



Motivation/Introduction:

In lieu of increased terrorist activity in recent years, it is meaningful to investigate terrorism and its causes (correlated factors) over time. Inferencing from attributes of terrorism events and finding links between socio-economic factors and terrorist activities are tough yet necessary. We not only attempt to draw correlations with external factors such as education, poverty, and religion employing statistical learning techniques but also create an interface for users to perform their own analysis using relevant data attributes.

Approaches:

Summary

InterPolo is a visual analytics system that applies interdisciplinary approach -- integrating **information visualization, statistical learning, and user interaction** to enhance user's exploration, analysis and understanding of global terrorism from 1970 to 2016.

Explore Data Through Interactive Map

We adopt an "Overview to Details" design model and implement an interactive visualization system for users to complete the sense-making loop including searching, filtering, schematizing, case-building and telling stories. The system allows users to firstly explore the data through an interactive terrorist activities map. The occurrence of terrorist attacks are visually encoded by the density of the points, higher density indicates a higher number of attacks. With zoom-in and zoom-out functionality of the map, users are able to view data points at different geo-granularity and synthesize their observations. To reveal more interesting insights, we build range slider for the user to dissect data in the time domain which helps them perform the visual analysis between different time windows in the history. Once users acquire high-level information from the above

Data:

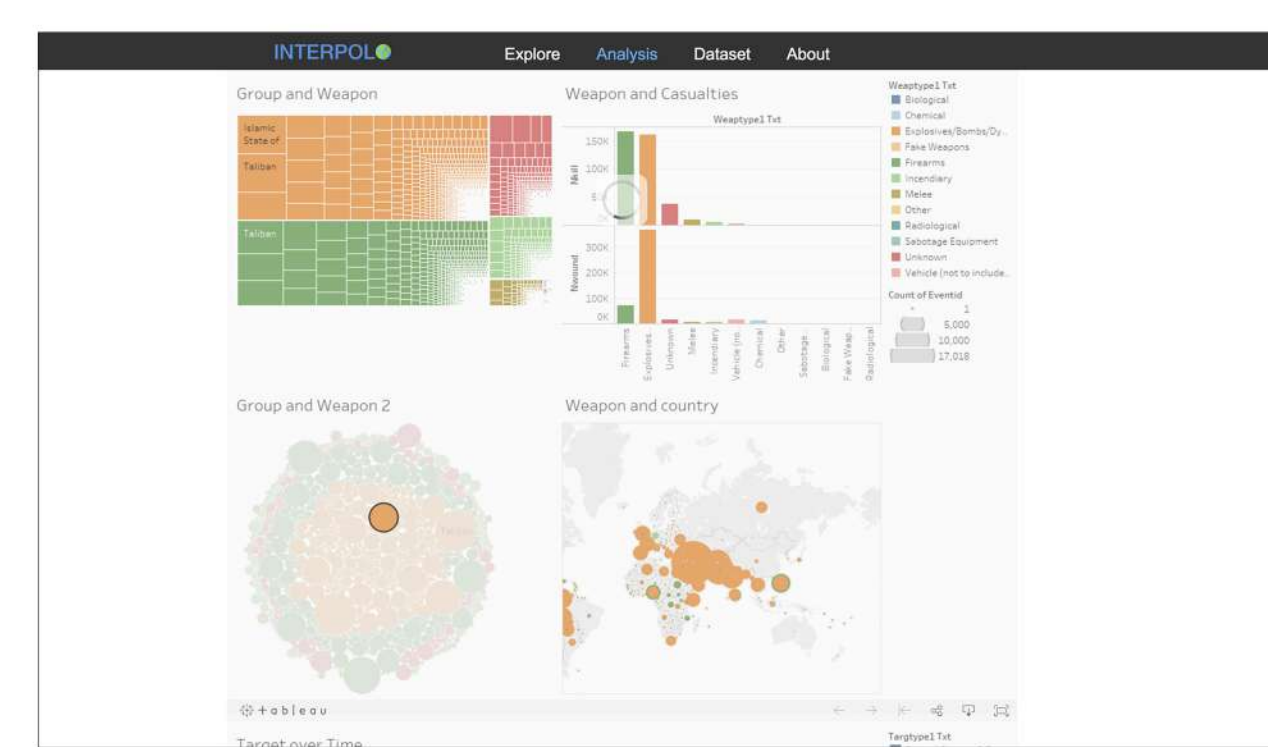
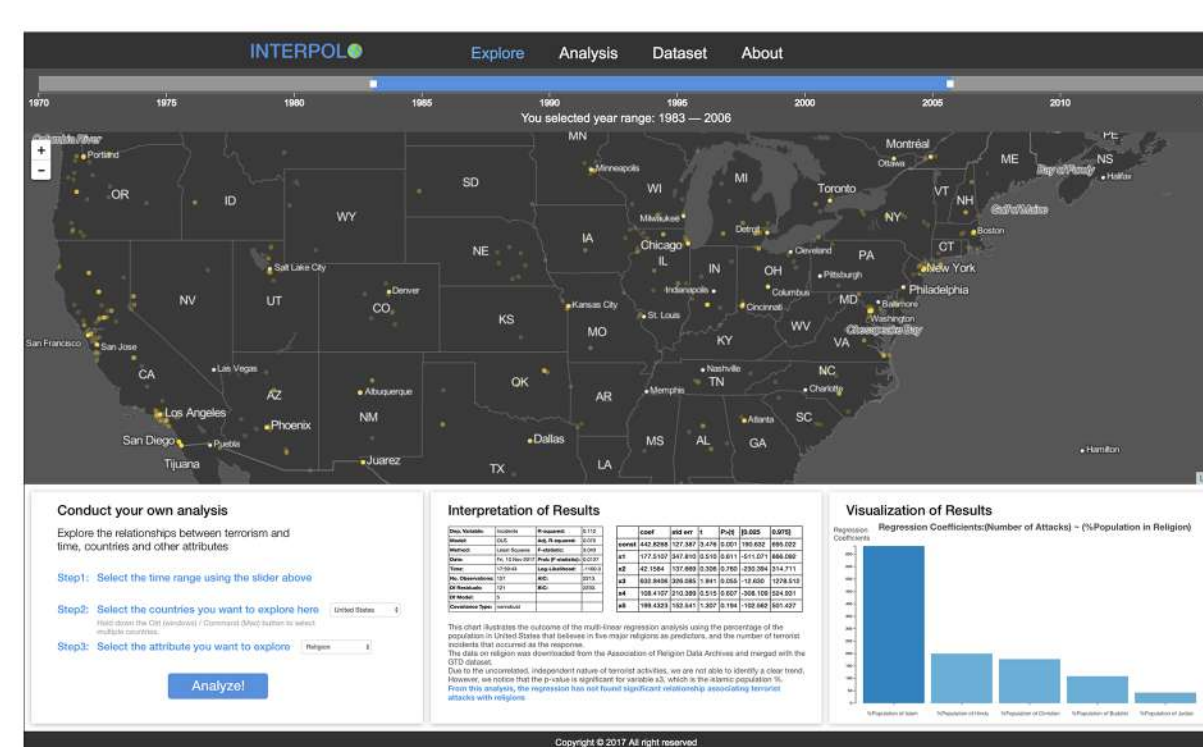
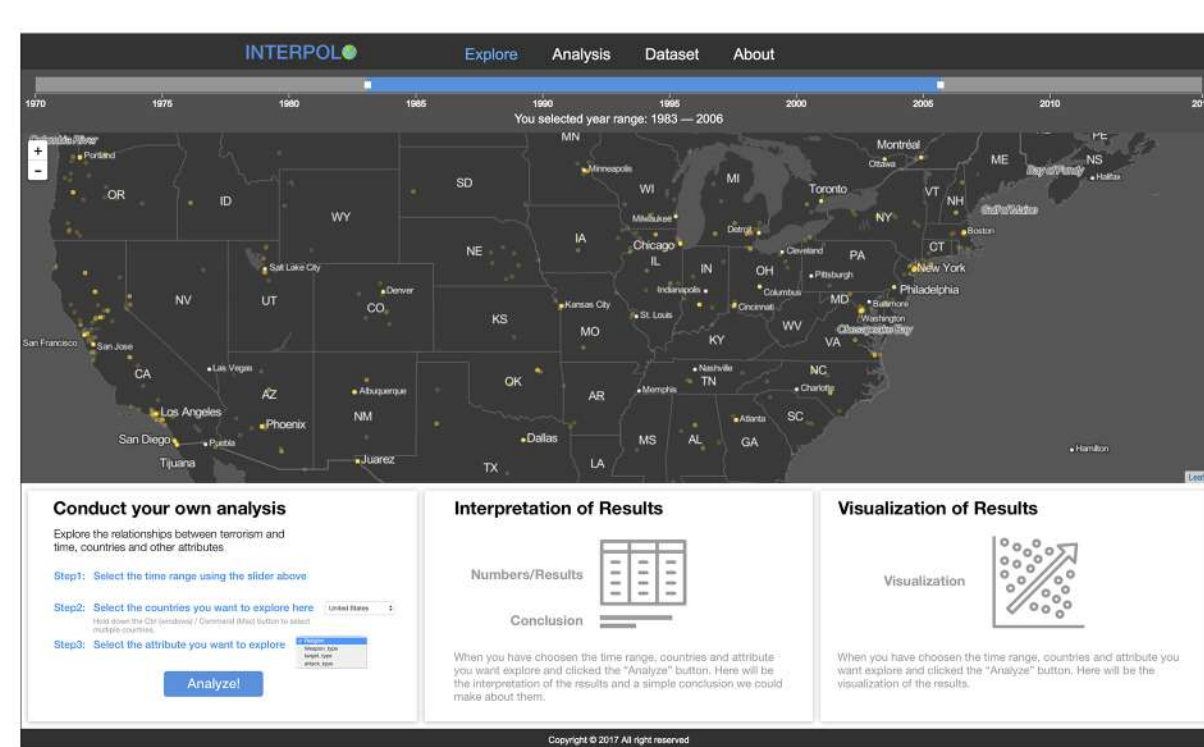
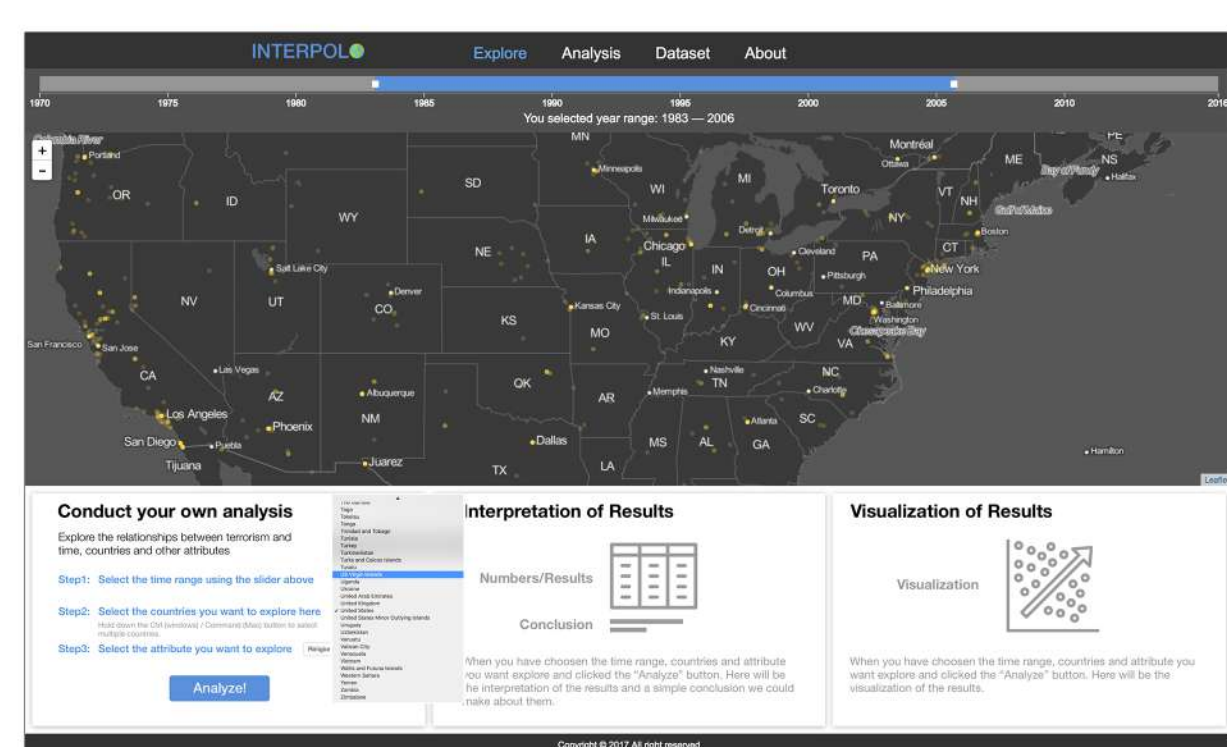
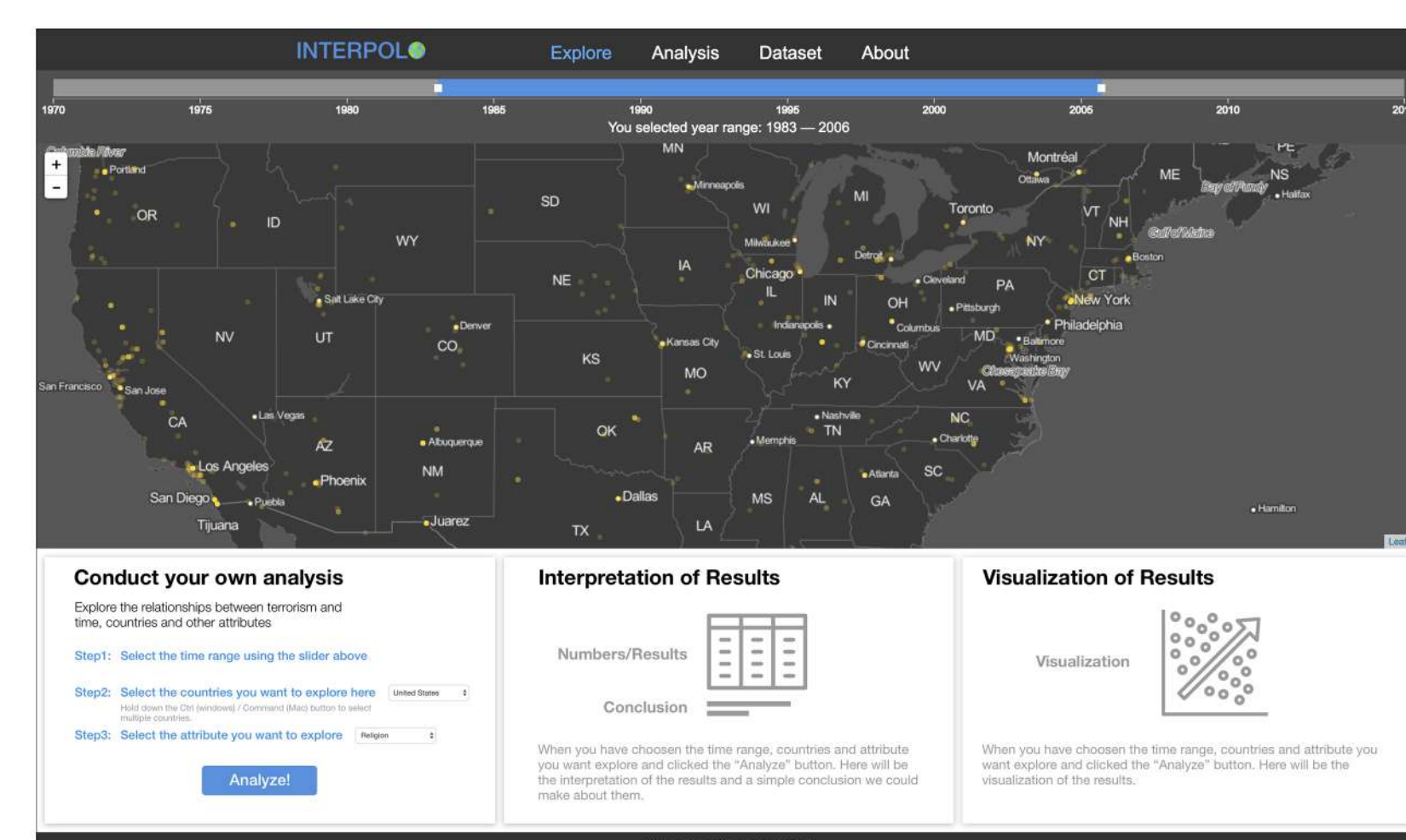
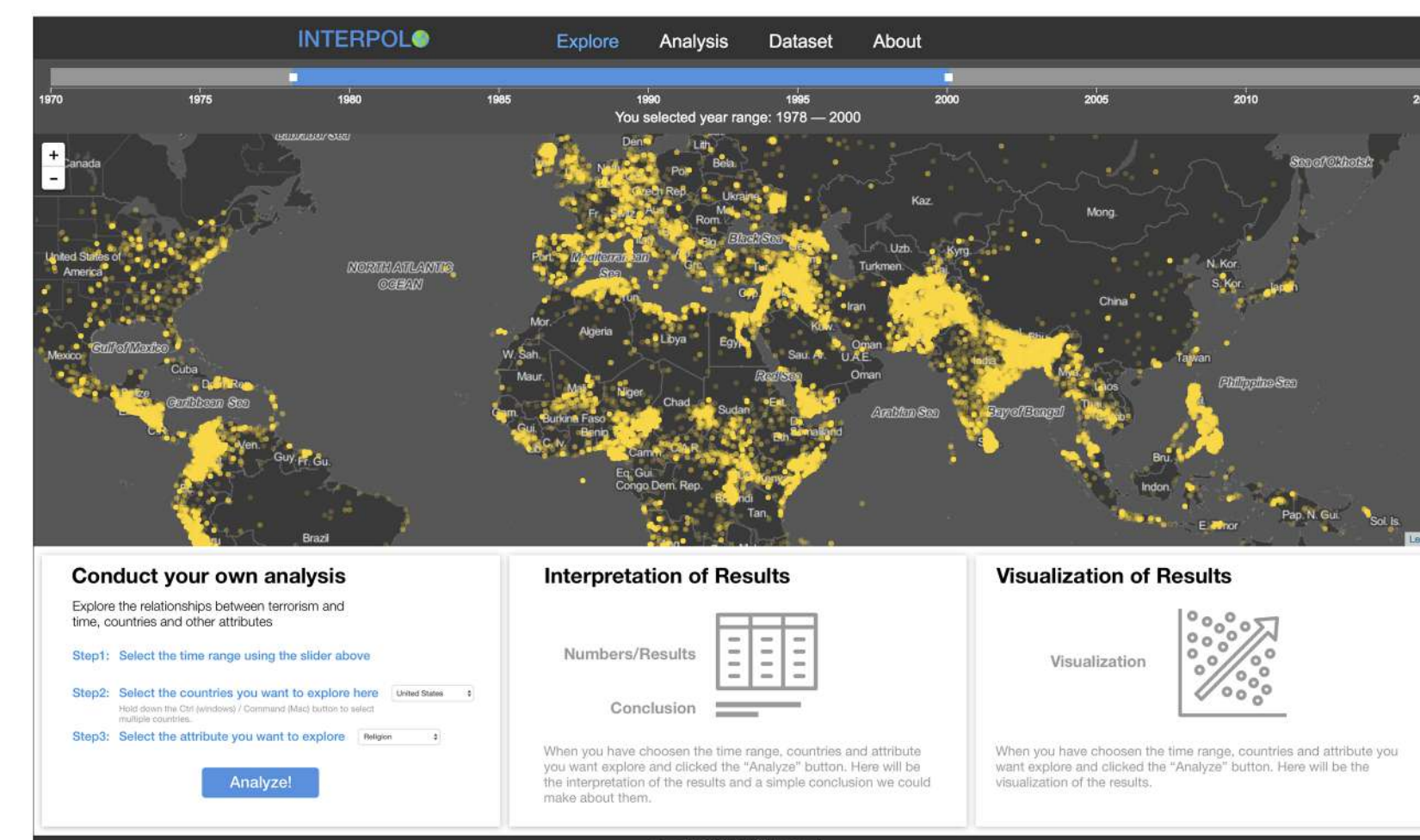
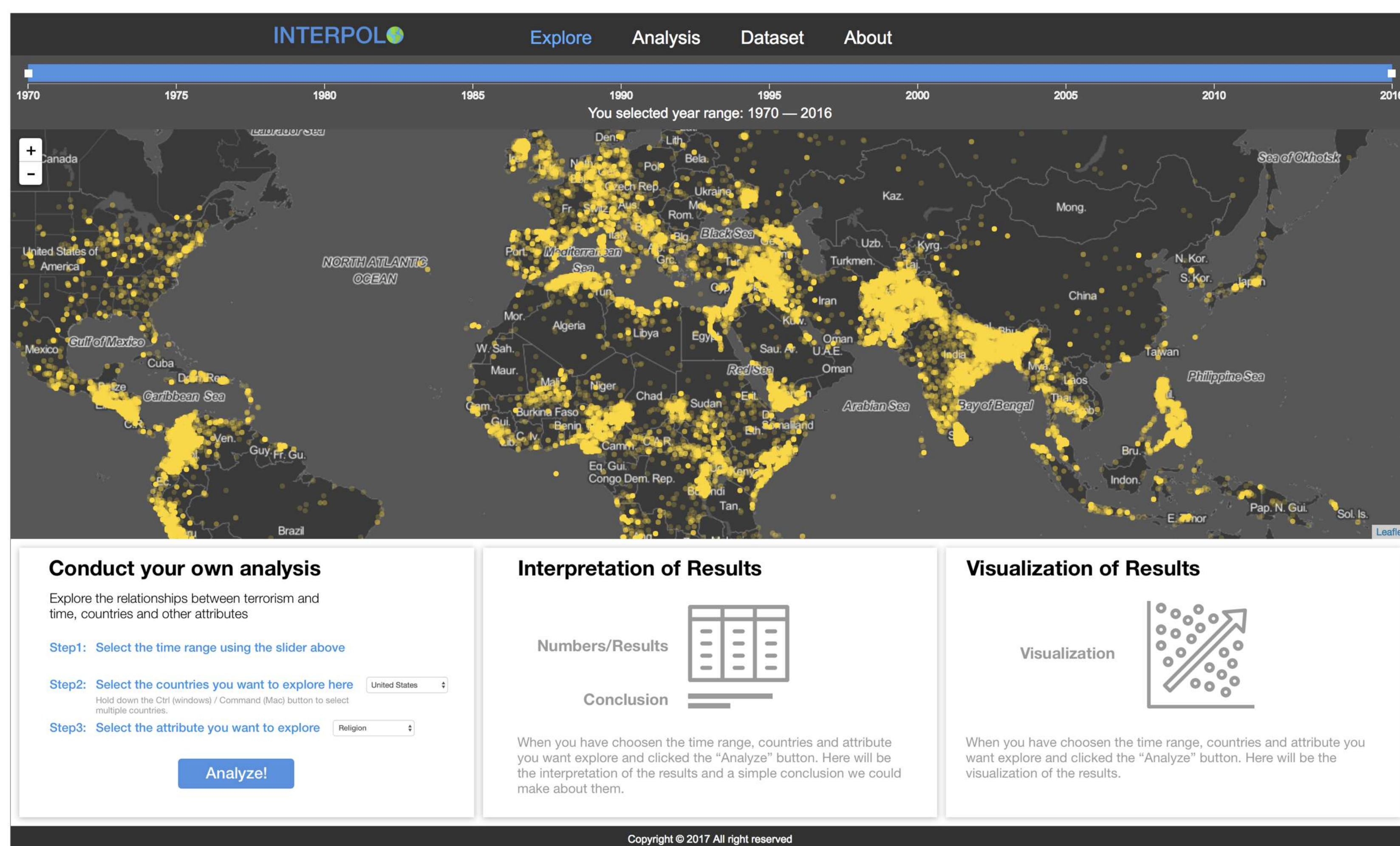
The Global Terrorism Database (GTD) is an open-source database including information on terrorist events around the world from 1970 through 2016 (with additional annual updates planned for the future). We download it from GTD Database website:

<https://www.start.umd.edu/gtd/>



Characteristics

> 170,000 Records 150.7MB Temporal-spatial 45 - 120 variables



Analyze Data Using Linear Regression

The user can choose countries and relevant attributes in his/her interest to perform the analysis. Once the user selects inputs, Interpolo builds a linear regression model to learn the relationship between casualties and user-specified predictors. The system returns the model coefficients and parameters back to the interface for statistical interpretation. If certain predictor causes more casualties in the terrorist attacks, its coefficient will be higher. To verify its significance through hypothesis testing, the system will also return p-values for coefficients. Such implementation provides a unique model for the user to derive personalized insights.

Experiments and results:

To evaluate our system, we employed user tests that focused on the participant's preference between an existing terrorism data exploration tool, and the interface we developed. Our study asked six participants to self-report subjective preference between the two interfaces based on six subjective metrics. The results (figure on the right) show that our interface is generally preferred to existing implementations. Further prototype iteration is needed to improve the interface usability and effectiveness.

