EG2013 Tutorial on VIDEO VISUALIZATION

8. Summary and Overall Q & A

Min Chen

University of Oxford

Tutorial Schedule

- Tutorial Introduction (10 min)
- A "Hello" Pipeline and Use Case (15+5)
- The Taxonomy of Video Visualization (25+5)
- Visual designs for video visualization (25+5)



Coffee/Tea Break

- Visual analytics of Videos (15+5)
- Empirical Studies and User Evaluation (25+5)
- Applications (25+5)
- Summary and overall Q&A (5+5)



Why Visualization?

- There is a more fundamental reason.

Analyzing vision at the complexity level

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THE COMPLEXITY OF VISUAL SEARCH TASKS

John K. Tsotsos

How Does Human Vision Beat the Computational Complexity of Visual Perception?*

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Behaviorist intelligence and the scaling problem

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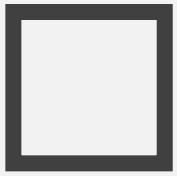
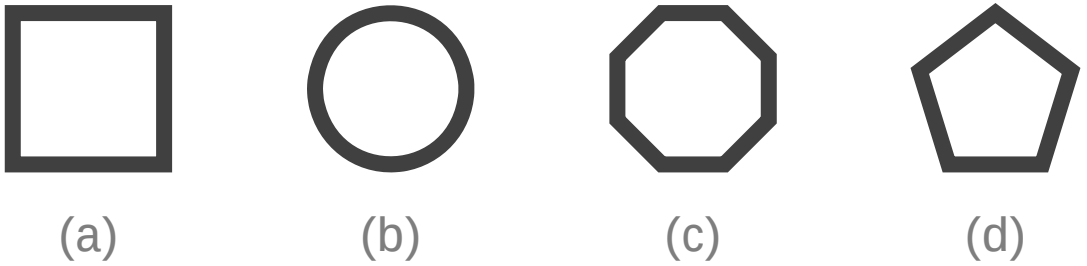
Received October 1992; revised November 1993

Bounded Visual Search

template





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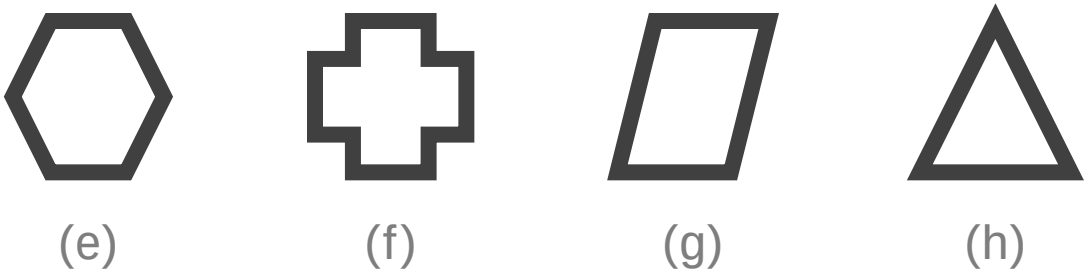
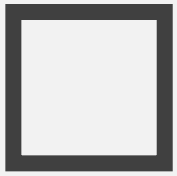


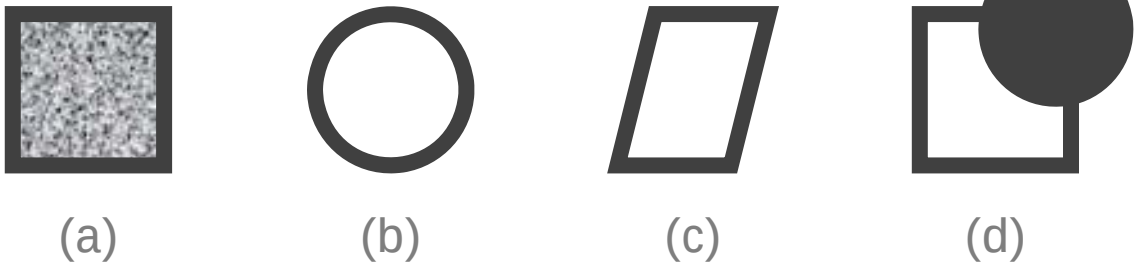
(e) (f) (g) (h)

(i) (j) (k) (l)

Unbounded Visual Search

hint





(a) (b) (c) (d)

(e) (f) (g) (h)

(i) (j) (k) (l)

Why Visualization?

Given

- an image $\mathbf{I}$ of n pixels, and a hint image $\mathbf{H}$, where each pixel $p \in \mathbf{I}$ is associated with a value $v(p)$,
- a difference function $\mathrm{DIFF}(v(p))$, and a correlation function $\mathrm{CORR}(v(p))$,
- two positive integers a and b,

To find a subset of $\mathbf{J} \subseteq \mathbf{I}$, such that

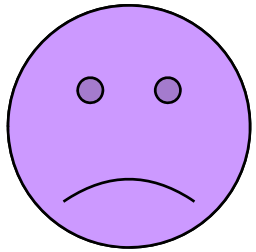
- $\sum_{p \in \mathbf{J}} \mathrm{DIFF}(v(p)) \leq a$ and $\sum_{p \in \mathbf{J}} \mathrm{CORR}(v(p)) \leq b$.

- This is basically the Knapsack problem,
- which is known to be NP-complete.

Why Visualization?

Unbounded Visual Search with Machine Intelligence

Decision



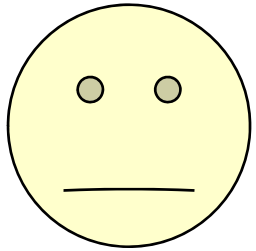
NP-complete

O(1)

Polynomial Video Processing Techniques

Video Visualization

Abstract Visual Represen-tations



O(N) or P

O(N)

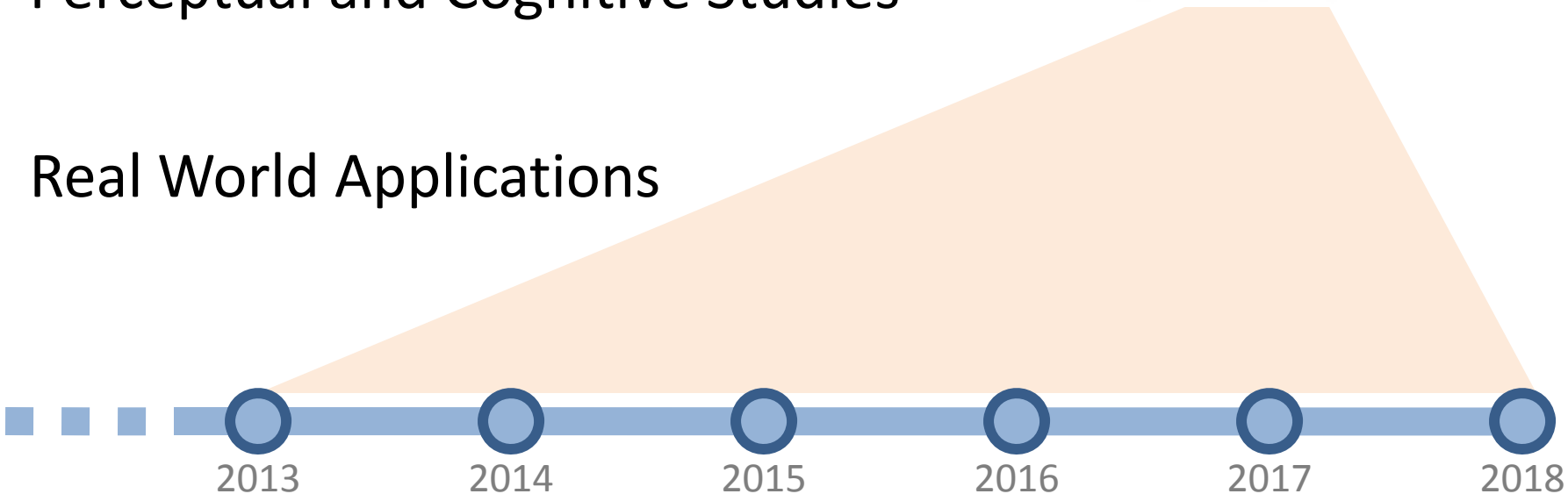
?

Video Visualization: Future Work

- New Visual Designs
- Fast Rendering Techniques
- More Effective Visual Analytics

- Mathematical Theories
- Perceptual and Cognitive Studies

- Real World Applications



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Questions and Answers

Rita Borgo, Swansea University
Min Chen, University of Oxford
Markus Höferlin, University of Stuttgart
Kuno Kurzhals, University of Stuttgart
Phil Legg, Swansea University
Simon Walton, University of Oxford
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