Fisheye Views  

G. Furnas, CHI 86

```c
int t[10000];
t[0] = (t[0] + 10000) % 10000;
for(i=1;i<k;i++)
    t[i] = (t[i] + 10000) % 10000;
    t[i-1] = (1 - t[i-1]/10000);
if(k-1 % 10000)
    break;
    t[k-1] = 0;
    case 'e':
    for(i=0;i<k;i++) t[i] = x[i];
    break;
    case 'q':
    exit(0);
    default:
    if(!noprint)
        if(i==k-1; t[i] <= 0 && i > 0; i--;
            printf("%d", t[i]);
            if(i > 0) "
```

Conventional view of C program
First-order fisheye view of C program, where focus is line 39 (same number of lines, redrawn using compaction)

First-order fisheye view (underlined code) vs. conventional view (boxed code)
Fisheye Menus

- Apple macOS dock with “Magnification” enabled
  - But, remember Fitts’s Law!

Data Types: 2D Spatial

- Inherently spatial data
  - Maps
Data Types: 2D Spatial

- Use of distortion viewing to provide “focus+context”

Simple magnification loses context

Robertson and Mackinlay, UIST 93

- Change scale in focus relative to context

Data Types: 2D Spatial

Inherently spatial data: Distortion viewing applied to a map

Redrawn version of DC Metro Map
http://www.cambooth.net/washington-metro-diagram-my-last-word/

Distortion viewing applied to redrawn DC Metro Map
http://holisticsofa.com/category/visualization/page/3/
Data Types: 2D Spatial

- Abstract data
  - Need to select bindings to XY coordinates
  - Can use semantic zoom
    - Zooming (magnification/minification) that changes the representation (e.g., shape, format, level of detail) instead of or in addition to geometric scale

Data Types: Multidimensional

- Abstract data
  - Parallel coordinates (A. Inselberg)
    - $N$ variables represented by $N$ parallel axes
    - Multivariate point depicted as a polyline connecting vertices on axes
  - Interaction
    - Limit range on axis
    - Scale axis
    - Reorder axes

E.g., http://www.parallelcoordinates.de/paco/
Tasks: Overview

- Panning/scrolling over display
- Separate “overview” display with “you are here” marker
  - E.g., Sublime Text 2

Tasks: Overview

- Focus+context
  - Handle overview and zoom tasks in same display
  - Focus items receive greater
    - Magnification and/or
    - Level-of-detail
  - Alternatively, two geometrically registered displays can be used
    - Feiner & Shamash, 91
    - Baudisch et al., 01
    - Jones et al., 13

S. Feiner & A. Shamash, UIST 91
Focus = flat panel;
Context = Head-worn display

P. Baudisch, N. Good, & P. Stewart, UIST 01
Focus = flat panel;
Context = projector
Tasks: Overview

- Focus+context
  - Handle overview and zoom tasks in same display
  - Focus items receive greater
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Tasks: Zoom

- Current example: Prezi

Not really information visualization, but builds on this work…

B. Jones, H. Benko, E. Ofek, & A. Wilson, CHI 2013
Focus = flat panel TV
Context = projector illuminating room
Tasks: Filter

- Narrow scope by eliminating (or de-emphasizing) “uninteresting” items
- Dynamic queries
  - Widgets specify queries
  - Satisfied interactively during manipulation
- Google instant
- Examples in which filters are satisfied after widget manipulation
  - spotfire.tibco.com/demos
  - bluenile.com “Search for Diamonds”

Tasks: Details-on-demand

- Present additional information when requested
- Examples
  - Separate window/display
  - “Popup”/overlay/“tool tip”
  - Modify rendering of item to increase detail
Tasks: History

- Show historical evolution
- Support undo/redo
- Support creation of variants
- Range of examples
  - Single level undo/redo
  - Multilevel undo/redo
  - Photoshop history
    - Non-linear history
    - History brush
  - Editable Graphical Histories
  - Automatically generated tutorials

E.g., hypertext browsing history