Lecture 8-2:
Introduction to Data Visualization

CMPT 733, SPRING 2017

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INCORPORATING NOTES FROM MICHAEL FRANKLIN AND DAVID TAYLOR

Outline

Why Visualization?

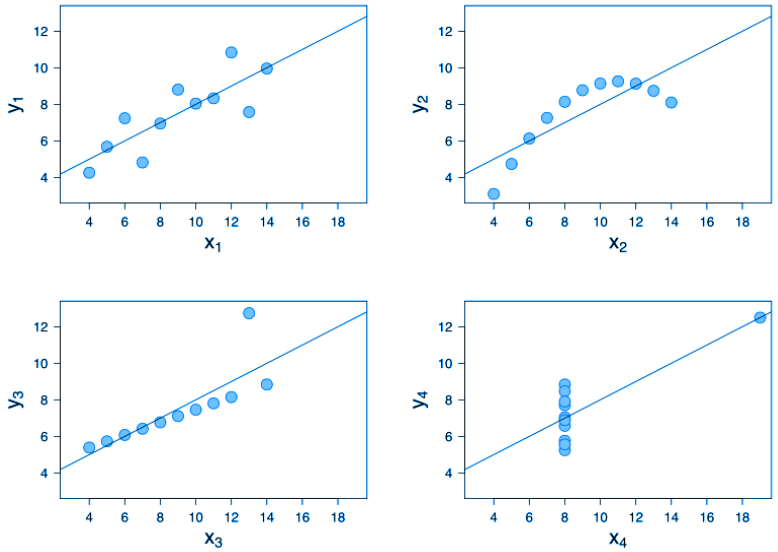
Principles of Visualization Design

Visualization Toolkits

Why Visualization?

Exploratory Data Analysis

	I		II		III		IV	
	x	y	x	y	x	y	x	y
	10	8,04	10	9,14	10	7,46	8	6,58
	8	6,95	8	8,14	8	6,77	8	5,76
	13	7,58	13	8,74	13	12,74	8	7,71
	9	8,81	9	8,77	9	7,11	8	8,84
	11	8,33	11	9,26	11	7,81	8	8,47
	14	9,96	14	8,1	14	8,84	8	7,04
	6	7,24	6	6,13	6	6,08	8	5,25
	4	4,26	4	3,1	4	5,39	19	12,5
	12	10,84	12	9,13	12	8,15	8	5,56
	7	4,82	7	7,26	7	6,42	8	7,91
	5	5,68	5	4,74	5	5,73	8	6,89
SUM	99,00	82,51	99,00	82,51	99,00	82,50	99,00	82,51
AVG	9,00	7,50	9,00	7,50	9,00	7,50	9,00	7,50
STDEV	3,32	2,03	3,32	2,03	3,32	2,03	3,32	2,03



From: http://www.qualia.hr/the-power-of-data-visualization-anscombes-story/

Why Visualization?

Communication

How to tell a good story about this dataset?

Year	Country	Income	Population	Lifespan
1820	Canada	1159.5	816,000	39
1820	USA	2240	9,638,453	39.4
…	…	…	…	…
2015	…	…	…	…

https://www.youtube.com/watch?feature=player_embedded&v=jbkSRLYSojo

Outline

Why Visualization?

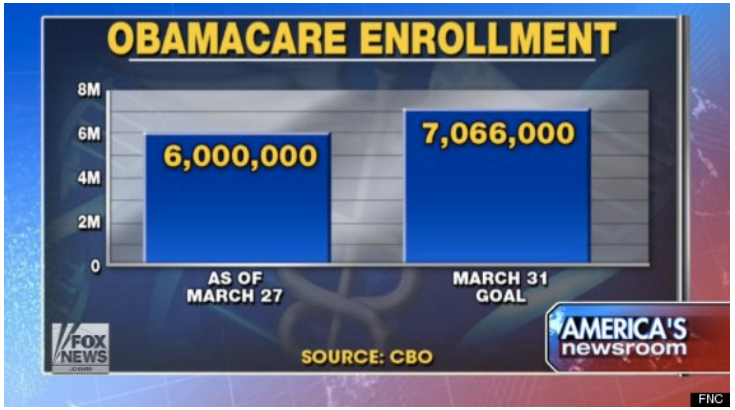
Principles of Visualization Design

Visualization Toolkits

Motivation

WTF Visualizations (http://viz.wtf/)

Without knowing the principles,
you might make a lot of mistakes like this!



Principle 1: Simplicity!

Are you going to design Google.com like this?

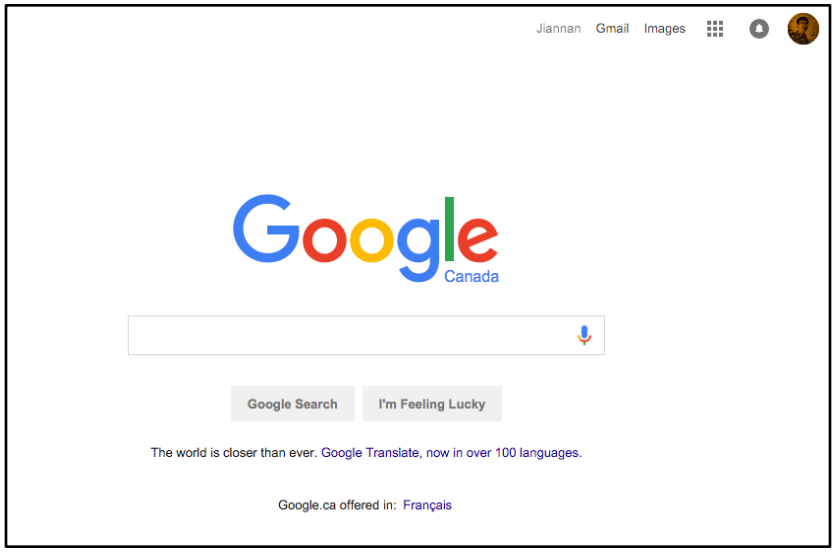


Chart Design: Simplifying

Example from Tim Bray

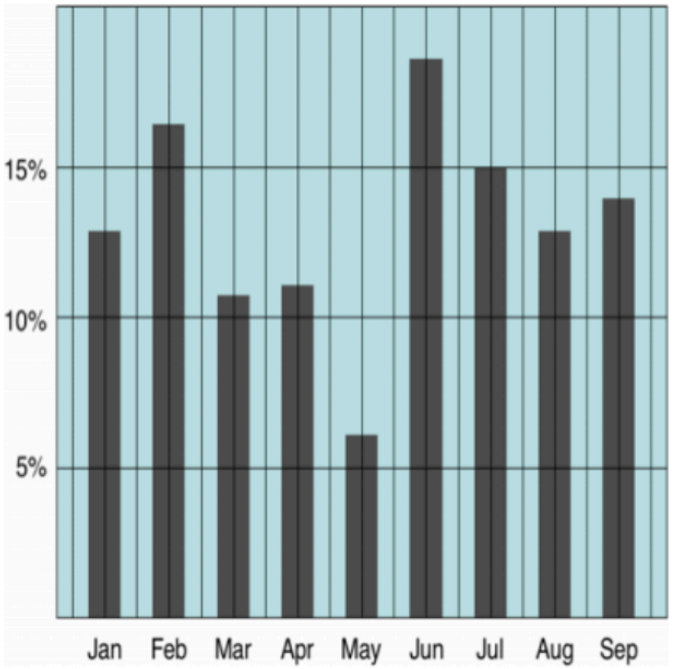
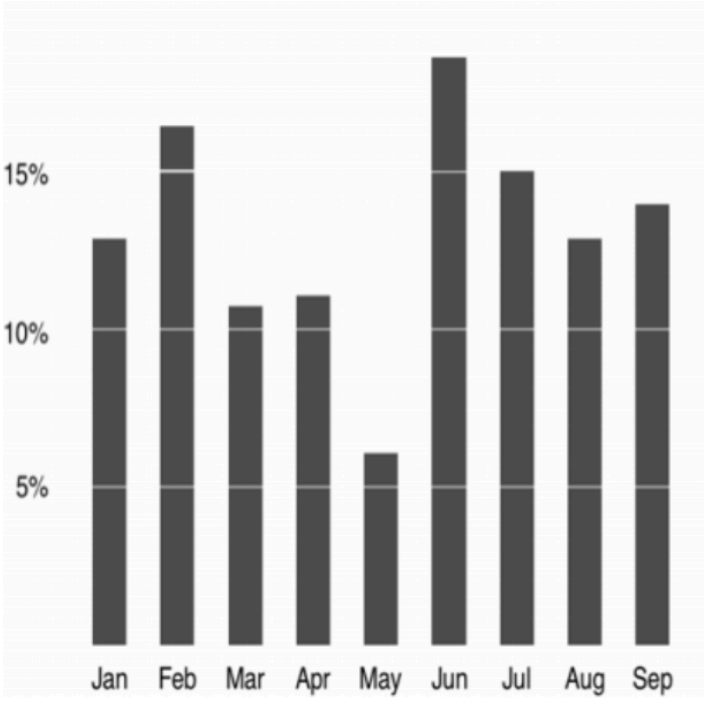


Chart Design: Simplifying

Example from Tim Bray



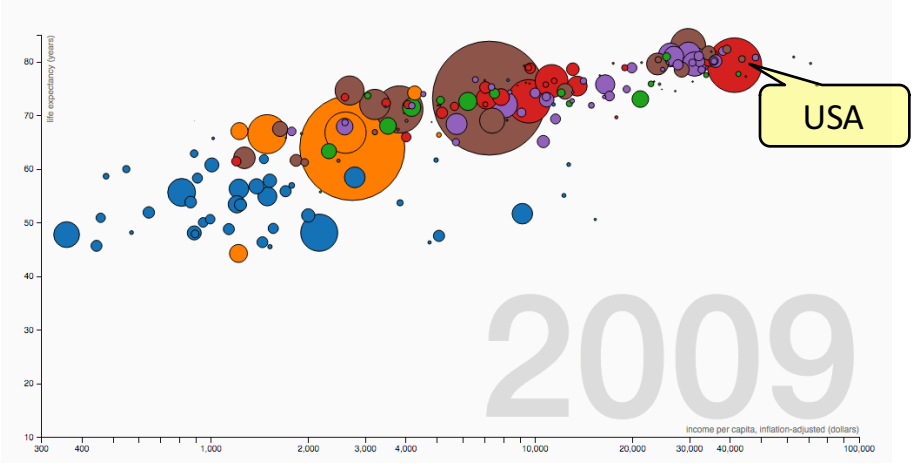
Principle 1: Simplicity!

Remove or not remove?

- Ask whether keeping an element reveals more information

Still so many?

- Interactive Chart



Principle 2: Understand Magnitudes

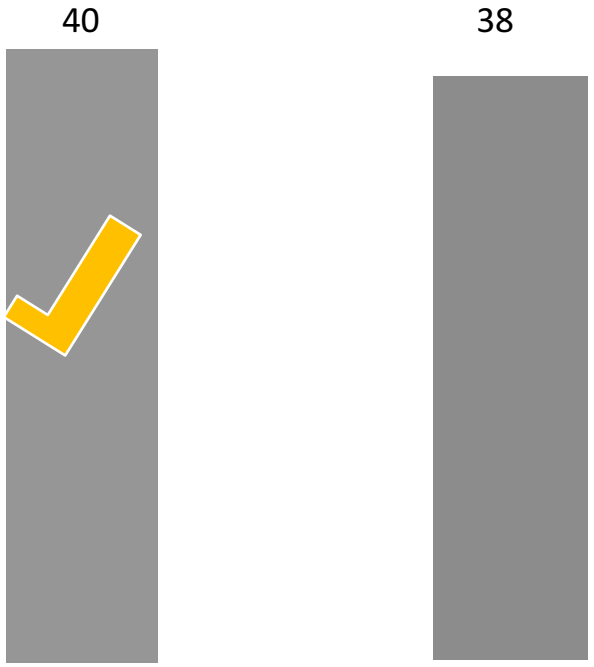
Which one is brighter?

(40, 40, 40)

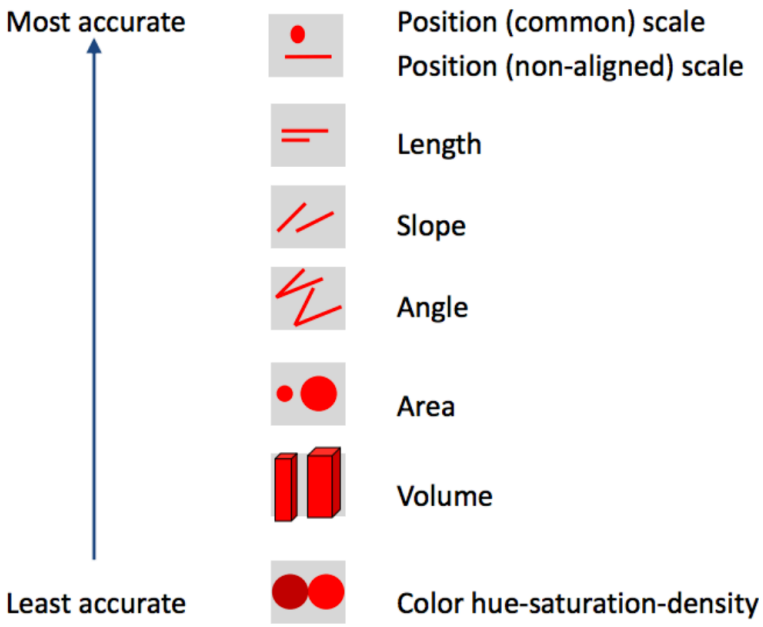
(38, 38, 38)

Principle 2: Understand Magnitudes

Which one is longer?

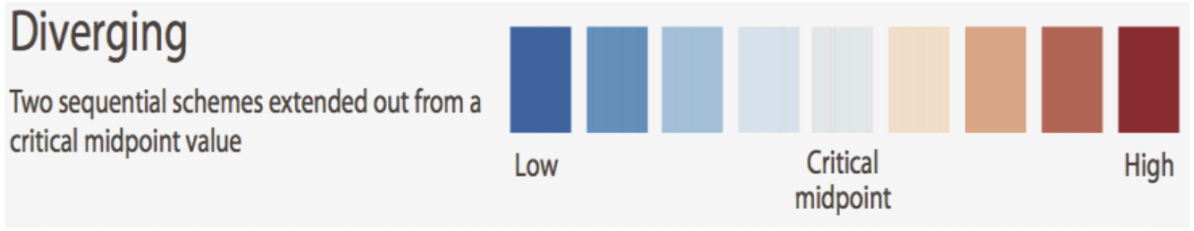


Principle 2: Understand Magnitudes

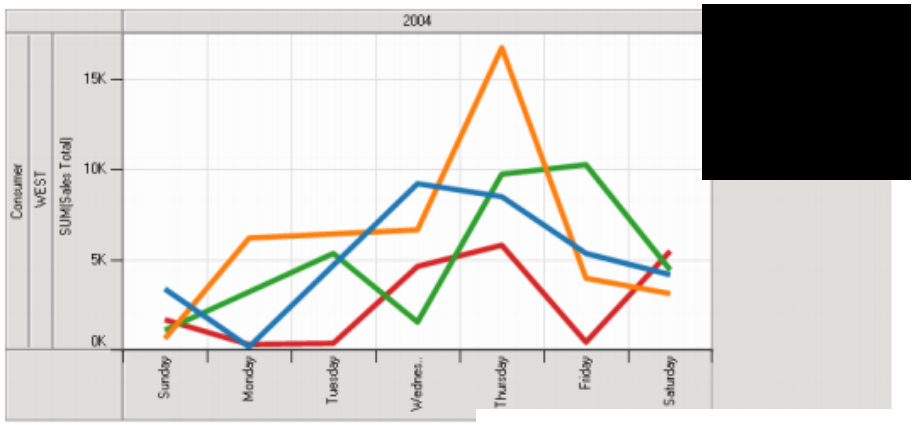


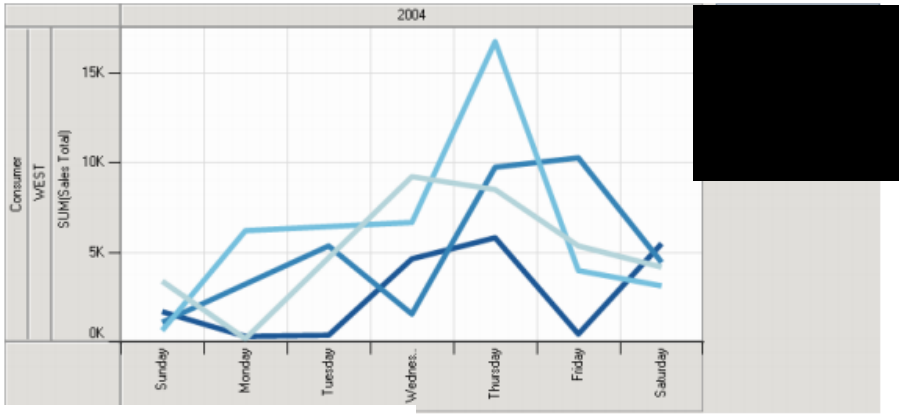
Principle 3: Use Color

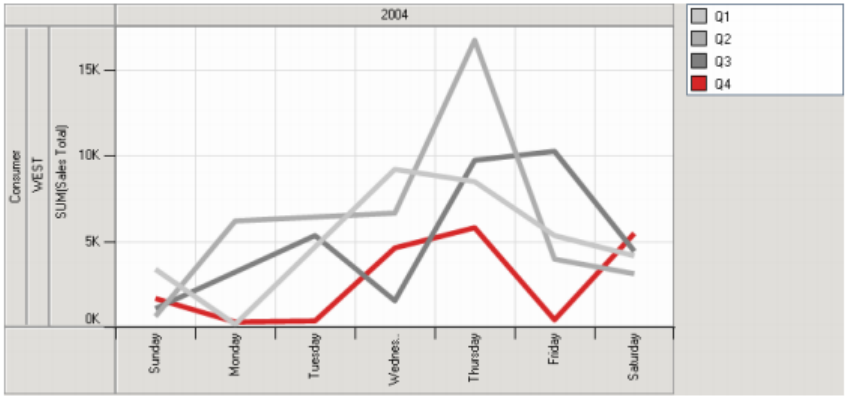
- **Make your visualization look beautiful**
  - Colour Lovers: http://www.colourlovers.com
- **Work for different kinds of data**



What's the difference?

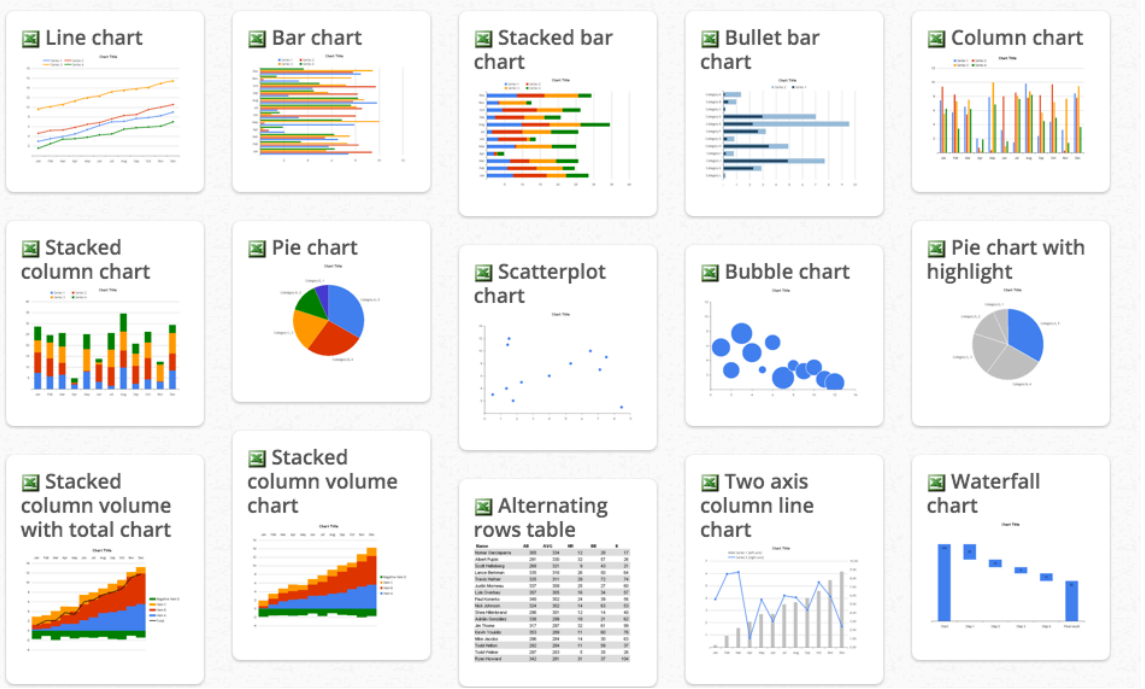






Principle 4: Use Structure

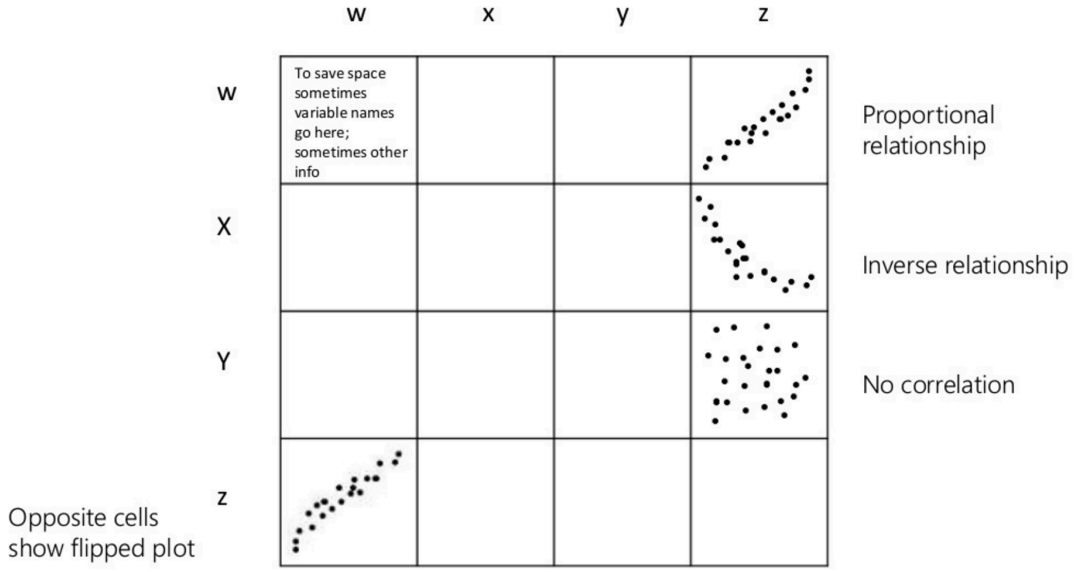
From http://labs.juiceanalytics.com



Principle 4: Use Structure

Correlation Visualization

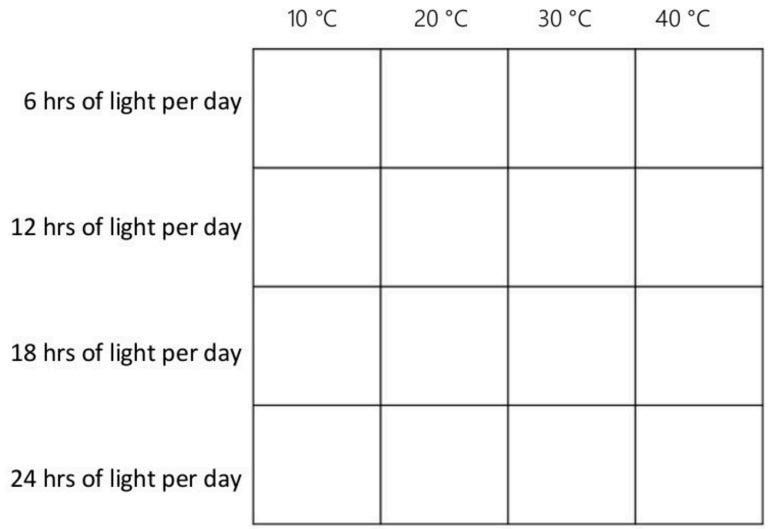
- Consider a table with n=4 attributes



Principle 4: Use Structure

Correlation Visualization

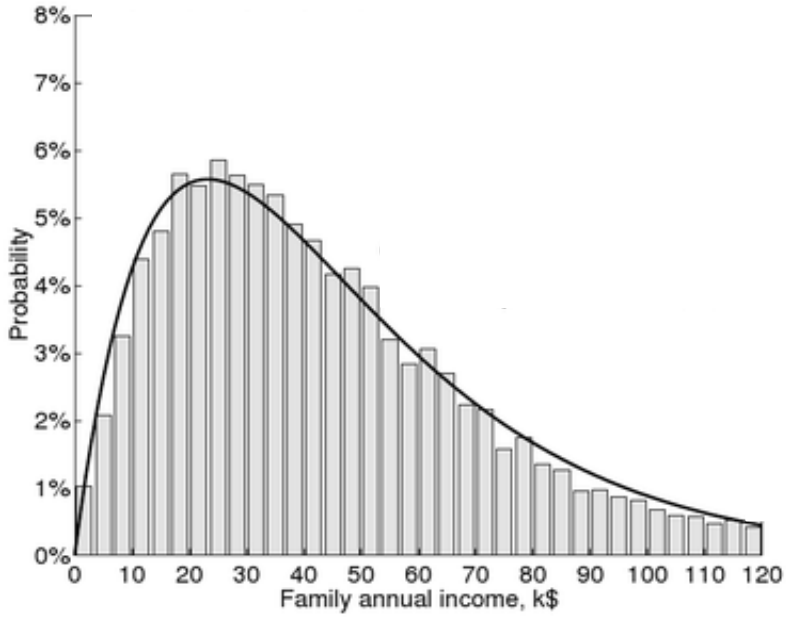
- Conduct a deeper analysis on each pair of attributes



Principle 4: Use Structure

Correlation Visualization

- Conduct a deeper analysis on a single attribute



Outline

Why Visualization?

Principles of Visualization Design

Visualization Toolkits

Efficiency vs. Expressiveness

Tools	Efficiency	Expressiveness
Excel, Google Charts	★★★★	★
Tableau, ggplot2	★★★	★★
D3, Vega	★★	★★★
OpenGL, Java2D	★	★★★★

Assignment 8

Part 2: Dynamic Visualization with D3

- Prerequisite: D3 Basics
- Task B. Dynamic Visualization using "transition"
- Task C. Dynamic Visualization using "selection.exit"
- Task D. Dynamic Visualization using "selection.on"
- Where To Go From Here (Optional)

Deadline: 11:59pm, Mar 12th

http://tiny.cc/cmpt733-a8