A near real-time visualization for understanding spatio-temporal patterns of violent crime in the District of Columbia

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Project Scope: The District of Columbia publishes violent crime incidents to their web-accessible data catalog site (http://data.octo.dc.gov/) in near real-time (one business day delay for processing). This dataset is of particular significance because of its fine precision both spatially (i.e., geocoded to within one-half of a city block) and temporally (i.e., coded to an eight hour work shift). We have developed a robust suite of web-based, space-time geovisual analytics tools to extend the value of the data served from the existing web site. Using our application, analysts can uncover detailed spatio-temporal patterns of DC crime previously unidentified due to data aggregation, as well as generate hypotheses about the etiology of crime clusters to support policy decisions for the prevention of such crimes.

Recent Progress: At run-time, the application loads the violent crime incidences from the DC data catalog site and plots the incidences on a basemap provided by the Google Maps API for Adobe Flash. Selection of an individual point on the map activates an information window with details about the crime. The user can then filter the visualization by space (e.g., police districts, census tracts), time (e.g., calendar date, day of the week, or work shift), and attribute (e.g., type of crime, method of attack). The application also provides linear animation across a user-defined temporal range and cyclical animation across a composite year, week, or day. Finally, the user is able to view crime incidents in context with other relevant information, such as police districts, police/fire stations, transportation depots, and socioeconomic variables reported by census tracts.

Relevance: The project is directly relevant to the *Communications and Interoperability Directorate* and the *Advanced Data Analysis and Visualization* research area by implementing established and novel geovisual analytic tools in an easy-to-use web interface. It is also tangentially related to the *Social, Behavioral, & Economic Sciences* through its case study domain of spatial criminology and incorporation of socioeconomic context variables.

Publications: This is a new project, thus there are no current publications yet.

Future Plans: We plan on implementing added functionality (e.g., complex textual queries, point aggregation into meaningful enumeration units, and coordinated scatterplot, histogram, and PCP views of the dataset) to support reasoning about the causes of the spatio-temporal crime patterns seen. We also plan to test the utility and usability of the tool with domain experts to evaluate its success in supporting the geovisual analytics of crime data.