A Study on Visualizations of New Product Trends on Online Social Networks

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Abstract—This study examines the new product information spreading issue from a data visualization perspective. Different from previous research, this study demonstrate how choosing proper visualization methods benefits the promotion of new products via online social network. With the adoption of proper visualization methods, the information flow can become intuitionistic, such as the topic trends, the customer satisfaction, and even why consumers choose competitors products instead of this one. We adopt Area Chart visualization and propose Dynamic Gauge visualization approaches based on D3 library to demonstrate the importance of visualization method choosing and applying for iPhone 5S topic trends. We identify in our study that topic trends differ in different cultures, the trends change over time during the new product release cycle, and different features of the product get various attention. Under these circumstances, a proper visualization method can help company make decisions according to the topic trends instantly. Based on these findings, company managers can make full use of online social network, recognize opportunities, identify issues, and better accomplish Product Lifecycle Management (PLM).

Keywords-Data Visualization; Online Social Network; Topic Trends; iPhone 5S; Product Promotion

I. INTRODUCTION

Online Social network analytics continue to evolve quickly as companies attempt to learn from behaviors of consumers and sentiments shared by them on online social networks. Under a perfect circumstance, through online social network analytics, company leaders could be informed of potential business opportunities, as well as possible product problems bubbling to the surface. Researchers proposed various kinds of information spreading models to make sense of the big data flow on the web[1], [2], [3]. Social network analysis, as one of the theoretical underpinnings of social computing[4], has already achieved some progress. However, as a matter of fact, many companies find it tough to obtain meaningful results from online social network.

In what follows, we attempt to take the iPhone 5S topic trends on Twitter of the UK and Sina Weibo of China as an example to demonstrate the effects of proper visualization methods. There are four parts in this paper. We start with a brief introduction of visualization tools and their application. Then we discuss product promotion on online social network

briefly. After that, we implement experiments on iPhone 5S on Twitter and Sina Weibo, analyze the results, and propose how to choose the proper visualization method for the topic trends of a new product release cycle on online social networks. We end the study with the conclusion that choosing proper visualization methods benefits the promotion of new products via online social network.

II. VISUALIZATION TOOLS

In recent years, with the advancing of data visualization theories[5], [6], more and more data visualization methods are proposed, as well as the corresponding visualization tools. Some of the most famous ones are Microsoft Excel, Google Charts and D3, as shown in Table I. Microsoft Excel is a commercial software, which can be used locally. Google Charts is based on Google Chart API, which is an open source development environment and allows web application developers create charts from their data and embed them into web pages. Google Charts can also be used cooperatively with Google Sheets, which is another free product of Google. D3 is short for Data-Driven Documents, a JavaScript library which uses data to drive the creation and control of dynamic and interactive graphical forms which run in web browsers[7]. Both Google Charts and D3 use HTML5 and SVG (Scalable Vector Graphics) technology.

Table I
THE COMPARISON OF 3 FAMOUS VISUALIZATION TOOLS

Microsoft Excel	Google Charts	D3 Library
Commercial	Free	Free
Locally	Embed in Web Pages	Embed in Web Pages
Constrained	Flexible	Very Flexible

III. PRODUCT PROMOTION ON ONLINE SOCIAL NETWORK

On the other hand, with the booming of online social network represented by SNS, SMM (Social Media Marketing), which gains website traffic or attention through social media sites, is drawing increasingly more attention from companies. When a company is planning on a new

product, they cant pay too much attention to the promotion via online social networks. As the web evolves we have seen a variety of social machines emerge[8], of course including online social network. The past several years witnessed the success of companies who are good at using the internet to promote their products. For example, Xiaomi has become a company that is valued 10 billion dollars in only three years. Xiaomi labeled itself as an Internet company. They release, sell, promote, and improve Xiaomi phones all through the Internet. The process is amazing, and the effect impressive.

The average process of a new product promotion is as follows:

1) New Product Release Rumor, which causes wide guess and discussion among consumers.
2) New Product Launching, which attracts broad attention and discussion among consumers.
3) Product Promoting, which attempts to become the hot topic again sometime after the launch.

In each stage, the focus of topics may change over time, as well as the sentiment of consumers. So, the visualization of monitoring the information flow is a key approach.

IV. VISUALIZATION EXPERIMENTS ON IPHONE 5S

We carry out an experiment on Twitter and Sina Weibo and demonstrate the iPhone 5S topic trends on Twitter and Sina Weibo.

Topsy is used to analyze the tweets on Twitter and get the statistic data. Topsy is a social search and analytics company based in San Francisco, California. The company is founded in 2007. It maintains a comprehensive index of tweets on Twitter, numbering in hundreds of billions, dating back to Twitter's inception in 2006[9]. Topsy analyzes data from conversations shows trends on social websites including Twitter. We can get some analytic results via Topsy, but its limited to a large extent. So, we just use it as a tool to get statistic data of what we need, referring to data on iPhone 5S here.

Advanced search is used to analyze the micro-blogs on Sina Weibo and get the statistic data. This advanced search tool is supplied by Sina Weibo officially. Detailed restrictions can be specified to get the statistic data on a specific topic.

In general, consumers talk about the common features of a phone, which usually are charger, battery, software, camera, screen, speaker, signal, and the operating system. When we analyze the iPhone 5S, we find that consumers also pay much attention to the new technology, Fingerprint, and the new feature different the previous generations, Color. So we take the 10 features of iPhone 5S into consideration and look at the topic trends of them.

In what follows, several visualization methods are introduced to show the topic trends in a proper way.

A. Area Chart

An Area Chart is a common way to show the change of a variable. Area Charts demonstrate cumulated totals with numbers or percentages (Stacked Area Charts in this case) over another variable, which usually is time. In this experiment, we plot Area Chart with D3. Although Google Charts can plot this chart as well, we still choose D3 considering the flexibility. The Area Chart is rendered within the browser using SVG or VML. When hovering over points, it displays information about the points. Fig. 1 is an easy example of Area Chart. The X-axis is the Year variable changing from 2013 to 2016, and the Y-axis shows the Company Performance, which is represented by two variables, Sales labeled blue and Expenses labeled red. As we can see, the area below the blue line and the red line are stacked with light color shade.

Then, we use Area Chart to demonstrate the topic trends of iPhone 5S. The Twitter trends of various iPhone 5S features are demonstrated as Fig. 2. And the Sina Weibo trends are demonstrated as Fig. 3.

In Fig. 2, each point represents the total tweet number of that topic in the week after that day as the X-axis shows.

In Fig. 3, each point represents the total micro-blog number of that topic in the week after that day as the X-axis shows.

When hovering over points, it displays the number of that point. We can also show the most retweeted tweet.
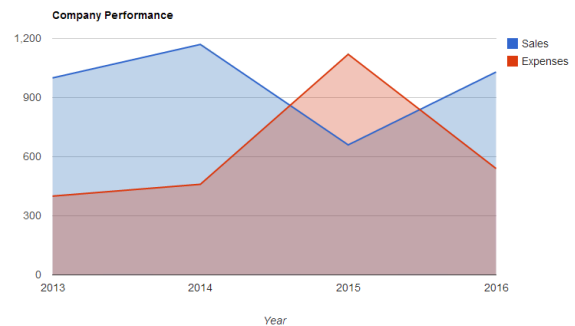

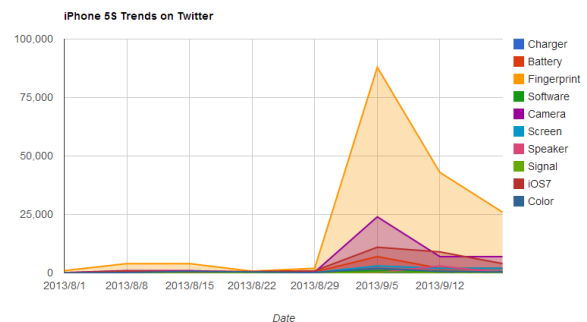Figure 1.   A Simple Example of Area Chart

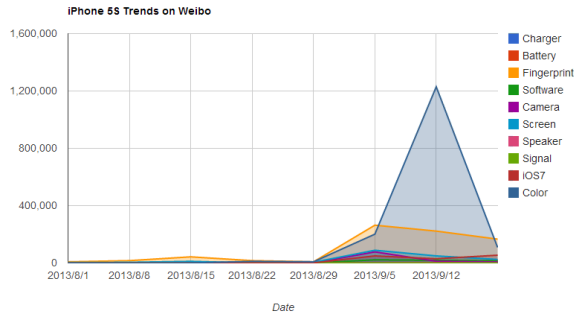Figure 2.   iPhone 5S Trends on Twitter

Figure 3.   iPhone 5S Trends on Sina Weibo

In addition, Apple sent the iPhone 5S Launching Invitation on Sep 4th. The Launching date is Sep 11th. The selling date is Sep 20th.

We can conclude from the Area Chart that:

1) Consumers care most about the new fingerprint technology on Twitter. This is reasonable because it is the first time bio-information technology is introduced in smartphones. Since the rumor about the fingerprint technology has existed for a long time, the fact satisfied consumers to a large extent.

2) The topic trends peaked in the weak after Sep 4th on both Twitter and Sina Weibo. This indicates that the launching date was set and the rumors was finally ended. Hence, the invitation sending date can be a way to pre-promote a new product.

3) Consumers on Sina Weibo talked about the color most of all after the launching date. This is quite interesting because we can see there is an obvious cultural difference between consumers in China and the west. Under this circumstance, attention should be paid to better satisfy consumers in China about the color, which turns out to be Champaign Gold. If Apple Company had forecasted the strong demand for Champaign Gold iPhone 5S in China market, we may not see the long-term out-of-stock of that model.

4) The second and the third hot topic are Camera and iOS7 respectively. This is reasonable because the iPhone 5S upgraded the rear camera from the previous generation. Consumers are satisfied with this upgrade. iOS7 is a totally new flat design compared with iOS6. Digging more, well find iOS7 is controversial. If we do sentiment analysis, we can see the change of sentiment and be prepared for the next step.

B. Dynamic Gauges

Google Chart has a visualization style named Gauge. In Gauge visualization, one or more gauges are rendered within the browser using SVG or VML[10]. Gauge demonstrates the value of a specific variable like a real gauge with the pointer pointing to a number and the dashboard displaying the value. A simple example is given in Fig. 4.
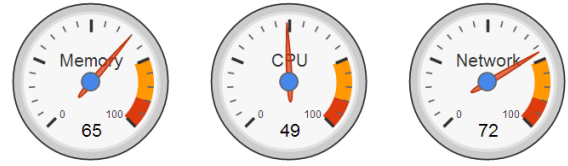

Figure 4.   A Simple Example of Gauge Visualization

As shown in Fig. 4, the Google style Gauge can only show a specific value of a variable. If we open our mind and take one step forward, the Gauge can do much more than that. Real gauges is not still. We can animate the still Google style Gauge and demonstrate the change of the variables. Hence, the Gauges are like monitor panels and we can watch the change of what we care about in an intuitionistic way. If the point changes rapidly, we may have to pay more attention to that variable.

However, Google Gauge doesnt support offline mode, and it cant be counted on to create highly customized Gauge visualizations either. In our experiment, D3 is chosen to achieve our goal, keeping dynamic monitoring on the topic trends of iPhone 5S on online social networks. SVG technology and d3.js library are adopted in this experiment. Fig. 5 shows a screenshot of the dynamic Gauges.

Through the dynamic Gauges, we can monitor the online social network topic change on iPhone 5S. Take a glance, and well know how many tweets are about the fingerprint of iPhone 5S and how it is changing over time. Taking the sentiment analysis into consideration, we can set the gauge into sentiment mode and monitor the sentiment change of consumers. This is quite useful when companies want to keep aware of consumers reaction and adjust their promoting strategy accordingly and instantly.

V.   CONCLUSION

In this paper, we demonstrate how choosing proper visualization methods benefits the promotion of new products
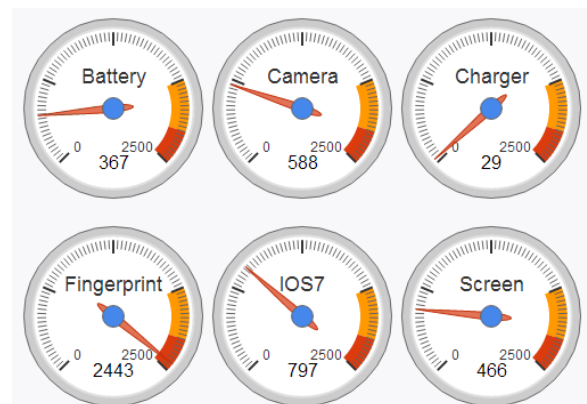

Figure 5.   Screenshot of Dynamic Gauges of iPhone 5S Trends on Twitter

via online social network. We identify in our study that topic trends differ in different cultures, the trends change over time during the new product release cycle, and different features of the product get various attention. Under these circumstances, a proper visualization method can help company make decisions according to the topic trends instantly. Based on these findings, we conclude that we do need to choose the proper visualization method to make a better promotion for a new product.

Besides, some improvements we want to make in our further research include that 1) a real-time test on various online social networks, 2) the information spreading model of new product release cycle, and 3) the same research process on various kinds of products.

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