MULTIPLE VIEWS

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LAST TIME
SPATIAL POSITION

bar chart

histogram
SPATIAL POSITION

dot plot

line chart
BANKING TO 45°

The aspect ratio of a graph is an important factor for judging rate of change.

perceptual principle: most accurate angle judgement is at 45°
layering: global compositing
layering: item stacking
scented widgets

**information scent:** user’s (imperfect) perception of data

**GOAL:** lower the cost of information forging through better cues

Willett 2007
interactive legends

define and control visual display together

controls combining the visual representation of static legends with interaction mechanisms of widgets

Riche 2010
administrivia
feb 14-23 : proposal meetings

march 7 : presentation topics due

march 9 : proposals due

march 27-april 3 : project updates

april 5-24 : paper presentations

may 1 : final project presentations

may 3 : process books due
- linking choices

- view choices
comments on readings?
- linking choices
  - linked highlighting
  - linked navigation

- view choices
LINKED VIEWS
multiple views that are simultaneously visible and linked together such that actions in one view affect the others
LINKED HIGHLIGHTING
LINKED NAVIGATION

http://www.historyshots.com/rockmusic/
- linking choices

- view choices
  - encoding: same or multiform
  - dataset: same or small multiple
  - data: all or subset (overview/detail)
  - conditioning
MULTIFORM

difference visual encodings are used between the views
VisBricks: Multiform Visualization of Large, Inhomogeneous Data

Alexander Lex, Hans-Jörg Schulz, Marc Streit, Christian Partl and Dieter Schmalstieg

Large volumes of real-world data often exhibit inhomogeneities: vertically in the form of correlated or independent dimensions, horizontally in the form of clustered or scattered data items. In essence, these inhomogeneities form
SMALL MULTIPLE

each view uses the same visual encodings but shows a different data set
OVERVIEW & DETAIL

one view shows information about entire dataset, while additional view(s) shows more detailed information about a subset of the data
**CONDITIONING**
divide the dataset into subsets; show each subset in a different small multiples view

**CONDITIONING VARIABLES**
dataset attributes used to chunk data into subsets

**ENCODING VARIABLES**
other dataset attributes used to visually encode the subsets
3.65 CONDITIONING. A scatterplot matrix displays trivariate data: measurements of abrasion loss, hardness, and tensile strength for 30 rubber specimens. The "+" plotting symbols encode the data for those specimens with hardness less than 62 °Shore.
HiVE
Hierarchical Visual Expression

- **conditioning**: transform multidimensional data into a hierarchy
- reconfigure conditioning hierarchies to explore data space
- use **treemaps** as spacefilling rectangular layouts
TREEMAP
- **conditioning**: transform multidimensional data into a hierarchy
- reconfigure conditioning hierarchies to explore data space
- use **treemaps** as spacefilling rectangular layouts
  - each rectangle is a conditioned subset
  - nested graphical summaries
    - size, shape, color used to show subset properties
    - containment ordering by condition variables
HiVE example: London property

**conditioning variables**
- house type
- neighborhood
- sale time

**encoding variables**
- average price (color)
- number of sales (size)

**results**
- between neighborhoods, different housing distributions
- within neighborhoods, similar prices

Slingsby 2009
HiVE example: London property

conditioning variables
- neighborhood location
- neighborhood
- house type
- sale time (year)
- sale time (month)

encoding variables
- average price (color)
- n/a (size)

results
- expensive neighborhoods
- near center of city
Configuring Hierarchical Layouts to Address Research Questions

Aidan Slingsby, Jason Dykes and Jo Wood
giCentre, Department of Information Science, City University London
http://www.gicentre.org/hierarchical_layouts/
TRELLIS

- panel variables
  - visual encoding attributes

- conditioning variables
  - assign to columns, rows, and pages

- main-effects ordering
  - order conditioning variable levels/states based on derived data
  - support perception of trends and structure in data
sort by group medians
critique
L10: Filtering and Aggregation

REQUIRED READING
Item Reduction Methods

The past two chapters that discuss view composition have only minimally addressed the question of whether any particular view shows all available data, or only part of it. Many datasets are so large that trying to show everything simultaneously would lead to incomprehensible clutter. There are two major families of methods for reducing the amount of information shown. This chapter begins the discussion with item reduction methods, where the goal is to reduce the number of items that need to be shown. The next chapter continues with methods for reducing the number of data attributes shown.

There are two major methods of item reduction, filtering and aggregation. With filtering, only a subset of the items are shown. Navigation can be thought of as a special case of filtering, where the subset is chosen based on a spatial viewpoint. While unconstrained navigation is easy to implement, constrained navigation can be much easier to use. Zooming in to see fewer items in more detail can be done geometrically, matching the semantics of real-world motion. With semantic zooming, the way to draw items adapts on the fly based on the number of available pixels, so appearance can change dramatically rather than simply shrinking or enlarging.
A Review of Overview+Detail, Zooming, and Focus+Context Interfaces

ANDY COCKBURN†, AMY KARLSON†, BENJAMIN B. BEDERSON†

There are many interface schemes that allow users to work at, and move between, focused and contextual views of a data set. We review and categorise these schemes according to the interface mechanisms used to separate and blend views. The four approaches are overview+detail, which uses a spatial separation between focused and contextual views; zooming, which uses a temporal separation; focus+context, which minimizes the seam between views by displaying the focus within the context; and cue-based techniques which selectively highlight or suppress items within the information space. Critical features of these categories, and empirical evidence of their success, are discussed. The aim is to provide a succinct summary of the state-of-the-art, to illuminate successful and unsuccessful interface strategies, and to identify potentially fruitful areas for further work.

Categories and Subject Descriptors: D.2.2 Design Tools and Techniques—User Interfaces; H.5.2 User Interfaces—Graphical User Interfaces (GUI)
General Terms: Human Factors
Additional Key Words and Phrases: Information display, information visualization, focus+context, overview+detail, zoomable user interfaces, fisheye views, review paper.

1. INTRODUCTION

In most computer applications, users need to interact with more information and with more interface components than can be conveniently displayed at one time on a single screen. This need is dictated by pragmatic, technological, and human factors. The pragmatic issues concern form-factors such as the size, weight, and fashion of displays that are used for varied tasks in diverse locations, as well as the cost of construction. Technological limitations constrain the ability of displays to match the breadth and acuity of human vision. However, for interactive systems, the authorisation and performance initiate...