**Project Update: Law Enforcement Resource Allocation (LERA) Visualization System**

Michael Welsman-Dinelle  
April Webster

---

**Motivation:**

- It is difficult to assess the real impact of different policy decisions and management programs on crime rates.  
  - E.g., Do anti-drug programs help to reduce youth crime rates?
- Searching for relationships between different variables in a large dataset can be time consuming and frustrating.
- In many cases, crime analysts perform this type of analysis using a statistics program (e.g., SAS, SPSS, R) or a data analysis program (e.g., Excel).

**Our goal:**

To enable crime analysts to answer these types of questions by bringing together both crime data and crime enforcement policies into a single INTERACTIVE visualization system that supports correlation/regression analysis.

---

**Supported tasks:**

- We aim to support three different types of tasks required of a crime analyst:
  - 1. How does a program impact a crime rate?  
  - 2. How does field training impact violent crime?  
  - 3. How do different programs impact a crime rate?

**Solutions considered:**

- We considered 4 different solutions for the task of interactively visualizing correlation:
  - Parallel Coordinates
  - Table Lens
  - General Graph Drawing Techniques
  - Scatterplots

**Our solution:**

- An interactive scatterplot visualization system

  **Implementation:**
  - Java
  - Prefuse Java toolkit
  - Support for scatterplots, tables, SQL queries
  - And for display issues such as mapping from field values to axes, color, shape, etc
  - Statistical toolkit
  - We have located a Java class that contains formulae for calculating different types of regression curves (linear, quadratic, exponential, etc)

**The Data:**

- We have 2 types of data sets for about 800 US law enforcement agencies for the year 2000:
  - Crime report data
  - Investment in technology, training, budgets

**Progress:**

- Phase 0 – completed
  - Downloaded and cleaned sample data
  - Using Prefuse toolkit for scatterplots
  - Found Java code for regression curve generation
  - Unable to find Java code for outlier detection
- Phase 1 – completed
  - Single scatterplot has been implemented
  - Domain expert has been contacted for usability study; waiting for confirmation of participation

**Anticipated Challenges:**

- Finding a Java statistics toolkit with support for outlier detection and regression curve generation
- Determining good orderings of scatterplot small multiples
- Finding a domain expert to use our tool and assess its usability

---

**The Data:**

- We have 2 types of data sets for about 800 US law enforcement agencies for the year 2000:
  - Crime report data
  - Investment in technology, training, budgets

**Our solution:**

- Specific features:
  - Outlier removal - ability to easily remove outliers, manually and automatically
  - Regression curves
  - Ordering of small multiples – using some scagnostic (e.g., correlation based one?)
  - Aggregation – a focus and context feature
  - Marking – simultaneous, interactive on multiple scatterplots
  - Use of filtering to select one or more states

**Progress:**

- Phase 2 Part 1 – in progress
  - Implementation of statistical methods: regression curves, manual outlier removal
  - Plan evaluation component
- Phase 2 Part 2 – to begin Nov 24
  - Implementation of small multiples
- Phase 3 – to begin Dec 1
  - System evaluation
  - Implementation of optional features – marking
  - Draft report

---

**The Data:**

- We have 2 types of data sets for about 800 US law enforcement agencies for the year 2000:
  - Crime report data
  - Investment in technology, training, budgets