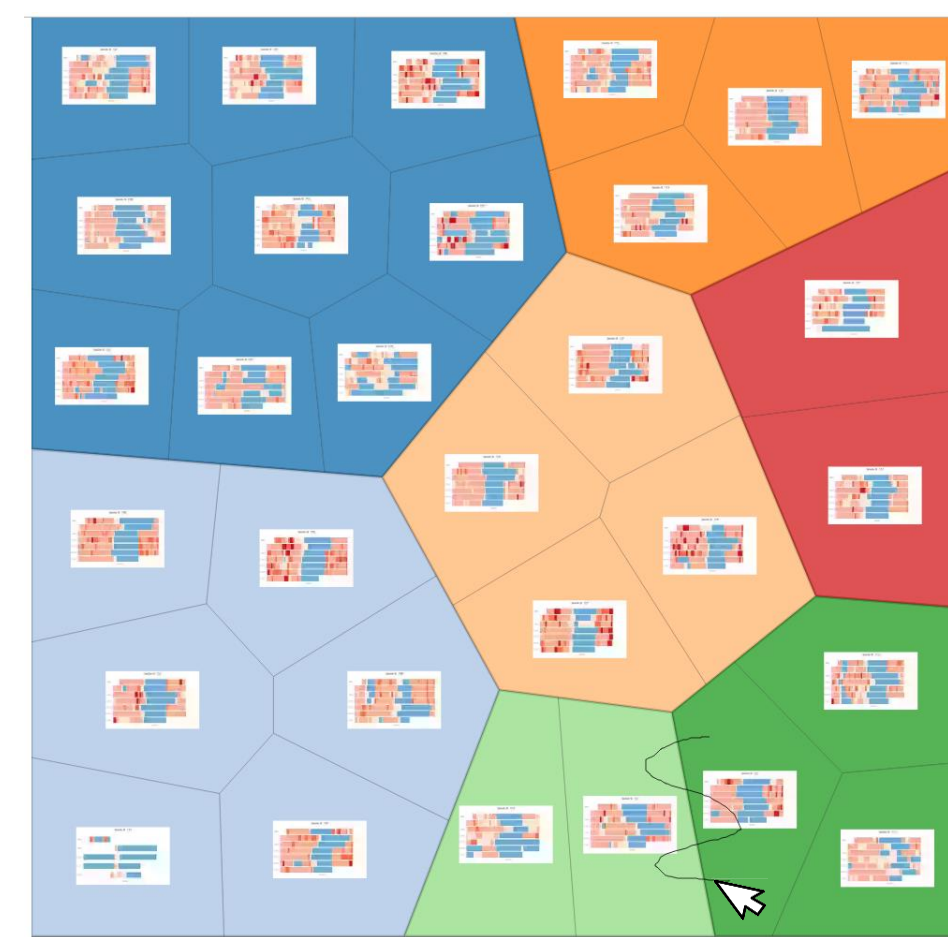
Move data to another group



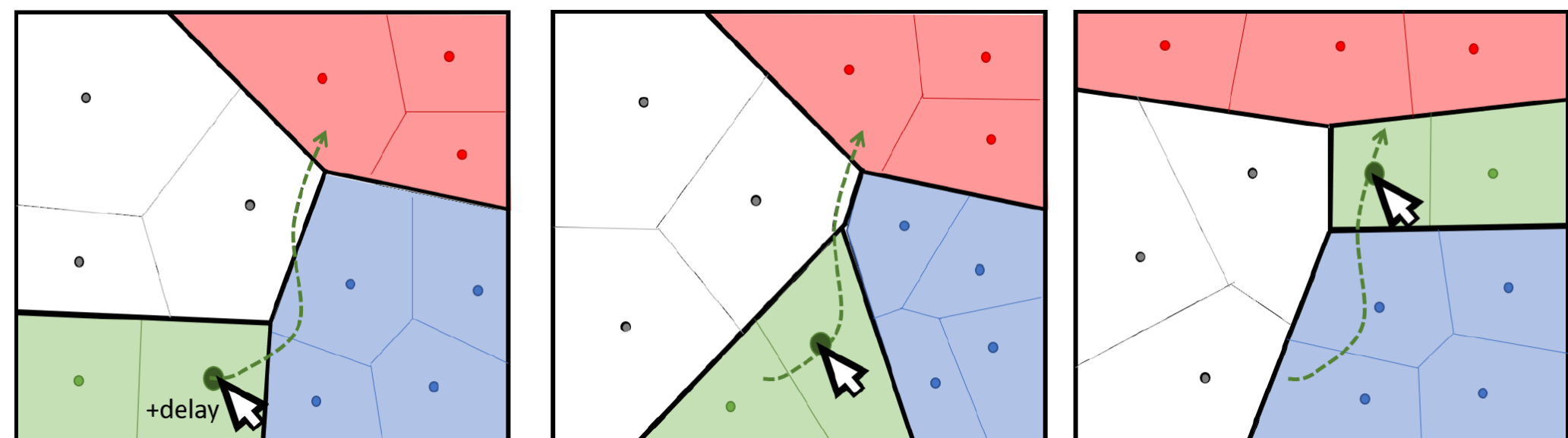
by drag&drop

Merge two groups

by stitching their common border

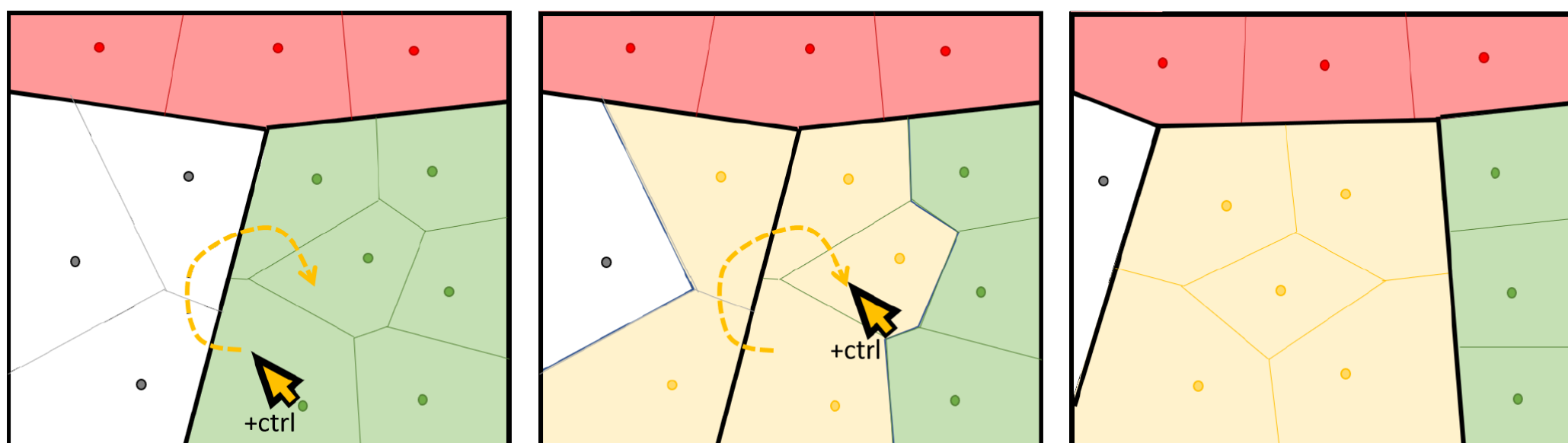


Move Group

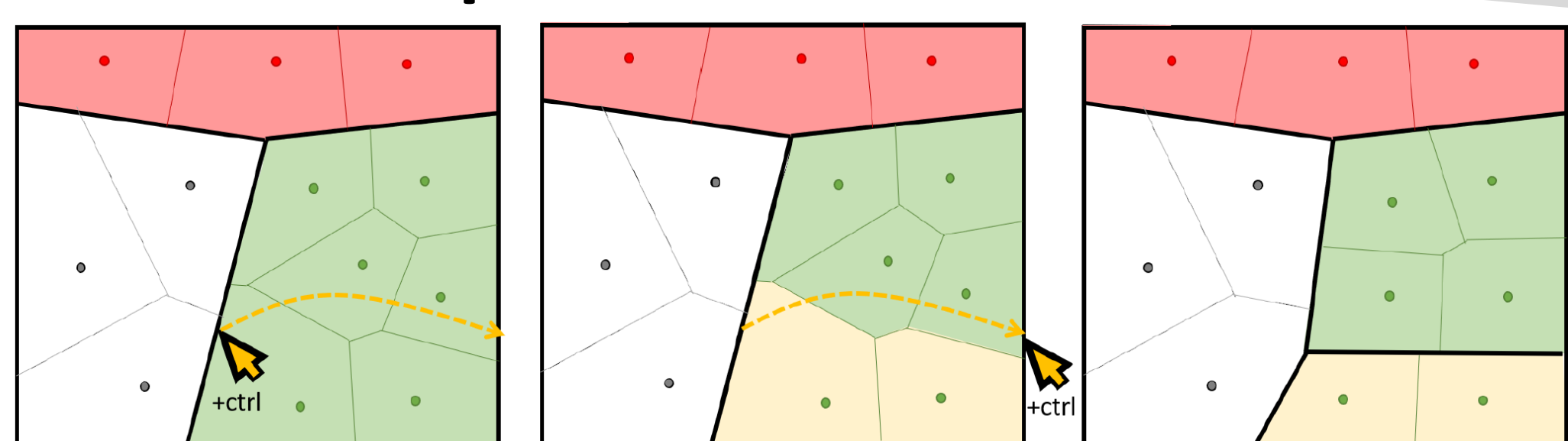


Work in progress

Split Groups



Slice a Group



Evaluate usability

Future work

Design and implement interactions for multi-level hierarchy

Related work

good bad

Metaphor	Technical solution		Characteristics			
	Auto-spreading	G+A by prox.	Loc.	Param.	Neighb.	Positioning
Base Layout	None	None	Any	None	None	Interactive
Node-link	FDP	Net. topology	Any	FDP	Fixed	Interactive
Bubble tree	FDP	Bubble contact	Any	FDP	Rad.+Loc.	Interactive
Grid	StoG, J-V	Grid adjacency	Grid	Grid size	Loc.	Interactive
Voro. treemap	CVD	Voro. adjacency	Anv	None	Fixed	Static
Our solution	CVD	Voro. adjacency	Any	None	Loc.	Interactive

Force-Direct. Placement (FDP), Snap-to-Grid (StoG), Centroidal Voronoi Diagrams (CVD) [2], Jonker-Volgenant (J-V) [3],

References

- [1] J. Bernard, M. Zeppelzauer, M. Sedlmair, and W. Aigner. VIAL: a unified process for visual interactive labeling. *The Visual Computer*, 34(9):1189–1207, 2018.
- [2] A. Nocaj and U. Brandes. Computing voronoi treemaps: Faster, simpler, and resolution-independent. *Computer Graphics Forum*, 31(3pt1):855–864, 2012.
- [3] R. Jonker and A. Volgenant. A shortest augmenting path algorithm for dense and sparse linear assignment problems. *Computing*, 38(4):325–340, 1987