

Voyager: Exploratory Analysis via Faceted Browsing of Visualization Recommendations

Authors here talk about the system Voyager (it is open sourced by the authors) which is a recommendation-powered visualization browser. It supports exploration of multivariate data. Voyager focuses on different variable selections rather than just different visual encodings for same variables. Compass recommendation engine is the used by voyager that ranks visualizations according to data properties and perceptual principles. Vega-lite language is used by voyager and compass.

The paper is influenced by exploratory search and EDA (Exploratory Data Analysis).

It is similar to tableau in translating actions (drag and drop) into high level grammar however it generates views automatically and recommends views to user. Voyager recommends data variables and not only visual encodings. It has the voting mechanism. User can also enter queries to search for charts. Authors then talk about some design considerations. 1) Show Data variation, not design variation – which means consider not only visual encoding of same data but also consider different data or variables. 2) Allow interactive steering to drive recommendation – which says gallery must adaptable to focus more exploration as analyst dig down the data. 3) Use expressive and effective visual encoding – which says effectiveness and expressiveness is important in visualization. 4) Promote reading of multiple charts in a context – related charts should be ordered together in order to make it easy for the user to understand. 5) Prefer fine tuning to exhaustive enumeration – instead of using space for multiple variations club the things together and add them as different interactions. 6) Enable revisitation and follow up analysis – voyager allows user to revisit the views.

Voyager interface consists of schema panel and main gallery. Schema panel allows users to select variables and desired transformation. Main gallery displayed visualizations. The Compass takes user selections, the data schema and statistical properties as input. It produces recommendations in the form of Vega-lite specifications. Vega-lite specification which is a JSON object has mappings for visual encodings and data variables. Compass generates visualization design, prunes the space of recommendations based on user selection and clusters result into meaningful groups. Compass takes into care the ease of read for charts and displays them accordingly. It performs clustering as mentioned in 5th point above.

Authors performed a survey of their system by asking few users who were experienced with Data visualization tools and did not about their system for evaluating their system and compared it with their other system polestar. It turned out that people preferred voyager for exploration and polestar for question answering. People gave good reviews for voyager and preferred to use voyager in future exploration tasks. Authors say that some improvement is needed in reading multiple charts, additional interaction techniques, perfecting voyager interface and that other possibilities may require higher research. They end the paper by talking about some open questions like fitting large plots in small spaces. In future they are trying to explore probabilistic recommendation models, combining voyager and polestar for better results.