COMP5048 Assignment2 - Individual

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I. Introduction

Our group report has contained the best result of our group discussion because we do not assign part for a specific team member at the beginning. We discuss each member's idea or understanding of question, then chosen and improve the best idea for our report. I have complete data processing for my visualization, visualize my concept to discuss in the team meeting to improve report quality, and have some literature research.

II. Contribution

For understanding the topic of this group project, which is ''Who is leading the mobile device market?", I have discussed with my team members based on my understanding. My idea is that the leader of mobile device market may not be the most successful company in the mobile device area. In this project, successful does not mean the company which has issued most device in this period. Because they are some companies may issue lots of products in sort term to try to save company or get market share back. As graph below showing, HTC has issued the most mobile from 1989 to 2012, but now it has disappeared in the main mobile device market.

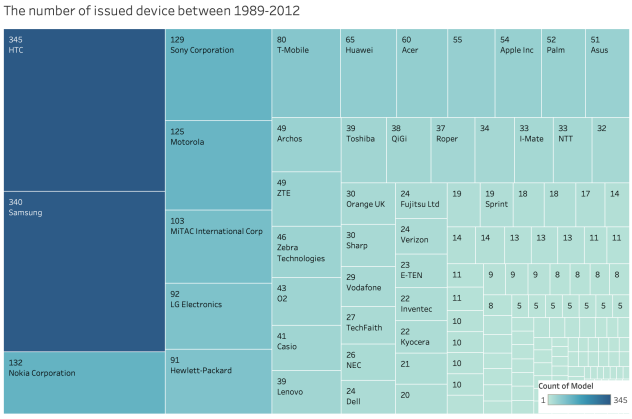

Fig. 1. The number of issued device between 1989-2012.

To make each model connect with its company, I merged different sheets in the Tableau and created a relationship between model id and company name because three sheets are containing different information in the raw excel file. In addition, I also use the data from Lin's data processing to complete some of my visualizations.

For better to answer who is the leader in the market, let see the trend of mobile device development in this period first. To visualize the trend, I use YEAR as the X axis variable and using CPU Clock (MHz), RAM, Storage, Pixel Density respectively as the Y axis to present the trend. The figure below shows the hardware of devices changes over time.

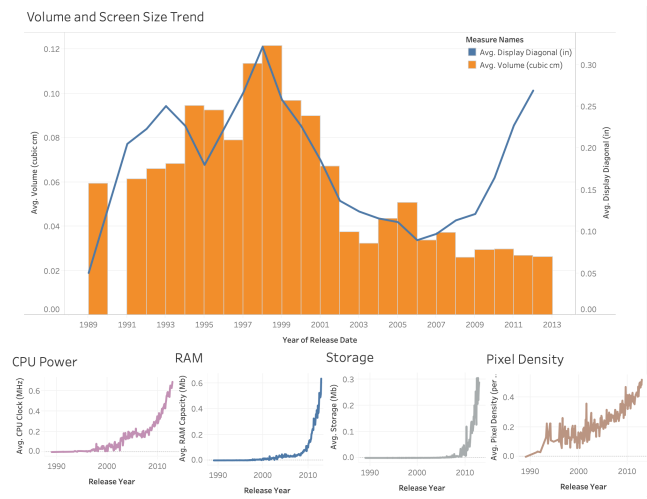

Fig. 2. The trend of mobile device changing on hardware.

As time progresses, the relationship between the size of the device and the screen size generally shows an opposite trend. At the same time, CPU performance, RAM, Storage and Pixel density are all increasing trends. These data prove that with the improvement of mobile devices' information technology and material performance, the company is trying to give mobile devices lightweight and high performance at the same time. In other words, the device manufacturer changes the mobile phone from the most primitive communication device to a multi-functional mobile device by assigning new functions, such as camera, GPS, mobile office, etc. However, since the given data does not contain a functional description, it is impossible to visualize the device functions from the data level.

After discussing the development trend of mobile devices, let's look at what types of mobile devices are included in the data. The figure below shows that the original data contains various mobile device types, including electronic handwriting devices, handheld computers, keyboard phones, smartphones, laptops, tablets, etc. Since there is no suitable method for us to classify each device accurately, we use a filter to find which model name contains phone, tab or pad to divide the devices into two categories, phone and tablet.

Fig. 3. Product appearance.

The first mobile phone in the world appeared in 1973, made by Martin Cooper in Motorola [1]. However, the first tablet device is much late than the mobile phone. So, the first tablet device we call it new device that try to open new market.

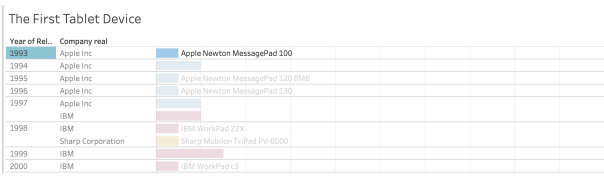

Fig. 4. The First Tablet Device.

As you can see from Fig.4., the first tablet type device was issued by Apple at 1993, and Apple was also the only one company which develop tablet device in the following 3 years. Hence, I can say Apple Newton MessagePad 100 was the new device that try to develop new market in the early 1990's. Then, the tablet market has rapidly growth after 2010. In 2010, Apple has released 5 tablet devices which is the company that have most tablet device that year.

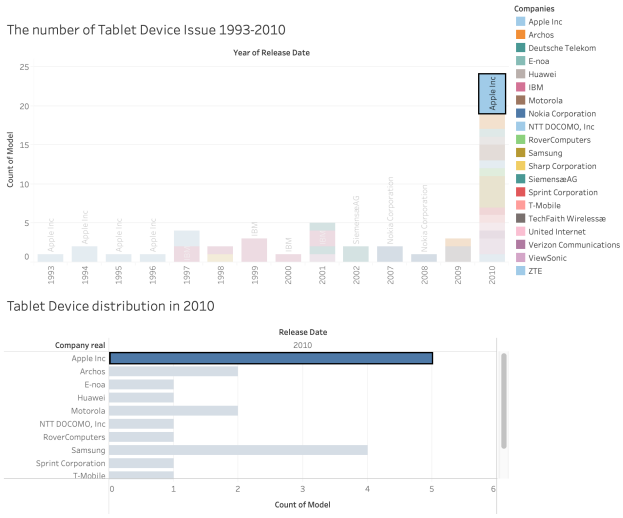

Fig. 5. Apple try to lead the new tablet market.

The reason that companies start competition in tablet device which have large screen and high-performance hardware is the information technology is good enough to support fast communication and the internet has begun to full of information and streaming media, people are spending much more time on internet and mobile device than past.

Next is trying to find the best device, then use the number of best device to define the successful company. Nowadays, there are many mobile devices released every year, but in the face of various specifications, which one should be the most concerned by consumers. In other words, the best product must have several features that consumers want and like to have. For customs, battery capacity, high performance CPU, great display, great camera, NFC, multiple windows, storage space, remote control, fingerprint sensor and wireless charging are the top 10 features that customer want and need [2]. In our case, we only have 3 variables that belong to the top 10 features, which are Storge, CPU Clock (MHz) and Pixel Density. At same time, our group member mention that KPI and KGI in this project. So, I want to use these three variables as KGI to define the best product in the market. The idea is like this:

Based on the order of top 10 feature that matter for mobile device, CPU Clock (MHz) represent the processing power, Pixel Density represent the screen quality and Storage. So I add 0.3, 0.2, 0.1 on CPU Clock (MHz), Pixel Density and Storage respectively, then average these three value.

Before Process Data

Storage (Mb)	CPU Clock (MHz)	Pixel Density (per inch)
0	0	0
1.54E-05	0.002230017	0.030792529
1.54E-05	0.001894864	0.035335689
1.54E-05	0.002230017	0.030792529
1.54E-05	0.003385544	0.129984856
1.54E-05	0.003500596	0.224886421
1.54E-05	0.003500596	0.224886421
6.45E-05	0.009548354	0.08859162

Fig. 6. Before Process Data.

After Process Data

Storage (Mb)	CPU Clock (MHz)	Pixel Density (per inch)
0.1	0.3	0.2
0.1000154	0.302230017	0.230792529
0.1000154	0.301894864	0.235335689
0.1000154	0.302230017	0.230792529
0.1000154	0.303385544	0.329984856
0.1000154	0.303500596	0.424886421
0.1000154	0.303500596	0.424886421
0.1000645	0.309548354	0.28859162

Fig. 7. After Process Data.

Fig.8. is the Device Score I get after process data.

Model	Year	Company_real	Storage (Mb)	CPU Clock (MHz)	Pixel Density (per inch)	Average Score	Score
Psion Organiser II LZ 64	1989	Zebra Technologies	0.1	0.3	0.2	**0.2**	**0.6**
Hewlett-Packard 95LX (HP Jaguar)	1991	Hewlett-Packard	0.1000154	0.302230017	0.230792529	**0.211012649**	**0.63303795**
Psion Series 3	1991	Zebra Technologies	0.1000154	0.301894864	0.235335689	**0.212415318**	**0.63724595**
Hewlett-Packard 95LX 1MB RAM (HP Jaguar)	1992	Hewlett-Packard	0.1000154	0.302230017	0.230792529	**0.211012649**	**0.63303795**
Psion Series 3a	1993	Zebra Technologies	0.1000154	0.303385544	0.329984856	**0.244461933**	**0.7333858**
Hewlett-Packard 1000CX	1993	Hewlett-Packard	0.1000154	0.303500596	0.424886421	**0.276134139**	**0.82840242**
Hewlett-Packard 100LX (HP Cougar)	1993	Hewlett-Packard	0.1000154	0.303500596	0.424886421	**0.276134139**	**0.82840242**
Apple Newton H1000 (Apple OMP)	1993	Apple Inc	0.1000645	0.309548354	0.28859162	**0.232734825**	**0.69820447**
Apple Newton MessagePad 100	1993	Apple Inc	0.1000645	0.309548354	0.28859162	**0.232734825**	**0.69820447**
Hewlett-Packard 1000CX 2MB RAM	1994	Hewlett-Packard	0.1000154	0.303500596	0.424886421	**0.276134139**	**0.82840242**
Hewlett-Packard 100LX 2MB RAM (HP Cougar)	1994	Hewlett-Packard	0.1000154	0.303500596	0.424886421	**0.276134139**	**0.82840242**
Apple Newton MessagePad 110 (Apple Lindy)	1994	Apple Inc	0.1000645	0.309548354	0.310802625	**0.240138493**	**0.72041548**
Apple Newton MessagePad 120	1994	Apple Inc	0.1000645	0.309548354	0.301716305	**0.23710972**	**0.71132916**
Hewlett-Packard OmniGo 100	1995	Hewlett-Packard	0.1000481	0.307547442	0.316860172	**0.241485238**	**0.72445571**
Apple Newton MessagePad 120 8MB	1995	Apple Inc	0.100130058	0.309548354	0.301716305	**0.237131572**	**0.71139472**
Hewlett-Packard 200LX (HP Felix)	1996	Hewlett-Packard	0.1000481	0.303500596	0.424886421	**0.276145039**	**0.82843512**
Hewlett-Packard OmniGo 700LX Communicator Plus	1996	Hewlett-Packard	0.1000481	0.303500596	0.424886421	**0.276145039**	**0.82843512**
Apple Newton MessagePad 130	1996	Apple Inc	0.100130058	0.309548354	0.301716305	**0.237131572**	**0.71139472**
U.S. Robotics Palm Pilot 1000	1996	Palm	0.10000717	0.307547442	0.258556285	**0.222036966**	**0.6661109**
U.S. Robotics Palm Pilot 5000	1996	Palm	0.10000717	0.307547442	0.258556285	**0.222036966**	**0.6661109**
Nokia 9000 Communicator	1996	Nokia Corporation	0.1000645	0.311549266	0.461736497	**0.291116754**	**0.87350026**
Hewlett-Packard OmniGo 120 Organizer Plus	1996	Hewlett-Packard	0.1000481	0.307547442	0.316860172	**0.241485238**	**0.72445571**
Psion Series 3c	1996	Zebra Technologies	0.1000154	0.303385544	0.329984856	**0.244461933**	**0.7333858**
Psion Siena	1996	Zebra Technologies	0.1000154	0.303385544	0.352195861	**0.251865602**	**0.75559681**

Fig. 8. Device Score and Average Score.

First, let's see which device is the highest value device in each dimension at every year. The following three graphs are the devices with the highest Value for visualization after data processing.

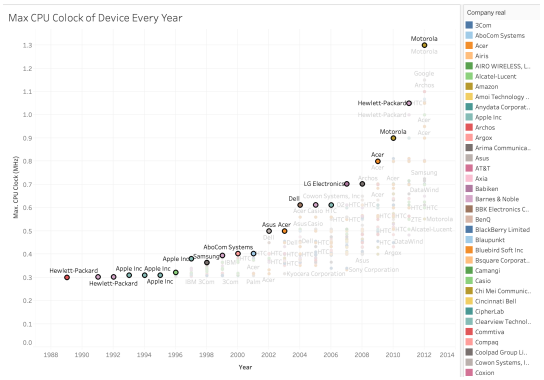

Fig. 9. The Max CPU Clock(MHz) Device of Each Year.

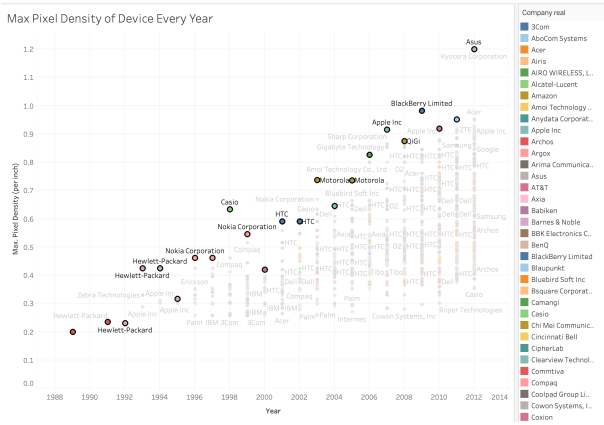

Fig. 10. Highest Score Device Each Year.

Each graph uses the year of release as the X axis and the corresponding variable as the Y axis. Then, use colors to mark different companies, and highlight the device with the highest value in each year's product.

In order to fine which device have the highest score, I have made the dot plot for both Total Score Device (Fig.12.) and Average Score Device (Fig.13.).

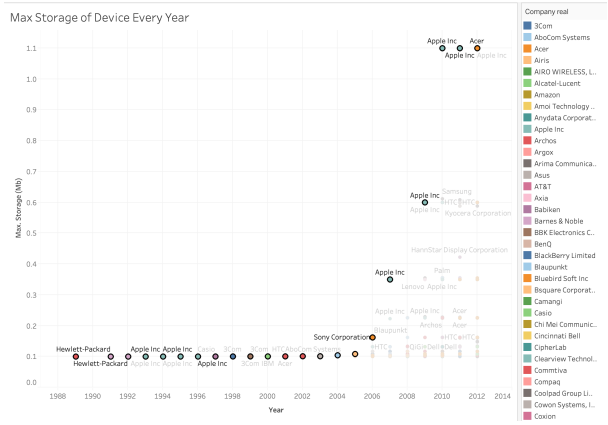

Fig. 11. Highest Average Score Device Each Year.

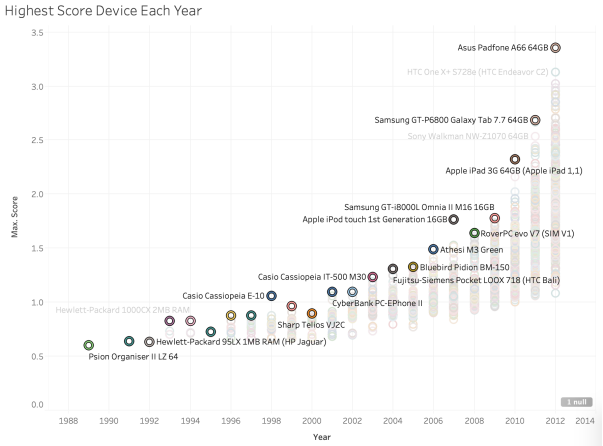

Fig. 12. The Max Storage value of Each Year.

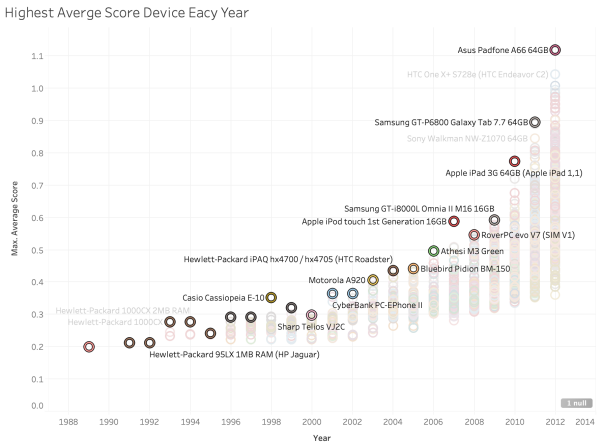

Fig. 13. The Max Storage value of Each Year.

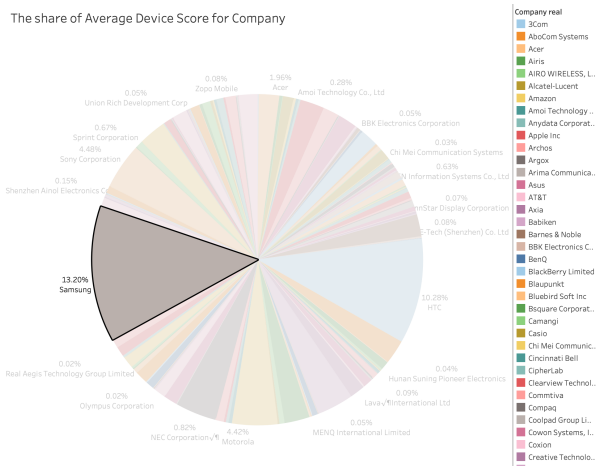

Fig. 14. The share of Sum Average Device Score for Company.

Then I use the model count to plot this pie chart, calculate the percentage of the total, use colour to mark different company in the chart and highlight the most share in the chart to help the audience catch the point. As you can see from Fig.14., Samsung has the most share amount all companies. So I could say Samsung is the most successful company in this period.

III. Conclusion

In this Assignment, I pay attention to the use of colours and the choice of visualization methods. I also help the audience catch the important information from the graph by highlighting it. From my view, I think Apple Newton MessagePad 100 was the new device that tries to create a new market in 1993. In addition, Apple also uses tablet device to try to lead the new market in 2010. However, the most successful company is Samsung after computing the average device score.

References

[1] Yan. Z., Mobile phone behavior,Cambridge University Press, 2018.
[2] K.Kim, ”10 smartphone must-have features, 2013. [Online]. Available: https://www.usatoday.com/story/tech/columnist/komando/2013/12/13/smartphone-battery-processing-display-camera/3921399/.