IMO: Sentiment Analysis Visualization on Mobile App Reviews

Jeffrey Xiao and Flora He

Abstract

In this project, we created an interactive visualization given the app data that would allow a market research team to better navigate, visualize, and draw comparisons between applications for mobile devices. In addition, we aim to use advanced tools such as sentiment analysis to construct graphs over time that would better illustrate how an app is performing at a certain time due to what factors. It would also have the ability to display two different apps side-by-side and comparison by the digital distribution platform.

Introduction

In an era where convenience is king, 77% of US adults own a smartphone, which on average has enough computational power to rival that of a midrange desktop from just a few years in the past. Because of this, the mobile app market has grown larger than ever, with 2.1 million apps available on Google Play and 2 million apps on the Apple App Store in 2018. With so much competition, development teams often have trouble ensuring that their apps stand out in today's oversaturated market. The app stores themselves have layouts more tailored to the consumer than the developer, with navigation designed to lead a potential customer to try an application with little information about it beyond a description, rating, pictures, and a couple of reviews. There are plenty of tools available for professional market analysis, but almost all of them feature plain tables and line graphs with relatively bare-bones data.

Background and related work

Thus far, there has been little work done in the field of custom visualizations of app store data. Moreover, most of the similar projects do not provide much direct comparison between applications. Many datasets are limited to one source, free apps only, or out-of-date data. In our visualization, we dynamically query both Android and

iOS app store data and allow the user to compare app performances in multiple categories.

One of the key points in the visualization involves using a sentiment analysis process on the reviews of a mobile application. Some of these papers discusses the method of collecting, parsing, and analyzing the data. Many sentiment analysis algorithms are not suited to this task because they exploit indirect indicators of sentiment that can reflect genre or topic instead. In general, we used word bags to define the attitudes of the reviews.

There are tons of data visualization tools focus on to represent data accessible and interactively, often in such a way that represents the complex and nuanced human nature behind the raw numbers. In our project, we will aim to borrow some of the philosophy behind their designs as well as some of their visualization techniques. We use monochrome to show the patterns of the app sentiment analysis.

Design
Design overview
Overview first, zoom and filter, details on demand.
Schneiderman's Mantra

- Overview market analysis in different sources(Macro level)

First, we give the user a broad awareness of the entire data space. The overview usage is not limited to initial reconnaissance; we allow the user to interleave the use of overviews and details views by switching back and forth between them many times.

- Explore per app analysis(Meso level)

At the beginning of the exploration process, we provide a few filter sections to guide the user in choosing where to drill down to inspect in more detail.

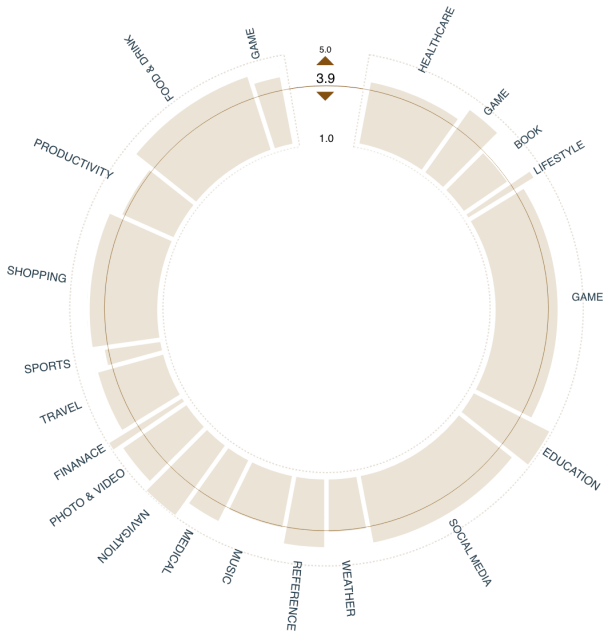
- Compare sentiment analysis in a time period(Micro level)

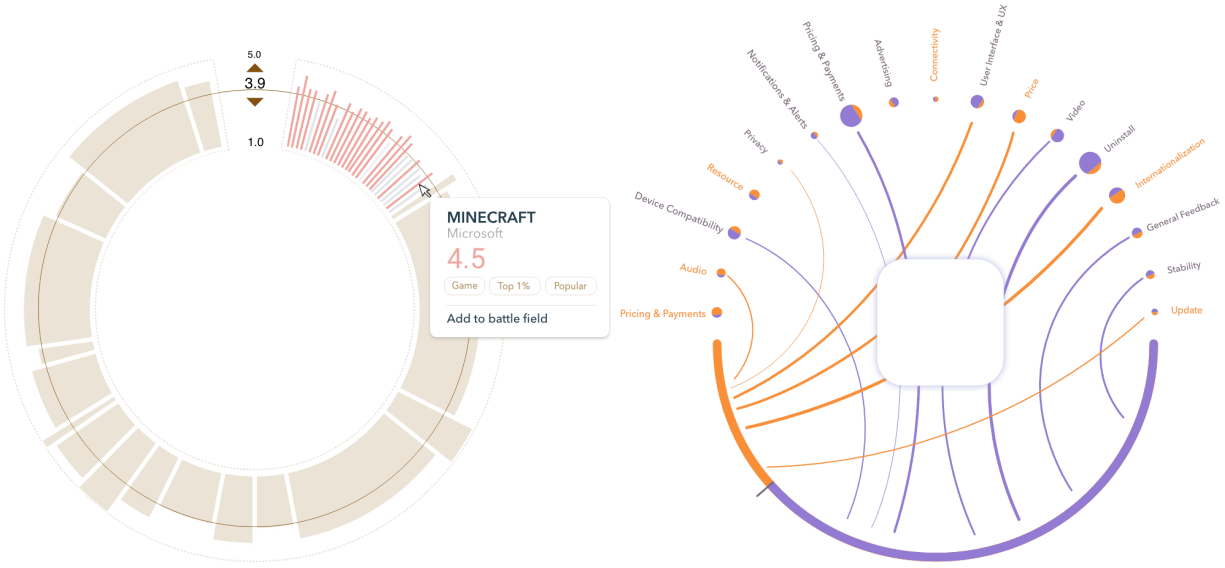
On the side of the page, we create a Battlefield for detailed comparison on demand. In this section, a line chart with more detailed rate change overtime are displayed.

Target users

- Developers who want to gain insight into meaningful app data trends
- Market research teams interested in sentiment analysis
- Project managers who monitor the app performance over time
- Random users interested in the mobile app market

Because of the widely varying audience, we have to strike a balance between a visualization that is pleasant to interact with and view as well as one that is easy to decipher and draw meaningful insights from.





Interactions

A single static view can show only one aspect of our dataset, therefore, we designed an interactively changing display that supports multiple queries, visual feedback, and responsiveness.

Selecting filters and changed them into labels on the top frame

Using the slider in the middle, the user can be sorting the app above a certain value

Hovering on the bar to read a list of attributes of that year

Showing the chosen apps on the sidebar

Detailed comparison when open the side slides

Choosing a period of time to compare the performance of two selected apps

Color

"Get It Right in Black and White" - Maureen Stone

This quote from Maureen Stone is sums up one of the most important design guidelines for effective use of color. Simply put, we must ensure the most crucial aspects of visual representation are legible even if the image is transformed from full color to black and white. The color scheme we utilized past this challenge.

We chose mono-color on the different app category and emphasized the central sentiment network diagram. The two representative colors, orange, and purple, are the strongest comparison color set, which distance 180-degree on the color wheel.

Layout

"Out of sight, out of mind" - John Heywood

The "out of sight, out of mind" mentality about missing information: users tend to forget to take into account elements that have been filtered out, even when their absence is the result of quite recent actions. The disjoint interaction (scrolling) in the vertical layout has a more detrimental effect on the experience than the compromised readability in a horizontal layout. Based on this fact, we chose the horizontal layout in the final design.

Eyes Beat Memory

Using our eyes to switch between different views that are visible simultaneously has a much lower cognitive load than consulting our memory to compare a current view with what was seen before. Arranging the overviews and detail, we designed a sidebar that shows the selected apps and floating filter sections on the right since aggregation can be somewhat safer from a cognitive point of view.

Future Evaluation

IMO, as an exploratory system, is inappropriate to define success on just one side. We intended to measure the expressiveness of the system on two aspects: User performance and User experience.

Learnability, Effectiveness, and Insightfulness are three metrics we selected to evaluate the usability of the visualization. And for the subjective User experience, we choose SUS scores, Satisfaction, and Future use willingness as key measurements.