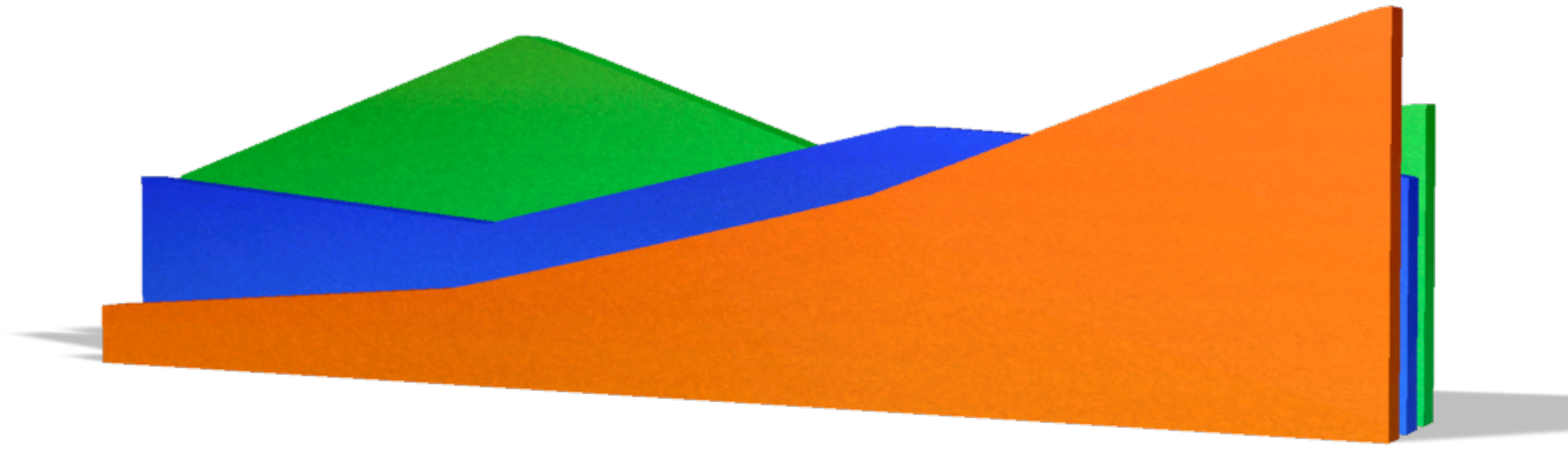


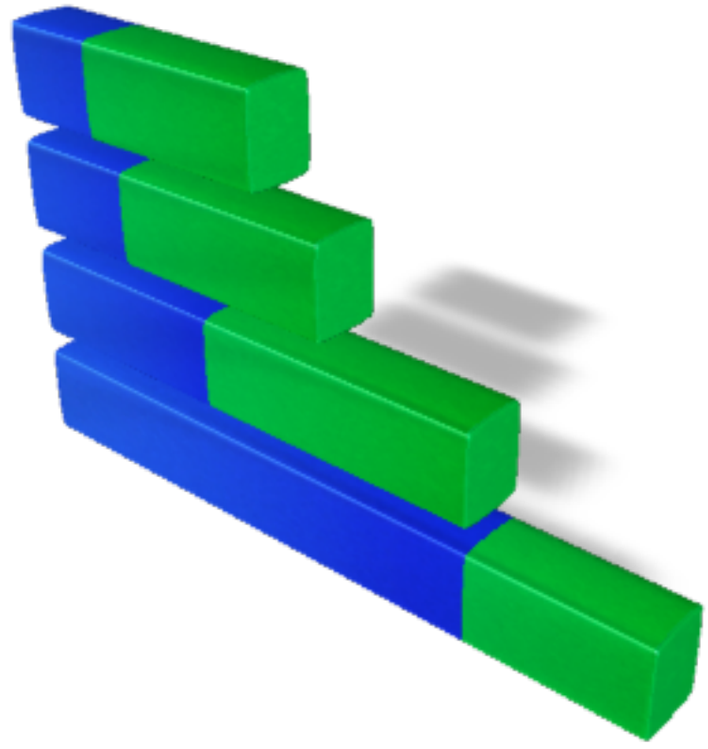
A Rank-by-Feature Framework for Interactive Exploration of Multidimensional Data

J. Seo and B. Shneiderman.
Presented by Kyle King and Ryan Blue

Visualizing Multidimensional Data

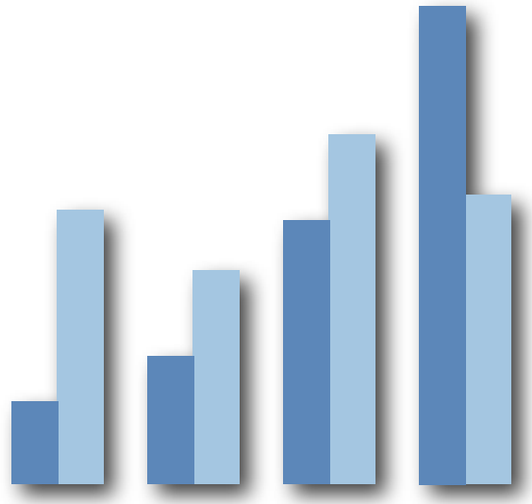
- Three Dimensions
  - Suffers occlusion
  - Cognitively difficult to navigate
- Greater Dimensionality
  - Non-Axis Parallel Projection
  - Loses intuitive meaning
  - Consider example from paper:

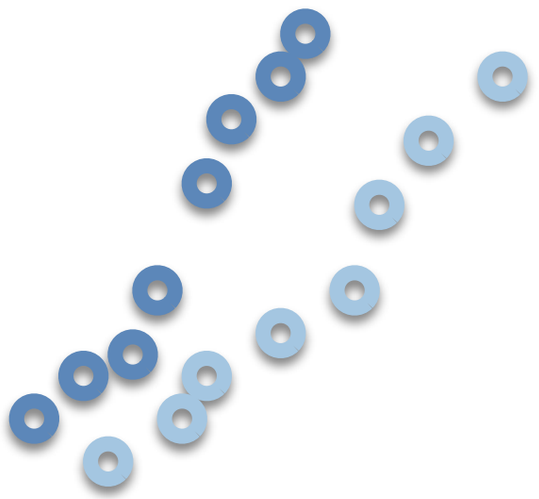
    3.7 **body weight* - 2.3**height* versus *waist size* + 2.6**chest size*



Projections

- Explore lower dimensional relationship through 1D and 2D projections
- One Dimension
  - Histograms
    - Number of histograms is linear in the number of dimensions
- Two Dimensions
  - Scatterplots
  - Number of scatterplots is exponential in the number of dimension





Exploring All Possible Projections

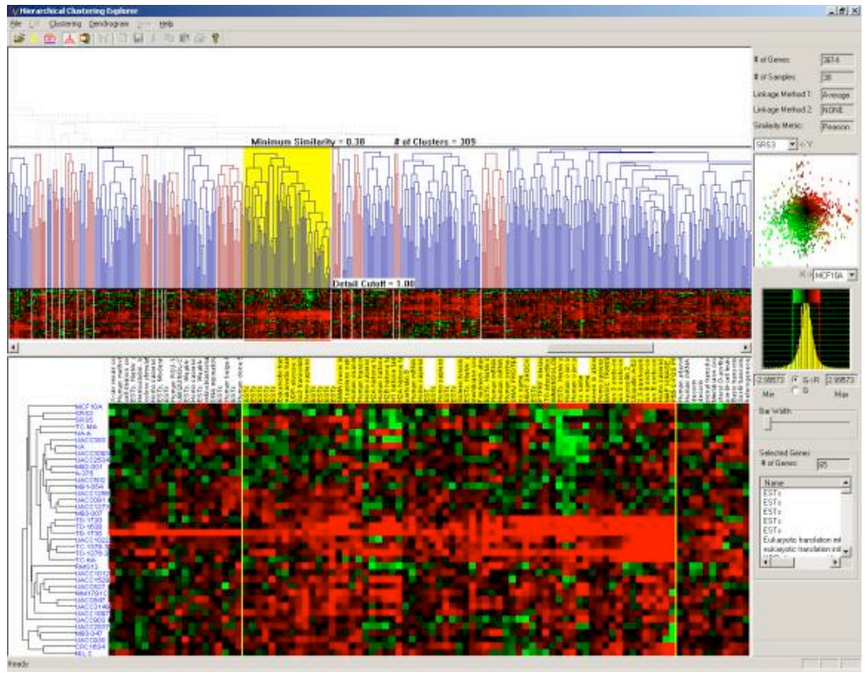
- There are many possible 1D and 2D projections
- There are many interesting features within each projection
    - Outlierness
    - Gaps
    - Quadracity
    - Uniformity
    - etc.
- There is no systematic way to explore all the possibilities

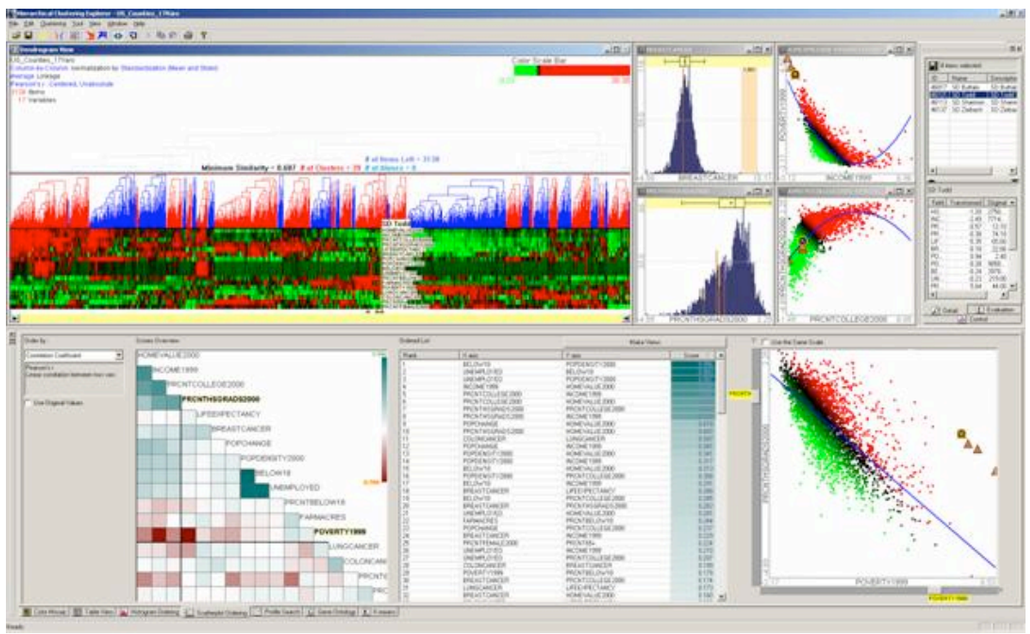
GRID

- Graphics, Ranking, and Interaction for Discovery
- A method for systematically exploring high dimensional data:
    - Study 1D, 2D, then find features
    - Ranking guides insight, and statistics confirm.
- The Rank by Feature framework applies these principles by:
    - Users select an interesting ranking criterion (i.e. quadracity)
    - Users are presented with a ranking of all possible projections according to the strength of the criterion
    - Users can explore graphs that strongly exhibit or lack selected feature

Hierarchical Clustering Explorer (HCE)

- HCIL Project
  - http://www.cs.umd.edu/hcil/hce/
- Implements Rank by Feature
  - Rank by feature prism
  - Histogram, scatterplot tabs
- Other HCE features
  - Dendrogram View
  - Minimum similarity bar
  - Cluster Mosaic





Demo