

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%)

Source: Crime Analysis in America, Center for Public Policy, University of South Alabama, 2002

Background

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

Background

- Current tool (e.g., Excel) used for exploring the effects of policies on crime rates is:
 - > Not easy to use
 - > Not intuitive
 - > Not interactive

Project goal

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

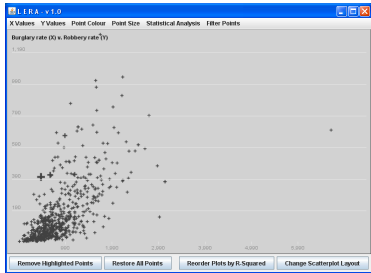
Implementation

- 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

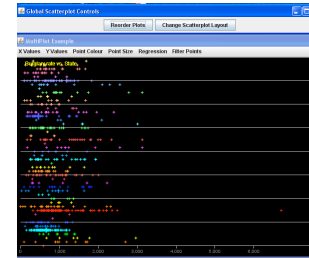
Demo



Usability study

- Comparative evaluation of LERA to Excel
- Think-aloud observation
- Limited number of participants
 - > One expert statistician
- Six different tasks done independently on each application

Version of LERA prototype tested



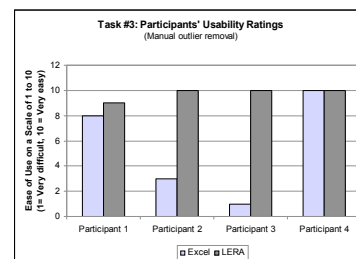
User feedback on Excel

- ✓ 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

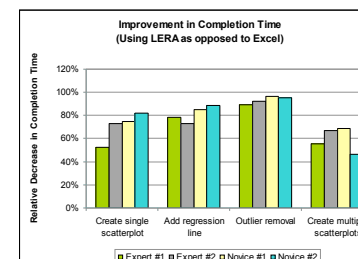
User feedback on LERA

- ✓ 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 – ease of use



Usability study – time



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?

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