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A Comprehensive Exploration of Text, Web, Social Media, and Geospatial Analytics for Informed Decision Making

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Abstract
Text Analytics is the process of turning unstructured text data into useful information for analysis, to gauge consumer opinions, feedback, and product evaluations. It also provides search functionality, entity modelling, and emotional analysis to enable fact-based decision making. Analysis of website visitor behaviour is done using Web Analytics. The number of websites and users on the internet is growing daily. It is the process of tracking website information that can help to improve the web application features and evaluate the behaviour of users. By performing social media analytics on social media for example twitter, Instagram, Facebook. Data such as likes, comments, shares and saves can be obtained and analyse to know how the society think about the product. Geospatial analysis is used to make visualizations that include maps, graphs, statistics that show data according to geographic location. This is important to be analysed as it tells which area or country has the highest product sold or lowest subscription of the service. To make the data much easier for human brain to analyses or to make a conclusion, data visualization design is the process of putting all data information collected into a visual context. For instance, graph or map. The main objectives of data visualization are to make it simpler or easier to spot the outliers and patterns trends in big data sets. There are a variety of clustering processes or techniques available to arrange the data efficiently to its related data. The clustering process that is used in data mining is presented in this work.

Keywords: Text Analytics, Web Analytics, Social Media Analytics, Data Visualization

1 Introduction
In this globalized world, everything may be thought as of generating data. Without data storage, where every action taken, informational detail about an entity or a person, every element will be lost if not documented well [1]. Without all this data being recorded, an organization will not be able to perform analytics that will help improve their business. Conversely, with all the data being recorded, organizations can use them to perform Text Analytics, Web and Social Media Analytics, Geospatial Analysis, and finally Visualization Design [2]. Velocity, Variety and Volume are the three primary characteristics of big data. There is huge volume of data in the zettabyte or exabyte range are involved with a wide range of content in complex forms including unstructured, structured and semi-structured formats such as documents, videos, images, log files and text files [3]. In this article, a study on how to improve Apple's sales effectiveness by using text analytics, web and social media analytics, geospatial analysis and visualisation design is discussed.

2 Problem Statement
One of the problems faced by Apple's business is that there are many competitors in the market [4]. Since there are many kinds of business which sells similar products to Apple, for example Samsung, Huawei, that's why it is likely that Apple lost their customer to them [5]. The next problem is that Apple has spent plenty of time and money on advertisement and human resources to promote their sales that made Apple wasted all their effort on an audience that will not purchase their product [6]. This is caused by the uncertainty if the audience are likely to make a purchase

because their behaviour is unknown. Moreover, too much marketing effort on specific area or country and still getting low sales [5], [6], [7].

3 Proposed solution

In this article, we discuss text analytics such as intent detection is performed by gathering text of online post from social media such as Facebook, Twitter, Instagram to know if the particular person is a potential customer [8]. This will increase the efficiency of online human resources to increase their sales by not wasting time on customers that are unlikely to purchase their product. Web and social media analytics are done so that the online marketing of Apple's business can be more effective [9]. Customer's behaviour, preferences can be easily captured by performing web and social media analytics. This will allow their business to stand out among their competitors.

As for geospatial analysis, Apple's will know or understand the finding trends and the phenomena easily via various kind of technology such as location sensors and GPS. This will increase the marketing effectiveness and product sales in any area that Apple is willing to promote. Furthermore, the visualization for geospatial analysis can include graphs, plots, statistics and maps to make the prediction more accurate and easier [10].

For visualization design, Apple's will know which electronic gadgets are more popular and attractive that can attract more people to buy them based on the market or analysis research. Nowadays, this can be known by analysing the patterns and trends of customers. The first point of view of customers is very important in order to increase business growth [11]. With good techniques or visualization in interface, outer face, animations and images, this can help to improve the customer experience within the business environment.

4 Result and Discussion

There is a need for data integration for Apple. This will help them to understand the current market they are in. By integrating data, Apple can use them to solve most of the problems stated in the problem statement. By using the data and visualizing it, Apple can spot which area has a higher sale and therefore improves the marketing on that specific area. This is because Apple sometimes wastes a lot of money and time on areas that do not perform well in terms of their sales. Next, Apple can seek for more audience and customers by using the data. Apple can use data collected from the web and perform text analytics. For example, they can use data from customers that have actually made purchases for their product as an algorithm to find potential customers that have similar behaviour as them [6], [8]. By filtering out potential customers, Apple will be able to save time from those who won't be making purchases on Apple products [3], [9].

By performing data integration, Apple will be able to understand more of their competitors [2], [3], [6]. They can analyse data collected from social media and web to understand the advantages and disadvantages of similar products of their competitors. This will help them improve their product and therefore make more profit. Privacy issues are important in text data retrieval as all this data is important to anyone who provided it and to the party that has it [12]. For example, a person's identity card number, paying method, buying habits and more, if these data are leaked to other competitors, the competitors might take advantage of it and take away their customers. In the order hand, customers who have provided their information is also important as of their privacy issue. This is because if their data is not protected and leaked to the wrong ones, the customer might get harmed.

Text data retrieval refers to the retrieval, categorization, and filtering of text collections based on text content, such as keywords, semantics, etc. Text retrieval, image retrieval, sound retrieval, picture retrieval, etc. are all examples of information retrieval. The matching object for text retrieval can be the entire published text, such as books, reports, or articles, or simply a portion of it, such as an abstract or an extract.

Table 1: Advantages and Disadvantages of Text Data Retrieval.

Advantages	Disadvantages
Business can use keywords for analysis and observation in a short time.	Every time a user makes modifications, the programme must be recompiled and redeployed.
Even a novice user will find it simple and straightforward to understand.	High network traffic utilisation and effects on performance.

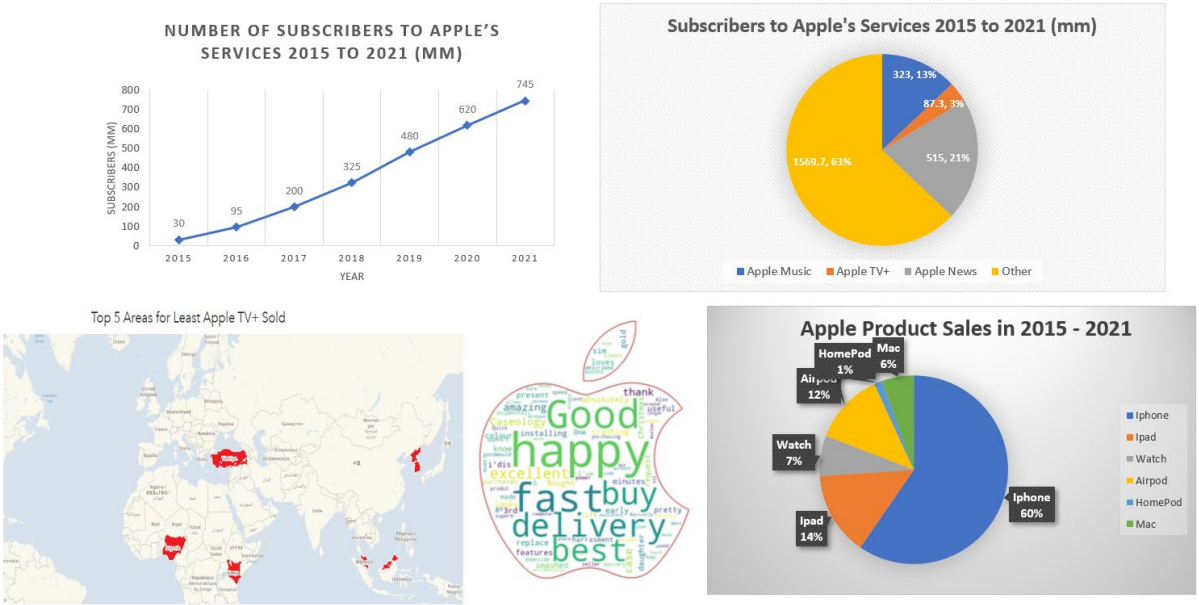

Figure 1. Dashboard

Figure 1 shows that the dashboard consists of types of analysis. There are number of subscribers to apple's services from 2015 to 2021, top 5 area for least Apple TV sold, a text analytics done in an apple shape and apple product sales in year 2015 to year 2021.

Figure 2. Geospatial analysis

As shown in Figure 2, in terms of geospatial analysis a geo map is used to represent the top 5 areas where the least Apple TV are product sold. It can be seen that the five areas are Turkey, Nigeria, Kenya, Malaysia, South Korea and North Korea. This may be explained because the Apple TV is a high tech and high-cost product compared to the others. That is why due to the fact that most highlighted countries have not that good technology or economy, they will have less citizens to buy the product. One of Apple's problems can be solved by using geospatial analysis. They will know where the country or area has the least sales compared to others and can improve it by implementing correct business strategies. For example, they can stop marketing and putting efforts in the high-tech product that much in some areas that are still developing and are not used or required by the people there. Conversely, Apple can

use geospatial analysis to know which country has the highest product sold and therefore, increase quality and quantity of the advertisement and marketing to increase their profit.

Figure 3. Wordcloud of customer feedback

By looking at the visualization on word cloud done by text analytics as shown in Figure 3, it can help Apple understand what keywords are associated to their business. For example, they are able to know the keywords from their customers feedback on the service provided. It can be seen that "good", "fast" and "happy" are the most popular keywords among the visualization. In this way, Apple will know that they have provided good services to their customers. In addition, Apple organization can also know the trend in the world currently and the intent of their potential customers by collecting data from platform such as Facebook, Twitter or Instagram and perform text analytics on it. They will know what kind of product is preferred currently for consumers by looking at the most appeared words in the data collected. This will definitely give them an advantage over their competitors.

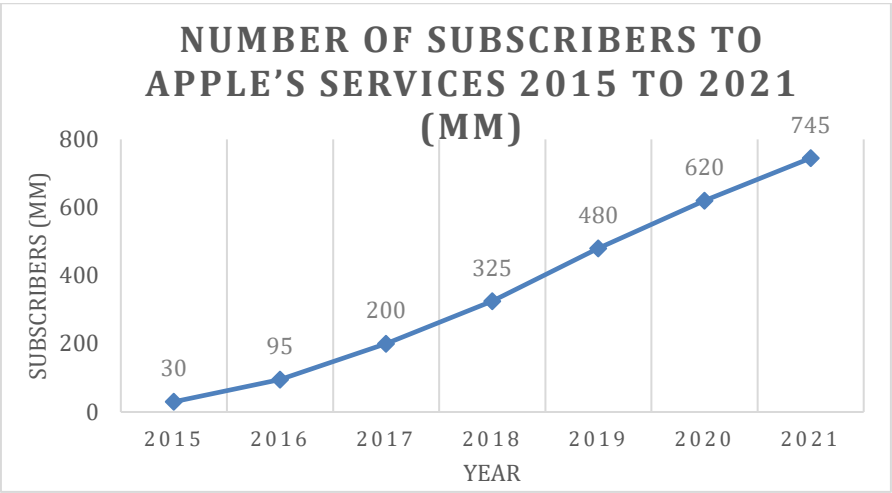

Figure 4. Number of Subscribers

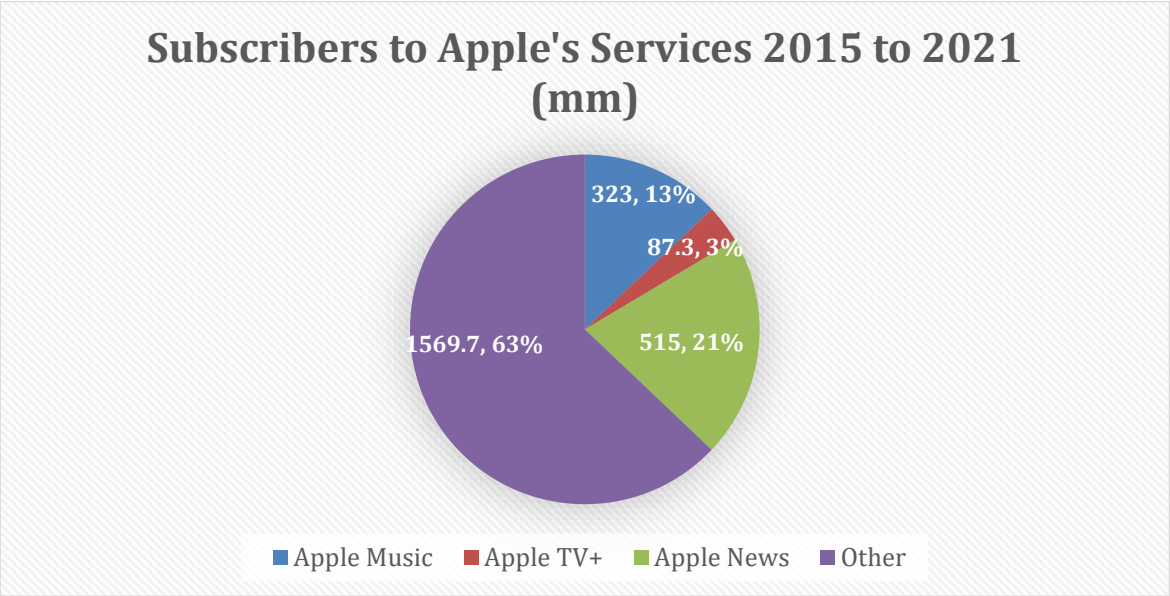

Figure 5. Subscribers on different Services

As for pie chart and timeline graph presented in Figure 4 and Figure 5, web analytics and stream analytics are performed to understand the number of subscribers to Apple's Services from 2015 till 2021. By performing the analysis, Apple will be able to know which kind of service that is provided by them is most preferred by consumers.

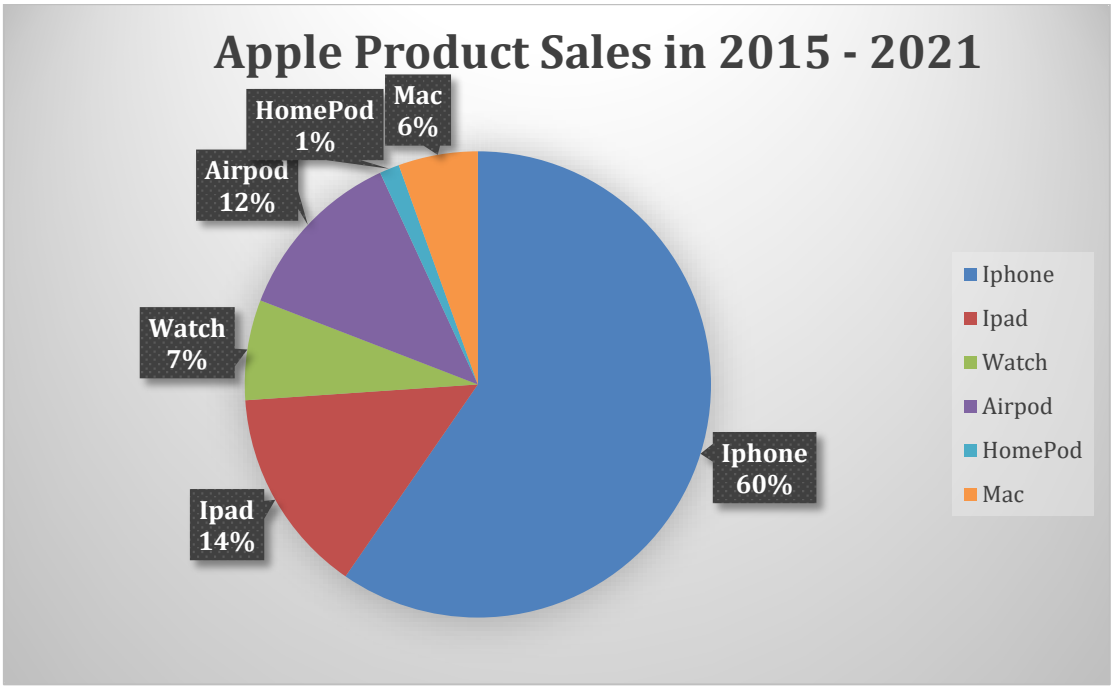

Figure 6. Product type of Apple

Figure 6 shows stream analytics and web analytics are used to know which kind of products are the most sold in the year 2015 till 2021. This will give insight to Apple's marketing department to know which kind of product advertisement is more effective in terms of sales amount.

5 Implementation Challenges

Based on our observation, the main challenge of implementing the Apple algorithm is user adoption. Most of the new technology has solutions that will need new employee practices and time for training. Although with the best solutions, strategy and plan can fail with the absence of training programme and effective rollout. Provide a comprehensive training programme that will help to increase the steps or techniques to improve their marketing skills. Furthermore, developing good value from business intelligence solutions will need to depend on how accurate the company's data is. Thus, Apple will face a lot of challenges to guarantee that accurate and up to date data are retrieved from diverse business systems within the Apple organization.

5.1 *Data collection Process.*

Based on our observation, the data collection process begins with searching on social media sites like Facebook, Instagram and Twitter. Not only that, but we also did data collection from websites analytics portals that includes reviews of apple products by consumers and sales. Furthermore, with data collection from customers, it will be much easier to find potential customers that have similar behaviour as them.

5.2 *Web Crawling*

Before Apple can proceed with any data analysis task, they will have to get the data. This can be done by performing web crawling. Web crawler is a script that crawls the Internet in a systematic and automatic manner. These crawlers are programmed and used to retrieve web pages that are needed and store them in a database. Web crawling in this manner is used to crawl the text of customer reviews for Apple products. It will be collecting comments or reviews from social media such as Twitter, Instagram or Apple's official website.

5.3 *Data Cleaning*

In the data cleaning process, Apple must have an accurate data analysis process in terms of proceeding to data cleaning. Whereby, some of the datasets collected consist of a lot of dirty data. Most of the Apple datasets which consist of duplicated or unnecessary data will be eliminated. Furthermore, when data appears more than one time in Apple datasets, it is said to be duplicated data. Typically, this will happen when a dataset is produced by merging the data from different sources. In other cases, some customers that submitted more than one reviews that consists of the same details on the Apple products or there is a data entry error. Data cleaning is very crucial for our Apple businesses since a lack of it might lower down the marketing effectiveness. Thus, which will also cause lower sales of business. Although the problems of the data might not be entirely resolved, it's better to keep them to a minimum way to ensure that there will still be improve on efficiency.

5.4 *Data Mining*

Data mining is also an important tool to develop Apple business models. By performing data mining techniques, Apple will be able to find the pattern out of many things such as customer's spending behaviour, knowing what kind of new products are essential for the current society and more. Apple can perform text mining algorithms such as clustering to obtain their needed results. Clustering is a process of grouping documents in a large collection that has similar characteristics into clusters to determine their similarities. This is usually done to find the pattern from data collected.

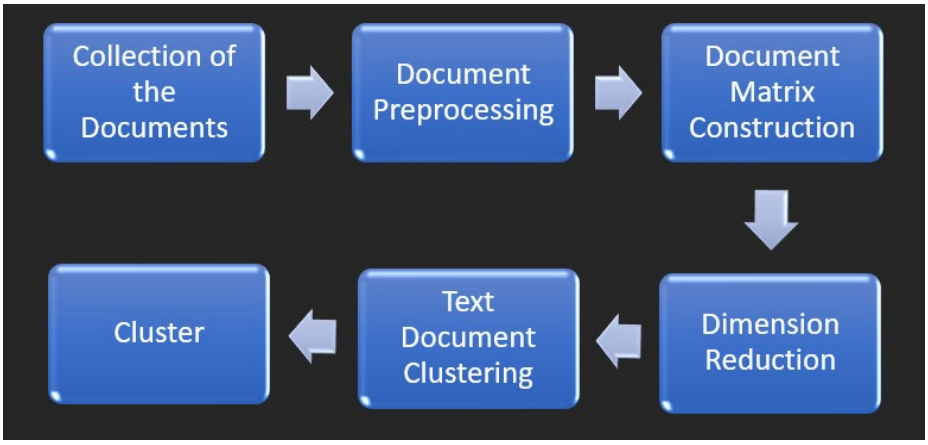

Figure 7. Clustering Process

Figure 7 shows the example of document clustering that can be done by Apple to find pattern in this case the documents are reviews from customers. They can collect and group documents with similar measure into the clusters and can be compared against another group of clusters.

5.5 *Data Visualization*

In today's world, data visualization is a necessary tool for making explanation of the numerous rows of data created everyday especially with the reviews of apple products by consumers and sales or subscribers for apple products. For instance, clouds which consist of lots of keywords are organised by the frequency of word. In the cloud, all the keywords are arranged and visualized well with attractive colour, font size and graphics. The keywords that appear in the middle with the largest font size will be the keyword that is used the most. We can quickly interpret the text data using data visualization or word cloud dashboard.

Figure 8. Apple Word Cloud

Figure 8 shows the word cloud visualization that can help Apple understand what the main keywords are associated to their business.

6 Conclusion

In conclusion, the usage of management of information systems gave Apple' business a great competitive advantage over its competitors such as Huawei, Samsung and others. The effective management of the information systems allows Apple company to build a better relationship with its customers as well as its stakeholders. The better relationships with customers and stakeholders, the more will the growth and profitability of the company increase. In todays' world, the use of technology is expanding rapidly every day. No matter if it's the Youngsters or senior citizen, they're getting addicted to the use of these machines. As the market expands according to the needs, more and more companies will appear in the future. Therefore, in order for Apple to continue leading this technology-based world, it is important for the company to maintain its competitive advantage by using the information system management to provide a better customer-based approach.

BIBLIOGRAPHY

[1]. H. Smith, “Storage consolidation,” Data Center Storage, pp. 35–58, Apr. 2016. doi:10.1201/b10798-4.
[2]. M. Longoria, “Important design attributes in data visualization design,” Power BI Data Visualization with Purpose, 2019. doi:10.1007/978-1-4842-5081-5_2.
[3]. S. Hamouda and Z. Zainol, “Semi-structured data model for big data (SS-DMBD),” Proceedings of the 8th International Conference on Data Science, Technology and Applications, 2019. doi:10.5220/0007957603480356.
[4]. H. Pan, “Analysis of the product evolution and marketing strategy of Apple Company,” Advances in Economics, Management and Political Sciences, vol. 21, no. 1, pp. 214–220, Sep. 2023. doi:10.54254/2754-1169/21/20230254.
[5]. G. Zhang, “Research on Apple iPhone’s marketing strategy in China,” BCP Business & Management, vol. 38, pp. 2176–2181, Mar. 2023. doi:10.54691/bcpbm.v38i.4076.
[6]. K. Ranslam and R. Lawrence, “A data analysis pipeline for automating Apple Trait Analysis and prediction,” Proceedings of the 12th International Conference on Data Science, Technology and Applications, 2023. doi:10.5220/0012088300003541.
[7]. Q. Cai and S. Chen, “Analysis of the influencing factors of marketing strategy on consumer purchasing behaviour: A case study of apple,” SHS Web of Conferences, vol. 188, p. 03005, 2024. doi:10.1051/shsconf/202418803005.
[8]. A. K. Roundtree, “From engineers’ tweets: Text mining social media for Perspectives on Engineering Communication,” 2018 IEEE International Professional Communication Conference (ProComm), Jul. 2018. doi:10.1109/procomm.2018.00009.
[9]. A. Beheshti, S. Ghodratnama, M. Elahi, and H. Farhood, “Social Media Text Analytics,” Social Data Analytics, pp. 62–80, May 2022. doi:10.1201/9781003260141-4.
[10]. R. R. Vincent, E. Sakthivel, Meena Kumari, F. Nisha, and A. Rohini, “Machine Learning for Geospatial Analysis,” Advances in Geospatial Technologies, pp. 168–195, May 2024. doi:10.4018/979-8-3693-6381-2.ch008.
[11]. O. C. Okechukwu, “Big data visualization tools and Techniques,” Advances in Data Mining and Database Management, pp. 465–496, 2018. doi:10.4018/978-1-5225-3142-5.ch017.
[12]. L. Jena, R. Mohanty, and M. N. Mohanty, “Privacy-preserving cryptographic model for Big Data Analytics,” Services and Business Process Reengineering, pp. 109–127, 2021. doi:10.1007/978-981-16-1007-3_7.