Tableau Public Gallery

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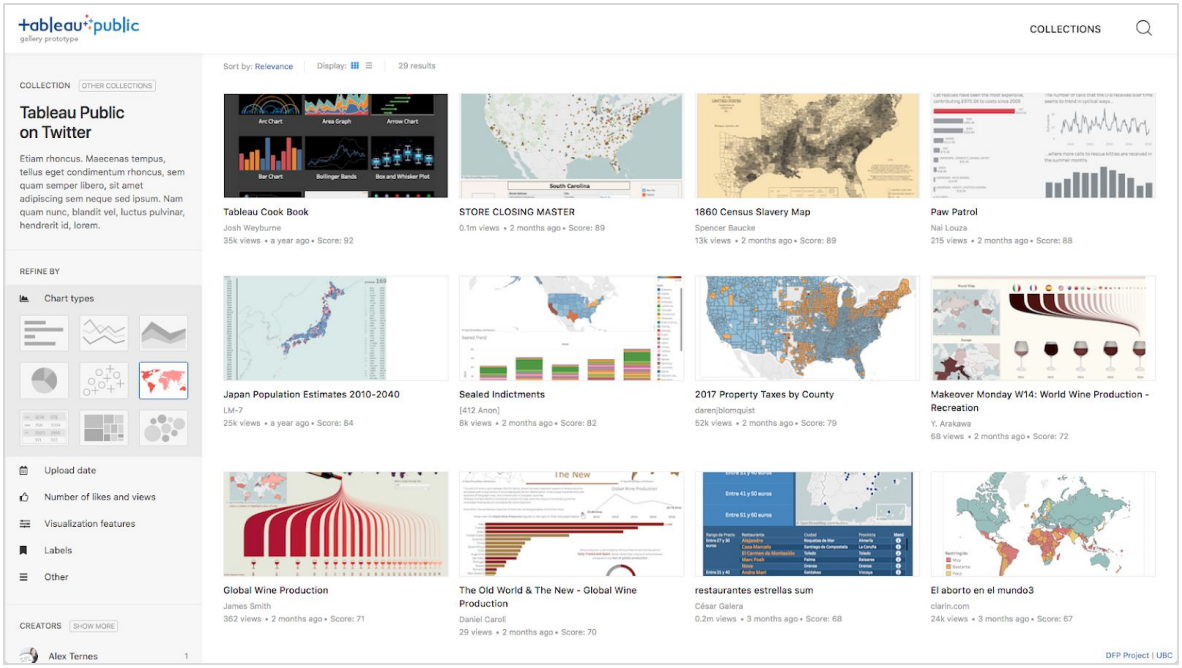

Figure 1: Screenshot of our prototype showing Tableau visualization dashboards that have been shared on Twitter. The results are displayed as large thumbnails in a grid layout. Users can filter and sort the visualizations along different dimensions. In this example, only dashboards are shown that contain a geographic map. A visualization can be explored interactively in detail by clicking on a result.

Abstract—*Our goal in this project has been to redesign the Tableau Public gallery and create an effective gallery for existing Tableau Public visualizations. We aimed to identify the main users of this gallery, investigated what tasks these users are currently completing, and explored their needs in the space of visualization and design. The "vis fan", someone with some data visualization or design experience, was chosen to be our primary persona and we found these users often conducted inspiration-based searches. We created a working prototype and discovered how users found inspiration using our tool during a task-based user evaluation. We found that our tool inspired users to create visualizations that were more complex, detailed, and interactive than their ideas before browsing the gallery. Based on these findings and the process of building our prototype, we have compiled a list of recommendations for Tableau.*

1 Objectives

Tableau Public, a free visualization tool, allows users to create interactive data visualizations. When a user saves a creation, it is added to a publicly searchable repository of visualizations. Currently the only way to find it would be to search textually and scroll through the pages of results, unless it happened to be on the manually-curated "viz of the day" page[1]. There is also an active community of information visualization creators looking to seek out novel high-quality visualizations. We strive to bridge the gap between this database of visualizations and these users who are searching for high-quality visualizations.

Inspiration-based searches are ones that aim to find content and materials to support the creative process, and by doing so, increase the searcher's knowledge of a topic. A preliminary survey of potential and current Tableau users found that many individuals are conducting these types of searches and must use multiple sources to effectively find data visualizations.

We aim to build a centralized repository for users to explore and discover high-quality Tableau visualizations for inspiration. Our goal is to provide current and new Tableau Public users functionality that supports the inspiration tasks they are already performing using multiple sources, including searching for visualizations created by notable members of the Tableau community and looking

[1] See Appendix A1 for screenshots of Tableau Public's current gallery interface

over a collection of visualizations created for a hashtag challenge.

2 Design and Testing

2.1 Preliminary Exploration

In order to understand the users, we conducted an online questionnaire with 41 participants and interviewed 1 Tableau expert and 3 users with less direct Tableau experience. We also compared Tableau Public's gallery with 16 other websites and visualization browsers[2]. Our goal was to learn about different users' experience with Tableau Public, their opinions on the system, and what they expect to encounter while browsing a visualization gallery. We found that individuals with less visualization experience emphasized the importance of knowing "the big names in data visualization" but also that they could not dedicate more time to find or browse data visualizations. They found it necessary to go to many different websites and were unclear what the best websites to follow were. The expert also looked at many blogs, but had a carefully curated list of blogs he regularly visits with great confidence. Our key findings from the expert were that on Tableau Public's current gallery it is hard to find interesting visualizations and the quality of the uploaded content is fairly low. He would like to see more high-quality content and the exploration process could be improved by adding a chart type filter.

Concurrently with the questionnaire and interviews, we met with a team at Tableau[3] in person to gain insights on their platform, any previous work, and their vision for the gallery in the future. Our key takeaways from the meeting were their vision is creating the "YouTube for data visualizations" and that currently many first-time visitors to the Tableau Public website (where the gallery is currently located) never return. Google Analytics tracking data shows that the average session length consists only of two page views and the bounce rate is relatively high (65%). Tableau visualizations are often embedded into external websites which leads to a high number of views but these statistics does not represent actual gallery visitors (90% external views vs. 10% gallery views). The gallery should be the first step to engage with visualizations and to explore the work of others and should be welcoming for someone who is new to the field as well as to visualization experts.

2.2 Scope and Requirements

We decided to narrow the scope of the project by targeting specific users. Based on our survey findings, we found that users who are interested in data visualization are less interested in the topic of the visualization and more interested in how the visualization is composed. We target users that are interested in data visualization and have some experience in this field, a persona we refer to as the "vis fan"[4]. We focus on vis fans because Tableau is invested in creating a platform for new users yet maintaining a friendly space for the expert users that already are invested in and actively using their current platform. Expert users should be satisfied with the interface, but may still require more advanced features that could be integrated over time. We chose to not target users who are interested in exploring a certain topic or users who are seeking tutorials for creating visualizations.

2.2.1 Browsing by Visualization Semantics

We have preliminary supporting evidence that individuals who have experience creating visualizations generally have a preference to search for and browse by visualization semantics such as chart type rather than by topic. This does not mean that the topic of the visualization is useless; it should still be captured either manually or automatically as metadata to be used for recommendations in the future.

2.2.2 Gallery-Style Curation

Currently all featured visualizations in Tableau Public's gallery are manually-curated. This is time-consuming and, as mentioned by Tableau employees, has caused controversy within the Tableau community. By implementing chart type recognition and a relevancy rating, we were able to automatically generate chart-type collections that showed content above a certain threshold of quality. We also pull in streams of Twitter data and generate social media collections based on recency and hashtags. This type of automatic curation is necessary for Tableau Public to grow as a browsable gallery.

2.2.3 Filtering Low Quality Visualizations

One common complaint of current users of the Tableau Public gallery is the high number of low quality or unfinished visualizations within the gallery. We require curated collections with a very basic relevance rating attached to each visualization; however, due to the small sample of data we had access to, we were unable to test the effectiveness of this specific rating. It is our opinion that there must be some kind of rating (whether it be publicly facing or internally scored) to give higher priority to better scoring visualizations.

[2] See Appendix A2 for a complete breakdown of these comparisons

[3] A Tableau manager, a Tableau Public product manager, and a Tableau Public developer

[4] See Appendix A3 for a full report of our primary, secondary, and anti-personas

2.2.4 Community Integrations

Another complaint from current users is the disconnect between the Tableau Public community and Tableau Public gallery content. Our plan is to bridge that gap by featuring visualizations pulled from Twitter and #MakeoverMonday challenges. While we recognize that community integrations are an integral part of the future gallery, it is out of scope for this project and the integrations we make should be considered the bare minimum. Possible other integrations could include embedded Twitter feeds and the ability to comment, like, or applaud other users' visualizations.

2.3 Prototype

In order to facilitate a better browsing experience and after rounds of prototyping, we created a collections view of visualizations that are grouped based on chart type, social media feeds, and hashtag challenges[5]. Within each collection, we allow sorting by relevance, date, and popularity, and filtering by chart type (see Fig. 1). The visualizations are all automatically assigned a "score" which filters out the low-quality and incomplete visualizations based on recency, number of views, social media shares, and whether they are missing key elements such as a description or title. Users can click on a visualization and interactively explore. They can also search for a specific vis or topic using the search bar which also has a handy autocomplete function.

2.3.1 Implementation

We use Python and the open-source framework Django in the backend that serves primarily as an interface between the database and the browsable gallery. The frontend is based on JavaScript, HTML, and CSS. We have used UIKit as a frontend framework and D3.js for generating the dynamic page layout. Interactive Tableau dashboards are embedded directly into the platform.

Our database contains visualization and user profile data from multiple sources:

- Tableau provided us with metadata for a few thousand visualizations.
- We used the Twitter API to collect URLs to Tableau dashboards that have been tweeted recently.
- We scraped information directly from the old Tableau Public platform to complete the information from Twitter and to collect more data about users.
- We manually added chart type labels to a few hundred visualizations in the database.
- We automatically assigned visualizations to predefined collections based on different attributes: *chart types*, *hashtags*, *shared on Twitter (yes/no)*

2.3.2 Technical Challenges

The challenges we faced during the development of our prototype system were threefold:

First, we aimed to have a few hundred visualizations in our database in order to guarantee a realistic browsing experience for the evaluations. Although we have received a sample dataset from Tableau, it provided only a starting point for our endeavor. We had to scrape additional information directly from Tableau's web page, such as visualization thumbnails or user profiles. The initial metadata only covered visualizations with more than 7000 views but we also wanted to include low-quality and incomplete visualizations to simulate the actual gallery content. Moreover, we scraped the data of new visualizations that have been tweeted recently to test our Twitter collection feature.

Second, the available data about a visualization itself is missing or deeply hidden in a VizQL object --- Tableau's internal description for rendering visualizations. This information is highly relevant, for example, to automatically assign chart type labels or to detect if a visualization can be rendered correctly on mobile devices. If the most important attributes are available as variables it would save a lot of engineering time and would increase the degree of automation significantly.

Third, the gallery contains many incomplete visualizations and, apart from an unstructured textual description, there is no indication which topic or domain a visualization belongs to. While topic modeling was beyond the project scope, we tried initial experiments to filter out incomplete and low-quality content. This has proven a difficult task due to the non-availability of the aforementioned visualization attributes and the automated publishing. A default draft mode would lead to fewer uploads but could narrow down this problem. Including a basic topic hierarchy or user-definable tags in the publishing workflow, could lead to a much more powerful gallery.

2.4 Evaluation

Our user evaluation explored how users find inspiration from using our prototype and we gained feedback on the usability of the tool. We had 7 participants who fell into the "vis fan" persona each do a session where they were given a data set and used pen and paper to sketch a visualization. We asked them to revise and improve their sketch before allowing 10 minutes to browse through our prototype for inspiration. Then they created a final new sketch, added annotations and improvements to previous

[5] For a full rundown of our prototype with screenshots, see Appendix A4

sketches, and ranked their three sketches[6]. During all the tasks, the participants were observed and encouraged to "think aloud" to explain their thought processes behind the actions taken to complete the task. During the browsing task, the participants' browsing behaviour was captured using clickstream recording and screen-recording software. A post-task semi-structured interview was conducted to revisit the participant's experience and to collect their input on the learnability and usability of the prototype. Following the interview, participants were given a final demographics survey in order to properly assess their classification within our personas.

2.4.1 Findings

In general, we found that browsing the gallery led to new ideas or confirmation of initial ideas. All participants chose a new sketch or a sketch that underwent significant revisions after viewing the gallery as the one they had the most confidence in. Viewing the gallery led participants to create more complex sketches using new chart types, more interactive elements, and other Tableau features such as multiple coordinated views.

Users were highly engaged while using the tool, browsing for 7-10 minutes without getting stuck or bored. One participant highlighted the polished nature of the product, noting afterwards that he didn't realize that it wasn't a currently deployed official Tableau website. The search feature was used by 5 out of 7 participants, but only after first getting an idea of what to search for from browsing a collection. Participants used the collections to pre-filter chart types instead of using the filter in the left panel afterwards (post-filter). Both the use of search and pre-filters could be accounted for by the specific task; however, since the task was created based on a common use case, we find these observations to be noteworthy.

When asked how the experience of browsing data visualizations on our prototype compared to the everyday experience of browsing content heavy sites, a majority of our participants noted the exclusion of personalized recommendations. Further questioning revealed that users want recommendations from the detail view that are not only a similar topic to the one they are currently viewing, but also some that look similar or are semantically similar to their current selection. Most of the participants would use Google web or image search to find some examples of visualizations if they would not have known about the gallery. In this context, a participant mentioned "it is much easier to use this [Tableau gallery]!"

[6] See Appendix A5 for the progressive sketches of our participants

3 Conclusions

Tableau's interest in having this gallery be a starting off point for new users and a gathering place for current users prompted us to target the "vis fan", someone with some data visualization or design experience. We created a working prototype that facilitates inspiration-based searching. Through user evaluation, we found that our tool inspired users to create visualizations that were more complex, detailed, and interactive than their ideas before browsing the gallery. It has been a pleasure collaborating with Tableau on this project and we hope to have given them some insight on how to improve their Tableau Public gallery.

4 Recommendations

Users noted that the current Tableau Public gallery is filled with low quality visualizations. Our recommendation to minimize this is to have the default creation mode in Tableau Public be draft mode. Users can be prompted to or choose to publish when their visualization is complete. Another thing is to create a relevance score. We had a rudimentary score in our prototype that worked well for a small sample of visualizations, but a more thoroughly tested and sophisticated score is recommended.

Instead of only allowing users to perform textual searches, we recommend browsable, curated collections. We also recommend that these collections not solely be organized by topic and instead be focused on visualization semantics, social media, and expert endorsements. In order for topic-based browsing to be possible, topic tags should be implemented. Within the search results and other types of collection views, sorting and filter along different dimensions should be present. We recommend that filters be based on visualization semantics such as chart type and that sorting takes popularity measures such as views and favourites into account.

To bridge the gap between the Tableau Public community and Tableau Public gallery content, we featured collections that pull links from Twitter and group #MakeoverMonday visualizations. These integrations should be considered the bare minimum. Possible other community integrations could include embedded twitter feeds and the ability to comment, like, or applaud other users' visualizations. In the future, tweets, retweets, and likes could be used as an additional method to identify and rank relevant content.

Finally, to be a comparable browsing experience to other content-providing galleries such as Youtube and Netflix, we highly recommend the inclusion of personalized recommendations. We believe that users would appreciate recommended content that is visually similar to the

visualization they are currently viewing as well as some content that is a similar topic.