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DATA & TASK ABSTRACTION

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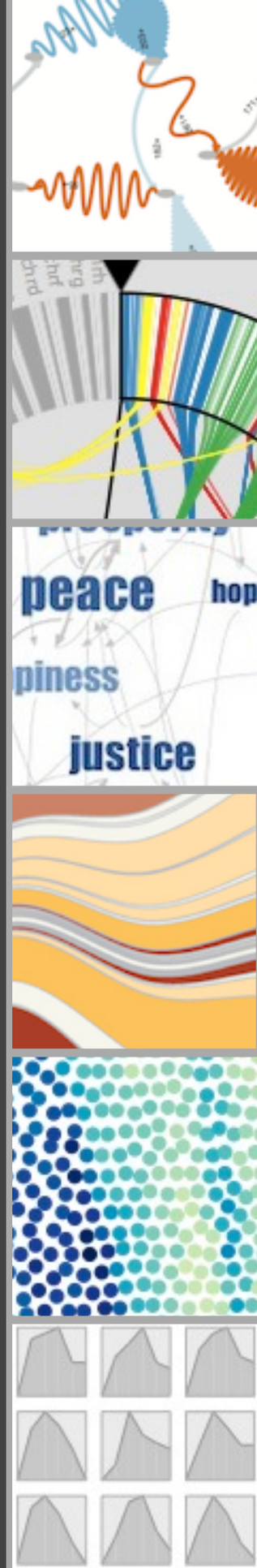

LAST TIME

- **analysis task taxonomy**

- **interaction principles**
  - classes of change
  - eyes over memory

target

translate

design

implement

validate

THE PANCAKE RECIPE CHALLENGE

PHASE 3

- go over designs with teammate
- create new team, go over designs
- articulate unified goal *(step 1)*
- create affinity diagram *(steps 2 and 3)*
- sketch design ideas *(step 4)*
- sketch interface *(step 4)*
- class presentations *(step 4)*

L8: Visual Representations

REQUIRED READING

5

Single View Methods

A first consideration in the design of a visualization technique is view composition. The highest-level question is whether a system uses only a single view, or multiple views in concert.

This chapter covers the set of visualization methods that integrate all information within a single composite **view**, where everything is visible in a single window frame. The chapter first discusses the basic visual encodings, and then ways to layer and superimpose multiple encodings within the same view. It concludes with a discussion of glyphs, where a single geometric primitive has more complex structure than a simple mark.

5.1 Basic Visual Encodings

To reiterate the principles of visual encoding covered in Section 3.3, the effectiveness principle dictates matching the importance order of the attributes with the rankings of the visual channels, from most important and highest to least important and lowest.

5.1.1 Spatial Position

Scented Widgets: Improving Navigation Cues with Embedded Visualizations

Wesley Willett, Jeffrey Heer, and Maneesh Agrawala

Abstract—This paper presents *scented widgets*, graphical user interface controls enhanced with embedded visualizations that facilitate navigation in information spaces. We describe design guidelines for adding visual cues to common user interface widgets such as radio buttons, sliders, and combo boxes and contribute a general software framework for applying scented widgets within applications with minimal modifications to existing source code. We provide a number of example applications and describe a controlled experiment which finds that users exploring unfamiliar data make up to twice as many unique discoveries using widgets imbued with social navigation data. However, these differences equalize as familiarity with the data increases.

Index Terms—Information visualization, user interface toolkits, information foraging, social navigation, social data analysis.

1 Introduction

The success of an interactive visualization depends not only on the visual encodings, but also on the mechanisms for navigating the visualized information space. These navigational mechanisms can take many forms, including panning and zooming, text queries, and dynamic query widgets. However, effective navigation relies on more than input techniques alone; *appropriate visual navigation cues can aid users by guiding and refining their exploration.*

Both psychological and sociological considerations suggest approaches for improving navigation cues. Pirolli and Card's information foraging theory [17] models the cost structure of human information gathering analogously to that of animals foraging for food. One result of this theory is the concept of *information scent*—a user's "(imperfect) perception of the value, cost, or access path of information sources obtained from proximal cues" [17]. Improving information scent through better proximal cues lowers the cost structure of information foraging and improves information access.

While effective information scent cues may be based upon the underlying information content (e.g., when the text in a web hyperlink describes the content of the linked document, it serves as a scent), others may involve various forms of metadata, including

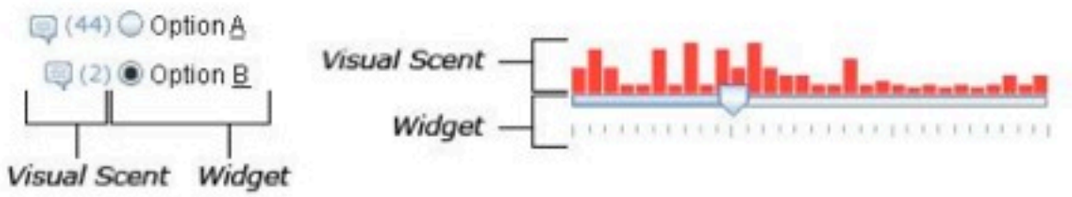

Figure 1. Widgets with visual information scent cues. Left: Radio buttons with comment counts. **Right**: Histogram slider with data totals.

social data analysis by enabling social navigation within the analytic environment of the visualization. We introduce *scented widgets*; enhanced user interface widgets with embedded visualizations that provide information scent cues for navigating information spaces (see Figure 1 for examples). We propose design guidelines for adding embedded visualizations to common user interface controls such as radio buttons, sliders, and combo boxes. We then present a Java-based toolkit-level software framework, developed according to these guidelines, that allows scented widgets to be added to user interfaces and bound to backing data sources. This framework allows visual navigation aids to be added to existing applications with minimal modifications to application source code. We also provide