Treemap Art Project: Aesthetics in Information Visualization

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Interdisciplinary research community
- Computer Science & Info Studies
- Psych, Socio, Educ, Jour & MITH

www.cs.umd.edu/hcil
vimeo.com/72440805
Design Issues

• Input devices & strategies
  • Keyboards, pointing devices, voice
  • Direct manipulation
  • Menus, forms, commands

• Output devices & formats
  • Screens, windows, color, sound
  • Text, tables, graphics
  • Instructions, messages, help

• Collaboration & Social Media

• Help, tutorials, training

• Search

• Visualization
Information Visualization & Visual Analytics

1999
Information Visualization & Visual Analytics

Visual bandwidth is enormous
Human perceptual skills are remarkable
Trend, cluster, gap, outlier...
Color, size, shape, proximity...

Three challenges
Meaningful visual displays of massive data
Interaction: widgets & window coordination
Process models for discovery

1999 2004
Information Visualization & Visual Analytics

- Visual bandwidth is enormous
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- Trend, cluster, gap, outlier...
- Color, size, shape, proximity...

Three challenges:
- Meaningful visual displays of massive data
- Interaction: widgets & window coordination
- Process models for discovery

1999

2004

2010
Spotfire: Retinol’s role in embryos & vision
Spotfire: DC natality data
Information Visualization: Cultural Meme
Information Visualization: Mantra

- Overview, zoom & filter, details-on-demand
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Information Visualization: Data Types

SciViz

• 1-D Linear
  Document Lens, SeeSoft, Info Mural

• 2-D Map
  GIS, ArcView, PageMaker, Medical imagery

• 3-D World
  CAD, Medical, Molecules, Architecture

InfoViz

• Multi-Var
  Spotfire, Tableau, Qliktech, Visual Insight

• Temporal
  LifeLines, TimeSearcher, Palantir, DataMontage

• Tree
  Cone/Cam/Hyperbolic, SpaceTree, Treemap

• Network
  Pajek, UCINet, NodeXL, Gephi, Tom Sawyer

• Text
  TagClouds, Wordle, ManyEyes, Ngram Viewer

infosthetics.com  visualcomplexity.com  eagereyes.org
flowingdata.com  perceptualedge.com  datakind.org
visual.ly  Visualizing.org  infovis.org
Treemap: Gene Ontology

+ Space filling
+ Space limited
+ Color coding
+ Size coding

- Requires learning


Treemap: Smartmoney MarketMap

www.smartmoney.com/marketmap
Market falls steeply Feb 27, 2007, with one exception.
Market mixed, February 8, 2008

Energy & Technology up, Financial & Health Care down
Market rises, September 1, 2010, Gold contrarians
FinViz: Mixed day, July 30, 2015

https://finviz.com/map.ashx
FinViz: Bad day, August 21, 2015
FinViz: Better day, August 25, 2015

Use mouse wheel to zoom in and out. Drag zoomed map to pan it. Double-click a ticker to display detailed information in a new window. Hover mouse cursor over a ticker to see its main competitors in a stacked view with a 3-month history graph.
Treemap: Newsmap.jp (Marcos Weskamp)

Turkey Denies Reports of Deal for Use of Its Bases in Fight Against Islamic State

Mobs Confront Hong Kong Students Readying for Police Showdown

Scuffles in Hong Kong, some barricades torn down, others fortified

Old-school Royals doing it with speed, defense

Frequently asked questions about Ebola

The infection of health workers in Madrid and Dallas with Ebola marked the first cases in which people contracted the deadly virus outside of Africa. The number of cases in West Africa, where the worst-ever outbreak is raging, keeps climbing. More than 8,000.

Frequently asked questions about Ebola

Ebola UK: Screening starting at Heathrow Airport on Tuesday

4000 Deaths And Counting: The Ebola Epidemic In 4 Charts

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Treemap: WHC Emergency Room
(6304 patients in Jan2006)

Group by Admissions/MF, size by service time, color by age
Treemap: WHC Emergency Room
(6304 patients in Jan2006) (only those service time >12 hours)

Group by Admissions/MF, size by service time, color by age
Treemap: Nutritional Analysis
Treemap: Spotfire Bond Portfolio Analysis
Treemap: NY Times – Car & Truck Sales

Truck Sales Slip, Tripping Up Chrysler

The past few years, Chrysler executives said they were following the lead of Toyota and Honda, focusing on vehicles that met the needs of their customers. But as American consumers turned away from large trucks and SUVs in 2006, Chrysler continued to churn out big vehicles, which were now selling at dealerships across the country.

Ford

-6.3%

Trucks/SUVs: 1.8 million
CARS: 1.1 million

Even the country’s best-selling vehicle, the F-150, slipped in 2006, with sales dropping 13 percent. One of Ford’s bright spots was the mini-Fusion sedan, which made its debut with a new look and sold well in its first full year.

General Motors

-8.7%

Trucks/SUVs: 2.5 million
CARS: 1.6 million

GM introduced new versions of its large SUVs in late 2005, hoping they would bolster sales. Instead, sales of big vehicles were hurt when gas prices climbed. One of the few standouts was the Hummer H3, new in 2006.

Chrysler

-7.6%

Trucks/SUVs: 1.6 million
CARS: 0.5 million

Pickups, minivans and SUVs made up 76 percent of Chrysler’s sales, which left it vulnerable when consumers shifted to cars.

Toyota

+12.5%

Trucks/SUVs: 1.1 million
CARS: 1.5 million

Toyota rolled out new versions of the Camry and, once again, it was the country’s best-selling car. Toyota also added the smaller Toyota Corolla.

Honda

+32.2%

Trucks/SUVs: 0.7 million
CARS: 0.8 million

Like the Corolla, the small Honda Civic did well. But the Accord stalled. U.S. sales, however, are waiting for the new version to be released this year.

Nissan

-5.3%

Trucks/SUVs: 0.5 million
CARS: 0.6 million

BMW

+2.1%

Trucks/SUVs: 0.1 million
CARS: 0.3 million

Mercedes-Benz

+10.3%

Trucks/SUVs: 0.5 million
CARS: 1.2 million

Mercedes-Benz, crowned by Democrat Chiranjeevi, took its new C-Class, BMW’s entry-level 3 Series, and the Audi A4.
Treemap (Voronoi): NY Times - Inflation

All of Inflation’s Little Parts

Each month, the Bureau of Labor Statistics gathers 84,000 prices in about 200 categories — like gasoline, bananas, dresses and garbage collection — to form the Consumer Price Index, one measure of inflation.

An Average Consumer’s Spending

Each shape below represents how much the average American spends in different categories. Larger shapes make up a larger part of spending.

- Food and beverages 15%
  The high price of oil is a factor that has made food prices rise quickly.

- Miscellaneous 3%

- Recreation 6%

- Education/Communication 6%
  Cellphones were added to the Index in 1997. Because the Consumer Price Index can be slow to add new goods, which are often cheaper, it may overstate parts of inflation.

- Housing 42%
  In the CPI, home ownership costs track rent prices more closely than housing prices. This means inflation may have been understated when home prices were rising faster than rents.

- Transportation 18%
  Gas is 5.2 percent of spending nationwide, but only 3.8 percent in the New York area.

- Health care 6%
  As a group, the elderly spend about twice as much of their budget on medical care.

- Apparel 4%
  The ratio of spending on women’s clothes to that on men’s clothes is about 2 to 1.

It’s among the statistics that the Federal Reserve considered when it cut interest rates on Wednesday. The categories are weighted according to an estimate of what the average American spends, as shown below.

Sources: Bureau of Labor Statistics; Michael Balzer, University of Konstanz  Matthew Bloch, Shan Carter and Amanda Cox/The New York Times

www.nytimes.com/interactive/2008/05/03/business/20080403_SPENDING_GRAPHIC.html
Book of Trees: Manuel Lima

THE BOOK OF TREES
Visualizing Branches of Knowledge
Manuel Lima
Treemap Art Project

Treemap Art

This site features draft designs and full views of the Treemap Art project.

By Ben Shneiderman

Although I conceived treemaps for purely functional purposes (understanding the allocation of space on a hard drive), I was always aware that there were appealing aesthetic aspects to treemaps. Maybe my experiences with OP-ART movements of the 60s & 70s gave me the idea that a treemap might become a work of art. That idea has now revived in my contacts with Manuel Lima who is producing a coffee-table book on the history of trees that has several chapters on treemaps and their variations.

I believe that there are at least four aesthetic aspects of treemaps:

1. layout design (slice-and-dice, squarified, ordered, strip, etc.),
2. color palette (muted, bold, sequential, divergent, rainbow, etc.),
3. aspect ratio of the entire image (square, golden ratio, wide, tall, etc.),
4. prominence of borders for each region, each hierarchy level, and the surrounding box.

In addition certain treemaps are inherently interesting because of the data displayed or patterns revealed. The aesthetic choices appeal to different viewers and the data displayed also triggers interest by different viewers. So even though treemaps are constrained by algorithmic rules, the aesthetic and data choices leave much room for creative explorations.
Treemap Art Project
Treemap Art Project: User Experience

Aesthetics
• Layout (slice-and-dice, squarified, ordered, strip),
• Color palette (muted, bold, sequential, divergent, rainbow)
• Aspect ratio (square, golden ratio, wide, tall)
• Prominence of borders (regions, hierarchy & boundary)

Engagement
• Choice of data
• Degree of explanation
• Context

Treemapart.wordpress.com
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Data Art Philosophies

- Tufte: No Chartjunk, High data-to-ink ratio
- Few: Clean simple clear
- Holmes: Engaging infographics
- Wattenberg & Viegas: Graceful content
- Ericson, Cox, Bostock: Visual journalism
- Shneiderman: Algorithms & interactions
- Cairo, Yau, Lima,… Grubbs
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