Law Enforcement Resource Allocation (LERA) Visualization System

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Outline
- Background
- Implementation overview
- LERA prototype demo
- Usability study results
- Challenges
- Future work

Background
- Crime analysts assess the impact of different policy decisions on crime rates
  - The most sophisticated type of analysis is linear regression (36%)
  - The most commonly used tool is a data analysis program such as Excel (60%)

- Too easy to remove points
- No undo button for outlier removal
- Colours are overwhelming

Challenges
- Very large data set
  - 2 types of data – crime rates & policy
  - 100 data fields
  - 800 US law enforcement agencies
- Searching for relationships – tedious & frustrating

Project goal
- To support crime analysts by bringing together both crime data and crime enforcement policies into an interactive, easy-to-use visualization system

Implementation
- Interactive scatterplot visualization tool
  - Implementation:
    - Java
    - Prefuse Java toolkit
    - Support for scatterplots
    - Statistical features
    - From scratch

Implemented features
- Statistical support – outlier removal, regression lines
- Small multiples - linked highlighting & ordering by scagnostics
- Focus & context – aggregates
- Filtering – select one or more states
- Visual encoding - X, Y, Colour, Size

Usability study – ease of use

Task #3: Participants’ Usability Ratings (Manual outlier removal)

Ease of Use on a Scale of 1 to 10  
(1= Very difficult, 10 = Very easy)

Excel  LERA

User feedback on Excel
- Regression lines easy to add
- Tedious to find input data in spreadsheet
- Outlier removal difficult
  - In data worksheet & must make copy
  - Mouseover of point only gives x and y
- Comparison of clustering impossible
  - No linking in Excel & no labels for points

User feedback on LERA
- Volume of info with mouseover
- Ability to specify colour for a variable
- Linked highlighting & mouseover
- Too easy to remove points
- No undo button for outlier removal
- Colours are overwhelming

Usability study – time

Improvement in Completion Time (Using LERA as opposed to Excel)

Challenges
- Prefuse
  - Not sure how much effort was saved
- Statistical support
  - No statistics toolkit
  - Less sophisticated, fewer statistical methods
## Future work

- **Features**
  - Zooming and panning
  - More scagnostics, outlier removal methods
  - More user control over colour encoding

- **Minor display issues**
  - Axis lines on top of points

## Questions?