

Project Proposal

INFSCI 2415 Information Visualization

Project Name: Contagious Diseases in the United States: Trends and Cycles in the Past 120 Years

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Proposal:

Project Tycho provides great datasets which contain weekly counts of cases or deaths of more than 50 contagious diseases at state or city level around the US for more than 100 years. With these datasets, it will be much easier to explore the epidemic spreads and preventions in the US from a historical view. However, due to the relatively large data size and the spatial and temporal range, it will be hard to reveal any trends or patterns through scanning the long table. Data visualization could provide useful tools and views for us to explore the datasets.

According to Y. Matsubara et al. (2014) and W. G. Panhuis et al. (2013), there could be three kinds of basic trends and patterns in the history of epidemic spreads and preventions:

- 1) In a long range of time, some of the diseases were significantly reduced by vaccinations while others were not; some were reduced but revived later. This trend could be effect by the development of medical science as while as the general economic development (represented by GDP per capita). Visualizing the Tycho dataset as a time-serious data, i.e. using index chart, could provide more entire and detail information of this trend.
- 2) Some of these diseases could have (seasonal) cycles and others do not. Using visual techniques of cyclic time oriented data, i.e. circular silhouette, could easily find the patterns of seasonal cycles of diseases.
- 3) Respecting the geographic locations, some places are more vulnerable to some diseases. With a map view as while as a tree view of disease incidences in different places and animated across time, we can find this pattern much easier.

Reference:

1. Yasuko Matsubara, Yasushi Sakurai, Willem G. van Panhuis, and Christos Faloutsos. 2014. FUNNEL: automatic mining of spatially coevolving epidemics. In Proceedings of the 20th ACM SIGKDD international conference on Knowledge discovery and data mining (KDD '14). ACM, New York, NY, USA, 105-114. DOI: <https://doi.org/10.1145/2623330.2623624>.
2. Van Panhuis WG, Grefenstette J, Jung SY, et al. Contagious Diseases in the United States from 1888 to the Present. The New England journal of medicine. 2013;369(22):2152-2158. doi:10.1056/NEJMms1215400.
3. Population: Historical Statistics of United States database (<http://hsus.cambridge.org>); List of U.S. states by historical population (https://en.wikipedia.org/wiki/List_of_U.S._states_by_historical_population).
4. GDP per capita: Bureau of Economic Analysis (<https://bea.gov>).