Earlham COLLEGE

Geographical Data Visualization Honglie Hu

For city data such as criminal data, traffic data and energy data

INTRODUCTION

Geographical data visualization can benefit people's lives and increase the efficiency of their decision making[2]. My main goal in this project is to build a website that supports geographical data visualization of city data such as criminal data, traffic data, and energy data in order to achieve the two merits listed above. My first contribution is to make the geographical data visualization method interactive. Users can upload a normal data file, like a CSV file or an XML file, directly to the geographical data visualization website. My second contribution is to build a data processing module that can fetch data, filter data, and transform data for the geographical data visualization method. My third contribution is to implement a geographical data visualization method called heat maps based on the Google Maps Application Program Interface (API).



Figure 1: Overview of the Website's Work Flow

REFERENCES: [1] John, S. Gis analyses of snow's map. https://www1.udel.edu/johnmack/ frec682/cholera/cholera2.html. [Online; accessed 3-Dec-2017]. [2] Graham, S., Carlton, C., Gaede, D., and Jamison, B. The benefits of using geographic information systems as a community assessment tool. In Public Health Reports (2011), 126(2), pp. 298–303. [3] Kagawa, T., Saiki, S., and Nakamura, M. Visualizing and analyzing street crimes using personalized security information service prism. In Proceedings of the 19th International Conference on Information Integration and Web-based Applications & Services (New York, NY, USA, 2017), iiWAS'17, ACM, pp. 208–214.

IMPLEMENTATION AND PLAN

Firstly, I built an interactive website, where users can choose what kind of geographical city data file they want to upload for visualization. Secondly, I built a data processing module. After getting the uploaded data file, the module would read data from the file and collect all geographical coordinates data. Then, the data is transformed into an appropriate form for visualization. Thirdly, I implemented personalized heat maps as the geographical data visualization method. Heat maps[3], which are frequently used to visualize geographical data at present, can display information like frequency and tendency clearly and precisely. Therefore, heat maps perfectly fit in the core functionality of the website: to display the frequency of criminal cases, traffic cases and other city information in a geographical area.





Figure 0: [1]

RESULT AND CONCLUSION



Figure 4/5: Data Traffic Collisions Data In Some Districts of LA (Zoom Out/ Zoom In)

The result can be seen above. In Figure 4/5, after uploading a CSV file of traffic collisions data, the frequency of traffic collision cases that happen in districts are displayed clearly. People can make decisions fast and well using the information, which can protect and benefit people indirectly and fulfills the core idea of the project. User can choose to zoom in, zoom out, and display the location names on heat maps to help reading. But there is one problem with the existing implementation: lack of power of personal web server. Because of that, not all data points can be displayed on heat maps, only data points (around 30000) in some districts can be displayed.

FUTURE WORK

The website does have some shortcomings and can be improved in future work. One improvement can be on the data processing section: to design better algorithms so that the website can accept different types of data file and can transform different forms of geographical coordinates data. The other improvement is to test and run the website on a more powerful web server.