CSE 332

INTRODUCTION TO VISUALIZATION

INFOGRAPHICS DESIGN

Klaus Mueller

Computer Science Department
Stony Brook University
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro, schedule, and logistics</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Basic tasks and data types</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data sources and preparation</td>
<td>Project 1 out</td>
</tr>
<tr>
<td>4</td>
<td>Notion of similarity and distance</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Data and dimension reduction</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Visual bias</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Introduction to D3</td>
<td>Project 2 out</td>
</tr>
<tr>
<td>8</td>
<td>Visual perception and cognition</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Visual design and aesthetic</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Cluster analysis</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>High-dimensional data – projective methods</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>High-dimensional data – scatterplot displays</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>High-dimensional data – optimizing methods</td>
<td>Project 3 out</td>
</tr>
<tr>
<td>14</td>
<td>Visualization of spatial data: volume visualization intro</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Visualization of spatial data: raycasting, transfer functions</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Illumination and isosurface rendering</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Midterm</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Scientific visualization</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td><strong>How to design effective infographics</strong></td>
<td>Project 4 out</td>
</tr>
<tr>
<td>20</td>
<td>Principles of interaction</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Midterm discussion</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Visual analytics and the visual sense making process</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Visualization of graphs and hierarchies</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Visualization of time-varying and streaming data</td>
<td>Project 5 out</td>
</tr>
<tr>
<td>25</td>
<td>Maps</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Memorable visualizations, visual embellishments</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Evaluation and user studies</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Narrative visualization, storytelling, data journalism, XAI</td>
<td></td>
</tr>
</tbody>
</table>
A clipped compound of "information" and "graphics"

A graphic visual representations of information, data or knowledge intended to present information
- quickly
- clearly

Can improve cognition by utilizing graphics to enhance the human visual system's ability to see patterns and trends
Graphical displays should

- show the data
- induce the viewer to think about the substance rather than about methodology, graphic design, the technology of graphic production, or something else
- avoid distorting what the data has to say
- present many numbers in a small space
- make large data sets coherent
- encourage the eye to compare different pieces of data
- reveal the data at several levels of detail, from a broad overview to the fine structure
- serve a reasonably clear purpose: description, exploration, tabulation, or decoration
- be closely integrated with the statistical and verbal descriptions of a data set.
Minard’s 1869 map of Napoleon’s campaign to Russia

Shows 6 variables in one 2D visualization:
- number of Napoleon's troops, temperature
- distance traveled, direction of travel
- latitude and longitude, location relative to specific dates
Some More Random Examples ...
The Time We Spend on the Internet

Almost 5 billion
users are watching
YouTube every single day
with an average viewing
time of 40 minutes.

The average adult
spends more than
20 hours
online a week...

...which includes
time spent on the
Internet at work.

We send over
200 million
e-mails per minute.

Stress in the Workplace

70% of American workers
experience stress-related illnesses.

34% think they’ll burn out on the job in the next two years.

33% more heart attacks are occurring on Monday mornings.

45% of entrepreneurs said they were stressed.

The Average Work Week

The average work week is closer to 50 hours than 40.

You get 168 hours a week.

Professionals and business leaders
who own mobile devices like
smartphones spend more than 47 minutes round trip.

The average commute time is 47 minutes round trip.
WHAT ARE WE EATING?
What the Average American Consumes in a Year

The Average American
Age: 36.6
Height: 5'9" (m) 5'4" (f)
Weight: 190 lbs (m) 164 lbs (f)

Fats & Oils: 85.5 lbs
Red Meat: 110 lbs
Poultry: 73.6 lbs
Fish & Shellfish: 16.1 lbs
Eggs: 32.7 lbs
Cheese: 31.4 lbs
Dairy Products (non-cheese): 600.5 lbs
Coffee, Cocoa & Nuts: 24 lbs
Fruits: 273.2 lbs
Vegetables: 415.4 lbs
Canned Goods: 38.6 lbs
Wheat Flour: 161 lbs
Beverage Malt: 134.1 lbs
Caloric Sweeteners: 10.5 lbs
There are 1.4 Billion students on Earth.

Only 65.2 Million educators Globally.

**THE CHALLENGE:** Too many children remain out of school, and those who are in school aren’t learning the skills they need for life and work.

- **Children leaving school before completing their Primary Education**
  - In the Sub-Saharan, 11.07 million children leave school before completing their primary education.
  - In South and West Asia, that number reaches 13.54 million.

- **Children out of primary school**
  - 61 Million children are still out of primary school.
  - 32 Million of these children are Girls.

- **1 in 5**
  - A 15 to 24 years old has not completed primary school and lacks skills for work.

- **An estimated 250 million children are not able to read or write.**

- **The poorest and most marginalized are the most affected.**

- **In some emerging economies, 3 in 10 youths cannot do basic arithmetic.**

- **Fragile and conflict-affected countries account for more than 30% of all children not completing primary school.**

- **Of the 775 million illiterate adults, two-thirds are women.**

STUDENT BULLYING

Bullying

Physical, verbal, or psychological attacks or intimidation against a person who cannot properly defend himself or herself. It includes two key components: 1. Repeated harmful acts 2. Imbalance of power

Effects of Bullying

Bullying can have a significant impact on both child and teenage students. Students who are bullied often suffer from anxiety, fear, withdrawal, low self-esteem, and poor concentration. A bullied student will often avoid school, have lower grades, and become socially isolated. There have been numerous reports of suicide due to bullying.

Most Common Types of Bullying:

- Hitting
- Threatening
- Intimidating
- Maliciously teasing and taunting
- Name-calling
- Making sexual remarks
- Stealing or damaging belongings
- More subtle, indirect attacks (such as spreading rumors)

Effects on Bullies

Bullying is often a warning sign that children and teens are heading for trouble and are at risk for serious violence. Teens (particularly boys) who bully are more likely to engage in other antisocial/inappropriate behavior (e.g., vandalism, shoplifting, truancy, and drug use) into adulthood. They are four times more likely than nonbullies to be convicted of crimes by age 24, with 60 percent of bullies having at least one criminal conviction.

Worst States to Live in for Bullying K-12

1 Out of 4 Students Will Be Abused by Another Youth
1 Out of 5 Admit to Being a Bully, or Doing Some “Bullying”

Sources:

- http://www.cops.usdoj.gov
- www.keepschoolsafe.org
- www.bullypolice.org

Produced by: Buckfire & Buckfire PC


Playground School Bullying Statistics

- Every 7 minutes a child is bullied
- Adult intervention: 11%
- Peer intervention: 4%
- No intervention: 85%
- 43% fear harassment in the bathroom at school
How To Make Effective Infographic

Five steps (from Venngage.com)

1. Outline the goals of your infographic
2. Collect data for your infographic
3. Visualize the data for your infographic
4. Layout your infographic using an infographic template
5. Add style to your infographic design
STEP 1: OUTLINE YOUR GOALS

Use the question pyramid

1 Burning Problem
The main question the infographic will answer.

2-3 Supporting Questions
Questions to provide information (what, which).

1-2 Probing Questions
Questions to provide insight (why).

Venngage.com
EXAMPLE: FOOD – WINE PAIRING

Burning Problem
How to pair food and wine

Supporting Questions
Which food components matter?
What are the types/categories of wine?
Which category works with each component?

Probing Questions
Why do certain pairings work better?
Step 2: Collect the Data

We discussed this
Step 3: Visualize the Data

Decide what are your primary goals

- what data aspect do you want to convey

The ICORE method

- Inform,
- Compare,
- Change,
- Organize,
- Reveal relationships, or
- Explore.

Venngage.com
Convey an important message or data point that doesn’t require much context to understand:

Make a numerical stat stand out with large, bold, colorful text:

The brain makes 700 neural connections per second before the age of 5.

Demand extra attention by pairing icons with text:

4200 VACCINES ADMINISTERED

Highlight a percentage or rate with a donut chart or a pictograph:

25% WERE CHILDREN

25% WERE CHILDREN
Compare

Show similarities or differences among values or parts of a whole.

Use a pie chart, donut chart, pictograph, or tree map to compare parts of a whole.

Use a stacked bar chart or stacked column chart to compare categories and parts of a whole.

Use a stacked area chart to compare trends over time.

Venngage.com
Show trends over time or space

Use a line chart or an area chart to show changes that are continuous over time.

LINE CHART

AREA CHART

Use a timeline to show discrete events in time.

TIMELINE

Use a choropleth map to show spatial data.

CHOROPLETH MAP

Use a map series to show data that changes over both space and time.

MAP SERIES
Use a list to show rank or order when you want to provide extra information about each element.

<table>
<thead>
<tr>
<th>LIST</th>
</tr>
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<tr>
<td>1</td>
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<td>3</td>
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Use a table to show rank or order when you want readers to be able to look up specific values.

<table>
<thead>
<tr>
<th>TABLE</th>
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<tbody>
<tr>
<td>Cars</td>
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<tr>
<td>BMW</td>
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<tr>
<td>Aston Martin</td>
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<tr>
<td>Bentley</td>
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</table>

Use a flowchart to show order in a process.

Otherwise, show rank or order with a bar chart, column chart, bubble chart, or pyramid chart.

BAR CHART

COLUMN CHART

BUBBLE CHART

PYRAMID
Reveal more complex relationships among things.

Use a scatter plot when you want to display two variables for a set of data.

Use a multi-series plot when you want to compare multiple sets of related data.
Add interaction

- filtering, sorting, and drilling down
- can’t do with a static chart
- but useful for online infographics displays
- will discuss later
Create a natural flow

- could use the question pyramid to guide the layout
- burning question into header
- follow with charts to address the supporting questions
- finish with the probing questions

Use a grid layout

- guides the reader’s eye
- symmetrical grid
- consider that people read
  - top to bottom
  - left to right

Venngage.com
One Column for Linear Flow

Venngage.com
Two Columns for Comparisons

Venngage.com
Who Said What?

Democrats

- Character: 11
- Jobs: 14
- War: 9
- Hurricane: 8
- McCain: 18
- God: 6
- Bush: 18
- Economy: 16
- Iraq: 12
- Change: 24

Republican

- God: 25
- Character: 14
- Energy: 18
- Economy: 18
- Bush: 6
- Terror: 12
- Jobs: 8
- Iraq: 15
- Tax(es): 22

Number of times words were used

The Words They Used - Graphic - NYTimes.com
CLean Water Systems

2.64 Billion people around the world do not have access to adequate sanitation

780 Million people do not have access to improved water sources

Every $1 spent on water and sanitation generates at least $4 in increased productivity

SOURCE
MULTI-SECTION Layout For Random Visual Access

- Easiest Indoor Plants To Keep Alive
  - English Ivy
  - Aloe Vera
  - Jade Plant
  - Pothos Plant
  - Rubber Tree
  - Dienffenbachia
  - Spider Plant
  - Fiddle Leaf Fig Tree
  - Snake Plant

- Working Remotely
  - Benefits + Tips for Working Remotely
    1. Work from anywhere in the world.
    2. Ability to focus.
    3. No commute to a company office.
    4. Work close to family.
    5. There are no geographical limitations for who can join the team.

Venngage.com
Step 5: Add Style

Overall goal
- make your infographics aesthetically pleasing
- make it easy to consume and understand

Minimize text
- should supplement the visuals
- short paragraphs (at most) at about a grade six reading level

Use font to point out importance
- readable font for the bulk of the text,
- amp up size and style of your main header, section headers, and data highlights
- make sure that the gist of your infographic is immediately apparent
Reducing Poverty

We're active in over 100 communities in Georgia alone. And we serve over 4 million Georgians each year. In 2017, the total investment amount was $152.7 million.

Find out how you can make an impact today

Venngage.com
Repeat basic shapes to reinforce the underlying grid
Emphasize Using Shapes

Use basic shapes to emphasize headers and list elements

Venngage.com
Add icons to reinforce important concepts in the text

- keep icon color, style, and size consistent
- pull everything together with extra background shapes
BE Diligent

Make sure the repeated elements you add are aligned!
Negative (white) space is often used in advertising

- the space around and between the subject of an image
- helps to define a subject
- helps emphasizing a message
NEGATIVE SPACE IN INFOGRAPHICS

Just as important as any other element of a design

- simplest negative space are margins around the graphics
Negative Space: Gaps

Use gaps between unrelated elements

- makes it easier to immediately understand which elements are grouped together
Much easier to make colors play nicely with each other by adding a little whitespace
COLOR FOR HIGHLIGHTING

Use color to highlight important information

Venngage.com
Use color to group related elements together

Venngage.com
Neutral Colors

Use neutrals to offset bright colors

- helps put together a composition
- can group in a more subtle way

Venngage.com
Color Palettes

rich & polished

#842F32  #FF6747  #F3E3CD  #876B92  #494B4D

brilliant blues

#37AF99  #2D89E7  #DC695D  #E9F2F2  #152329

baroque luxury

#A51E22  #EBA631  #E0C898  #E5E1DA  #0BF8D3

gracefully modern

#FAA777  #C9C9BD  #F0E6EE  #60686F  #333C3E

sunny & warm

#D55226  #F6933D  #F8BC38  #D8C6B4  #697798

classic & trustworthy

#CA3542  #276478  #849FAD  #4ECBC9  #57575F
There are Templates on the Web
Plotly is a Python open source graphing library

- not as powerful as D3
- but does not require javascript programming