CSE 564: Visualization

Interaction and Information Navigation

Klaus Mueller

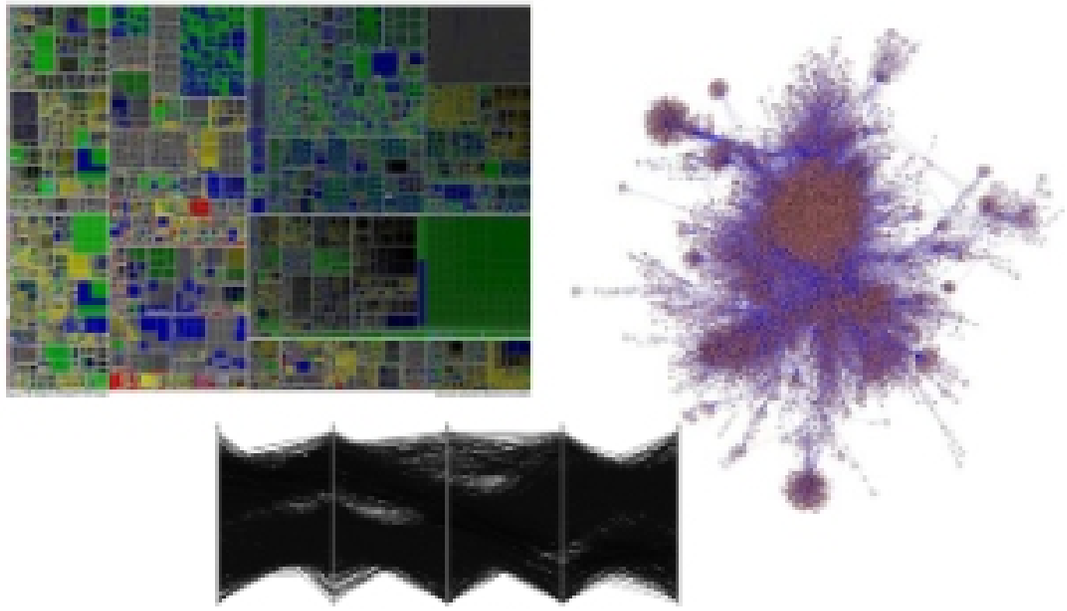
Computer Science Department

Stony Brook University

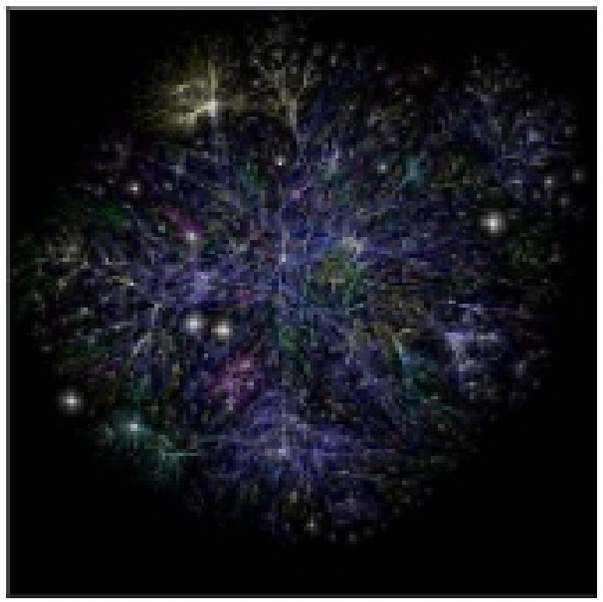
Too Much Data?

How can we deal with data overload

* see the forest for the trees (or the other way around)



Too Much Data?



Internet routes (1/15/2005)

(NY Museum of Modern Art)

The Key to Overcome the Data Deluge: Interaction

Allow users to control what is currently shown:

* level of detail
* extent of the data (spatial, values)
* aspects of the data (attributes)

But do not leave the user lost in the forest

* provide navigation hints

Two powerful paradigms:

* overview, and detail on demand (forest and trees)
* focus and context (trees and forest)

Interaction needs to be interactive (as in responsive)

* user needs get quick visual feedback on actions

Interaction: Key to Visual Analytics

Puts the human in the loop

- appeals to human's expertise and intuition

Requires a suitable human-computer interface

- recall the lectures on color and perception

Interaction can help with:

- making sense of it all
- putting things in proper context
- data overload (scalability)
- telling stories with data (explain findings to others)

Evaluate effectiveness

- do human users actually benefit?
- user studies!

A Taxonomy of Fundamental Interaction Types

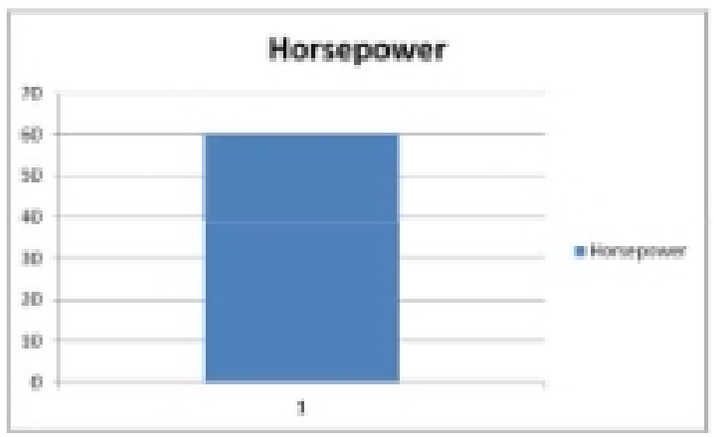
Stephen Few (chapter 4):

- compare
- sort
- add variables
- re-scale
- re-express
- filter
- highlight
- annotate
- bookmark
- aggregate
- re-visualize
- zoom and pan
- details on demand

Example

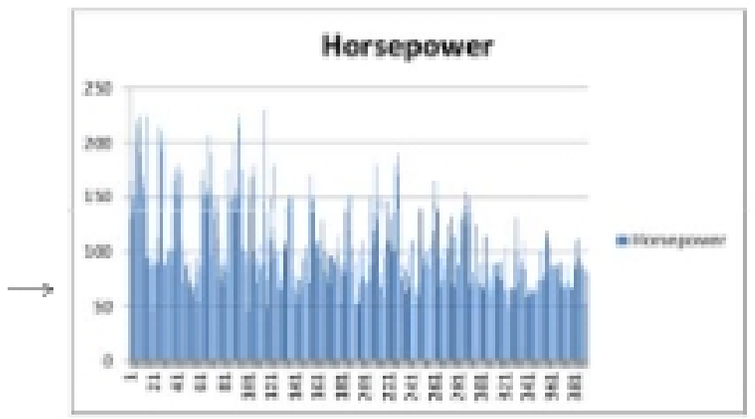
Assume you have been offered a car to buy

- assume you are mostly interested in horsepower, weight, acceleration
- the car you have been offered has 60 hp, 1834 kg, 8 s



Compare

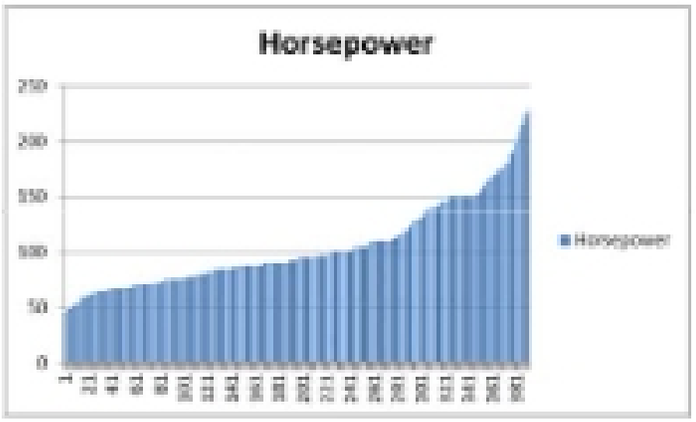
See the car with other available cars



hard to see how it really ranks

Sort

See the car in the context of other available cars

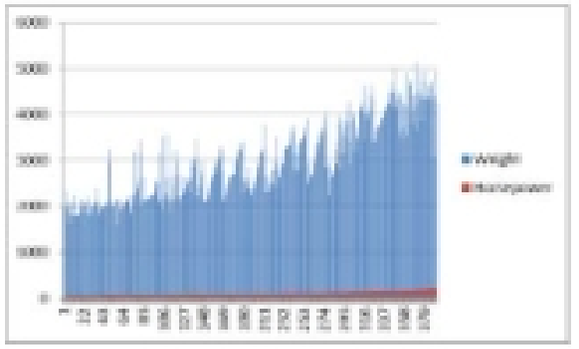


it is a low-horsepower car

Additional Variables

Is horsepower correlated to weight?

* are there trade-offs?

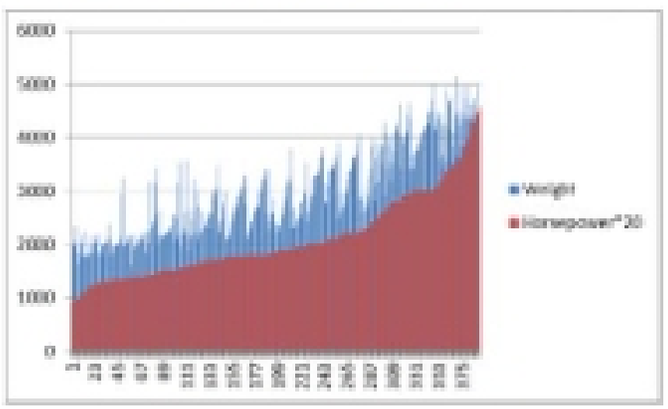


hard to see what is going on

Re-Scale

Scale horsepower into the same range than weight

- could also normalize each to (0.0, 1.0)

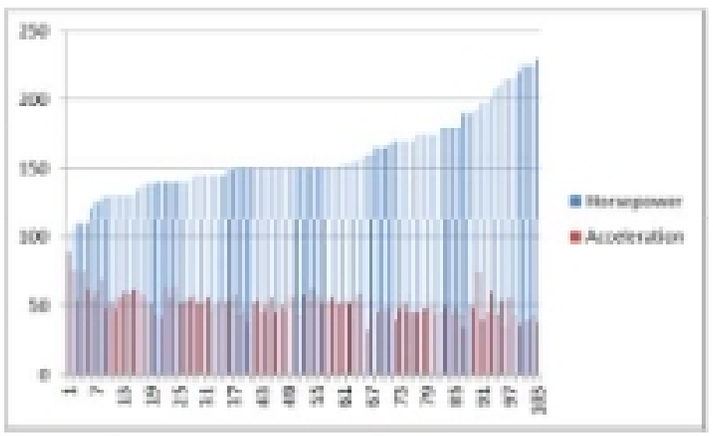


There seems to be a positive correlation

- cars with higher horsepower are also heavier

Another Variable

How does it relate to acceleration?



non-intuitive that acceleration is less for high horsepower cars