

## ***Data Analytics in the Social Media Industry***

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**Abstract:** The purpose of this paper is to understand the use of data analytic in business, mainly focus on social media company. Social media is a platform or means for people to engage with others in a socially engaging manner. This paper starts with the origin and development of the social media industry, including analytics of the major players in chronological order such as Myspace, Facebook, and ByteDance; opportunities for future development and challenges are then discusses, as well as the value chain, focusing on operational stage, marketing and sales stage, services, and HR management. This paper evaluates how data analytics deliver values to stakeholders through the value chain from six perspectives: human resources, accounting and finance, product design and development, logistics, marketing, support service, and hypotheses how advanced data analytic applications, including reinforced learning, deep learning, and cognitive computing, could benefit the industry in the future.

**Keywords:** data analysis, data analytic, social media company

### **1. Introduction**

Data analytics refers to the use of appropriate statistical analysis methods to analyze, summarize, and understand a large number of collected raw data in order to maximize the development of data functions. Data analysis is a process in which data are studied and summarized in detail in order to extract useful information and form conclusions. With the continuous progress and development of society, we are gradually transforming from the information era to the big data era. In the business field, the purpose of data analysis is to concentrate and extract the information hidden behind the data, and summarize the internal laws of the object of study, and help managers to make effective judgments and decisions. For the social media industry, the managers use data analytics tools to predict and analyze customer preferences and other behaviors and thus make the corresponding adjustment of their strategy to generate potential profits. In this paper, we focus on the social media industry and the different data analytics tools that assist the industry to achieve its purpose.

## 2. Industry Overview

### 2.1. History of the Social Media Industry

The history of social media stretches deeper than people could imagine, since the development of today's social media applications reflects thousands of years of natural evolution. Definition of today's social media is a platform where people have the opportunity to engage and communicate with others, but surprisingly, the concept of social media can be traced back to ancient times when people could only express thoughts and feelings utilizing speech or by signs or gestures. Cave paintings were the oldest methods of communication where people could record important events and mark territories. Later at 550 B.C, when writing became institutionalized, people started to look for ways to communicate with their neighboring communities, which was the time that the postal service was invented. The innovation of the postal service could also be considered a crucial footstone for the social media industry. In the late 19 century, two significant innovations changed the social media industry: the invention of the telephone in 1890 and the radio in 1891. They substituted the old methods before that used horse to deliver messages between the cities or small towns with radio signals, which could be transmitted and received more efficiently. Then, the radio became one of the most important inventions during the 20th century because it not only brought countries together but also brought new ways for people to communicate and interact. The innovation of the internet marked a new era of social media.

The first company that focused on the social media industry was Myspace, founded by Charis DeWolf and his partners in 2003, provided social networking services to its customers. In the beginning, Myspace was the most prominent social media company in the world and had a significant influence on technology and music. Myspace gained a substantial portion of its market share globally and the company had grown to have approximately 1,600 employees in 2009. However, the success of Myspace didn't last long, it gradually lost its market share due to unsuccessful strategic plans. This failure provided the chance for another well-known company, Facebook, to participate in the social media industry and then became a major player worldwide. Facebook was founded by Mark Zuckerberg in 2004 and it is viewed as a leader in the social media industry since it provides a social media platform that is enjoyed by over one billion users and has more than 2.85 million monthly active users.[1] Then, in recent years, another notable Chinese social media company called ByteDance plays an indispensable role in the industry. The goal of ByteDance is to stimulate creativity and enrich life. ByteDance's content platform enables people to enjoy technology-enabled content. It wishes to inform, entertain, and inspire people in terms of language, culture, and geography. ByteDance's most popular product is called TIKTOK, which is an application that mixed music, lip-syncing videos, comedy, and Twitter content.[2] TIKTOK was first used in China and then boosted its international appeal. Within a year, the TIKTOK application had more than 100 million users, and the popularity of lip-synced videos continued to rise. According to authoritative research, the company's products are available in over 150 countries globally and its shares have been estimated by the private markets at more than 250 billion dollars.[3] Compared to Facebook, ByteDance has over 80 million monthly active users in the United States today. These colossal numbers indicated ByteDance's position as a ruler in the social media industry in 2021.

### 2.2. Opportunity and Threats

The rapid increase in the popularity of the social media industry brings opportunities for ByteDance's future development, and we-media is a good example. We-media is an idea and an unprecedented global movement that aims to improve the human experience in the social media world. Unlike in the past when only professionals had the opportunity to run the social media industry, in contemporary

society, everyone could be a movie producer or publisher. The success of TIKTOK shows a promising future for We-Media. [4]

Aside from the promising future of we-media, the advertising revenue model also provides opportunities for social media companies to generate more money. The advertising revenue models are used by media companies to place attractive advertisements on their platforms. In the past, social media companies often used viral marketing without doing data analytics, thus it was hard to provide an appropriate product to the targeted customers. Nevertheless, social media companies could interest a targeted market segment and thus generate unprecedented revenue opportunities with the use of big data in recent years.

However, challenges, which needed to be considered seriously by social media companies, always come along with opportunities. [5] To be specific, even trivial problems could grow to be detrimental problems. For example, people in the 1950s have never thought about data privacy since there was no information about the database. On the contrary, personal data could be collected whenever people used their devices online in the current society. Therefore, the first challenge faced by social media companies would be privacy issues. Regarding privacy concerns, most people do not want to release their personal information online. People's unwillingness to share their private information would in turn lead to less information or data collected by social media companies, thus they are unlikely to use personal information to conduct market research. Consequently, privacy issues not only bother users but also create problems for the social media companies since they probably have other companies that could imitate the company's product, and the outcome would be the loss of the company's potential revenue.

Additionally, another challenge that social media companies face is the product monetization issue. When there are only a small number of companies appearing in the social media industry, companies don't need to consider monetization issues, but the competition among the social media industry would get fierce over time. Hence, if the social media company wants to survive in the fierce competition, it needs to figure out several unique strategies to have a comparative advantage over the others. Traditionally, most social media companies generated revenue from their applications because the other companies would pay for the advertisements on the application to increase their popularity. However, the problem was that excess advertisements would annoy the users, thus leading to the ineffectiveness of this type of advertisement. Therefore, future clients may want to promote their products more effectively other than through social media applications, but in more content-related methods, which would result in declining social media companies' revenue. [6]

Given the fact that Myspace already went out of the market due to the failure in the competitive social media industry, one could conclude that a killer or unique idea was not enough for a company to maintain its success because problems may arrive anytime during the marketing and promoting stages. To illustrate, the developers need to select appropriate tools for marketing their products in the best possible way since the competition among social media companies was increasingly fierce. According to the research, an online entertainment product becomes successful through a 90% marketing effort and only a 10% of development effort. In this light, market research and analytics have become essential for social media companies. [7]

In conclusion, today's social media industry is completely digital. All the value delivery elements that started first from the product or content development to delivery of the product and then to experience to consumers are all digital. To understand how data analytics positively impact value delivery, it is important to understand the value chain of the social media industry.

### 2.3. Value Chain

A business is composed of series of related activities that create value, and value chain mainly suggests how the value is delivered to the customers that the company serves. Social media

companies' operation activities can be very different from other traditional businesses. Unlike companies in the conventional industries, social media companies produce goods that are not in physical shape. We-Media gives everyone a chance to become a producer or publisher. That is, people can create content themselves. However, the content should be reviewed cautiously before being published. For example, according to ByteDance's official site, the company employs over 10,000 people to monitor video content. ByteDance develops and uses content filters to block inappropriate or illegal content during companies' operations. In contrast to traditional businesses, the raw materials of ByteDance are pictures, videos, messages, posts, and reviews. The value will be added to the company's product in content packaging continuously.

After successfully adding value to the product in the operation stage, companies continue to increase value during the marketing and sales stage. To improve customer awareness, social media companies always integrate lots of marketing for more market share. Paid advertisements are often used at this stage. Specifically, paid advertisements are done by social media companies using huge amounts of ads to attract customers for downloading or using their products. For example, when TIKTOK first appeared in the market, there were ads on metros and shopping malls in China. Another way to increase customer awareness is using fan advocacy, which is prevalent in the social media industry. Companies often operate with celebrities to propagate their products and thus add value to the product. For example, ByteDance uses fan advocacy by asking celebrities to set up their official account on TIKTOK. Positioning helps companies to divide customers into different categories. Because of positioning, companies can use different sales methods for targeting different customer groups.

Producing and marketing are not enough. That is, companies also provide different kinds of services to improve their value. For example, companies offer customer service to ensure customer satisfaction. Currently, even social media businesses are providing e-shopping platforms. TIKTOK, the app created by ByteDance, incorporated e-shopping into its platform during 2019. In this case, ByteDance is then responsible for ensuring the product's safety issues, delivery service, returns, and after-sales service support.

Aside from activities directly associated with customers, social media companies also improve their value within corporations. HR is responsible for recruiting, training, performance management, salary and welfare. HR management needs to be innovative since the industry is highly competitive as it is creative. For example, Facebook is famous for its corporate culture that fosters happiness and satisfaction. [8] To improve satisfaction, Facebook focuses on reducing pressure on its workers. Facebook adapts open office design to allow communication and collaboration. This practical plan helps to keep employees interested and engaged. Moreover, the HR team of Facebook also cares about performance management. Facebook provides continuous feedback to their employees. According to the research, performance appraisal will happen twice a year based on performance results and coworker feedback. To guide performance, Facebook gives employees an idea that performance is essential and will be appreciated. [9]

#### **2.4. Current Applications of Data Analytics**

In order to achieve the values, companies did plenty of actions and studies. The current data analytics applications in today's streaming media companies will be explained in six topics: Human resources, Accounting and Finance, Product design & development, Supply chain & logistics, Sale & Marketing, and support services.

### **2.4.1. Human Resources**

#### ***Performance Management***

Some companies use data analytics to determine the behaviors of the employees by collecting data from their daily works and comments from their superiors. For example, Facebook collects data and analyzes the "impact " of each employee to make decisions about firing or promoting a person [10,11].

#### ***Decide Suitable Salary to Prevent Talents Loss***

In order to prevent the loss of talents, some companies have developed their own unique way. Take Facebook as an example, Facebook keeps tracking the salary of other companies and uses various statistical models such as "The sticky-wage" model to decide the reasonable salary to prevent the loss of talents [10,11].

#### ***Improve Efficiency***

In order to maintain competitiveness in the market, having a high-efficiency work system is essential. Facebook uses multiple regression analysis to figure out what can improve the efficiency of employees [11]. For example, finding the housing allowance can help employees live nearer, save their time and help them become efficient. Moreover, they may pump up the housing allowance [10-12].

### **2.4.2. Accounting and Finance**

In addition, data analytics also plays a significant role in accounting and finance. Companies mainly focus on collect their current and past data of finances to decide now or even predict future changes. The benefit of this is that companies can better understand their performance in the past and come out with better strategies for the current and future. For example, the company can analyze the data of what time of the year that they have the most significant amount of financial income. That is, in this particular period, the company can invest more finance products than other times. Moreover, companies can use analyzing models to predict and to early warning the upcoming financial crisis, which gives more time to companies for planning and dealing with the crisis [10].

### **2.4.3. Product Design & Development**

Lastly, developers need to collect data from users to understand how well their products meet users' expectations. The forms of data can be diverse. For example, when did users open the application most often, what contents do users like to read, and what content do they share with a friend? For example, Facebook uses a data analytics tool called "Deep Text", which can analyze users' text. By performing this technology, Facebook can understand users' preferences to push contents that users prefer. Facebook develops this "Deep Text" tool, and its principle is to study and analyze the context which user post or texts and link them up together to understand the meaning of a particular word. If a user is posting a post asking which vacuum is better, Facebook will record it down and push vacuum-related contents or send the user vacuum advertisements [11]. In addition, data analytics is also essential in product development. As discussed above, it is crucial for developers to collect data from users to understand how well their products meet users' expectations. Unlike other companies, for instance, Netflix uses AI and machine learning to create unique movie trailers for different people. Credit to Netflix's "Ultimate Personalize" strategy, it has over 93% of user retention rate. Therefore, using data analytics is very useful in product development [12].



#### 2.4.4. Logistics

Logistics is an important part that can contribute to a company's success. It provides supportive activities such as using special effects and helps the company overcome challenges such as improving the efficiency in video review or how to deliver content to customers better. ByteDance, for instance, launched an AI lab in 2016, which can distinguish the contents of audio and video, including politically sensitive identification, pornography identification, violent terrorism identification, advertisement detection; recognize the pictures, transform the speech into words, and even utilize face identification [13].

To be specific, AI Lab provides a special effect that facilitates users to create different interesting videos. Moreover, customers can easily find interesting special effects and create popular videos. The face recognition techniques can recognize the face and put special effects on people's faces, such as cute stickers or different kinds of hairstyles. Also, the checking process that combines humans and machines is beneficial to the company. Human resources are limited-not as efficient as computers-while computers can solely distinguish the superficial contents, which need engineers to check again. In this way, the combination of human and AI machines is adopted. The computer will check most submitted works and categorize uncertain works. Those uncertain works will check again by engineers, so the company does not need to hire many workers to check the videos for 24 hours without taking a break. In other words, this approach helps the company improve efficiency and accuracy.

Another essential thing that AI Lab provided will be big data analytics. The computer will analyze the users' preferences, delivering the contents they enjoy the most. By analyzing the recent videos that they watched or their search history, customers will be satisfied by using the application because they only watch the videos they prefer. Even the advertisements only recommend the products they may have tendencies to purchase.

#### 2.4.5. Marketing

It is significant for the social media company to make decisions based on the market condition. When talking about the market of social media companies, people might wonder why TIKTOK is more popular than KWAH since they are in the same field. Before TIKTOK came out, KWAH was the most popular short video platform in China. But since 2016, when TIKTOK was first published, TIKTOK spent only 1.5 years to have one hundred million MAU (Monthly Active Users) and nine months to break through over four hundred million MAU, while KWAH spent approximate seven years to have over four hundred million MAU [14]. One reason behind this phenomenon is the market situation. TIKTOK came out at an appropriate era when short video became popular and the 4G technology popularized, which helped TIKTOK developed rapidly, following the trend: the market condition was beneficial for TIKTOK.

Another reason is that the algorithm is different, making the audiences different. TIKTOK is more suitable for people (age 17-35) [14], while KWAH users are generally older. TIKTOK can create and maintain hot spots, bringing more flows and attracting more users. In contrast, KWAH always delivers the newest videos to customers, making it hard for them to keep a hot spot for a long time. Also, KWAH only tries to encourage new authors and delivers their videos to users, making it hard to keep hot.

As a result, since customers can decide the orientation of the market while the company will adapt to the market, by analyzing the market, the company can make better decisions and be more likely to succeed. To customers, they will have a better user experience.

The advertisement is also necessary for the social media company to gain a reputation. A company itself publishes one kind of ad to make their product more popular. Another one is cooperating with

other companies to make money and get mutual benefits. The customer can trust the big companies due to the brand awareness. In this case, the company can attract more customers [15].

#### **2.4.6. Support services**

A good platform can act as a good support service for the social media company. The public can submit their works by using the applications such as YouTube or TIKTOK that the company created. These software applications are platforms that connect the public to public, which means that everyone can create and share their works. For example, some celebrities, including singers and actors, use Facebook to share interesting things with others. Some academic articles were also published to benefit people who want to conduct research.

Furthermore, companies try to keep the operation of their apps, so the computer server is vital to support a large number of users at the same time. The support teams who can solve the problems and answer the questions are also needed. All these can help the customer to understand and use the app better, having the opportunities to share their ideas and even influence society. The company will gain more fame, and more investors are willing to fund.

### **2.5. Future Applications of Analytics**

#### **2.5.1. Direction of Industry Growth and Change**

Regarding the benefits of the current data analytics-related actions and studies that social media companies used to provide more value to their customers, companies also can use data analytics tools to generate value in the future. With the use of data analytics tools to predict future changes, social media companies can benefit from the tools because they can make corresponding strategies to face future major changes. Some strategies that worked a few months ago may not produce the same results in the future because there could be changes in consumer behavior and the threat of new competitors.

First, predictive data analytics tools can help the social media industry to predict the change of customer preferences in the future, thus making the strategies correspond to the changes. Companies can regularly, legitimately, and seamlessly collect data from customers, then generate deep insights into their customers and use the past data to predict the future change of customer's preferences. For example, if TIKTOK's data analytics tools find that the consumers will prefer to watch interesting short videos that contain cute animals in the future, then the social media company ByteDance can make appropriate strategies to face this big change by providing more short videos that show the cute animals in the future that fits the customer's preferences. Therefore, the updated strategies produced by data analytics tools ensure the company's strategy is always up to date and gives it a competitive advantage in the social media industry.

Second, the data analytics used in the social media industry will predict the reliable marketing strategies and weaknesses of future competitors. Regarding the fact that a small social media company might have potential threats to the big companies by attracting customers from them and bring other negative effects, the data analytics tools play a significant role in assisting the big company to predict future changes of competitor's information. For example, the social media company ByteDance can use data analytics tools to figure out specific strategies that the new competitors might use in the future and then alter its current marketing strategies. Therefore, ByteDance needs to use the tools to predict the major change in the future and figure out the weakness or threats of competitor's strategies to prevent losing its revenue.

### 2.5.2. Advanced Analytics Applications

With the continuous development of social media industry, companies are facing more challenges. Due to the increasing number of users' data, companies need to improve their operational efficiency by enhancing machine learning and using more advanced methods for data analytics. As a result, companies can focus on developing typical advanced analytics applications, including deep learning, reinforcement learning and cognitive computing.

#### *Deep Learning*

Deep learning is an area that companies could focus on improving in the future. It means that the more aspects of information can be analyzed by machine and the machine's ability to process various information is strengthened. For example, when analyzing information such as images, text, and voice, the machine can analyze in greater depth the impact this data may have on consumers. Machines today can collect and analyze information such as users' personal data, the user's product usage frequency, the time of use, and the user's consumption records and so on. But in the future, companies should analyze more aspects of information, for instance TIKTOK, besides the above data, the machines should also analyze the background music, picture style and color composition of the video's users liked.

Through the analysis of diversified information, the company can precisely understand the user's preferences and recommend their favorite products to users. While the company meets the user's need for personalized services, it also has a competitive advantage in the social media industry.

#### *Reinforced Learning*

In addition to deep learning, reinforcement learning should also be attached great importance by the company to improve in the future. Reinforcement learning refers to strengthening the machine's analysis tools so as to improve the accuracy and proficiency of the machine. Social media pays more attention to the reinforcement of the machine, and gradually improve the computing power of the machine by constantly updating the process of the program, so as to replace some manual work with high repeatability and high precision requirements. For example, TIKTOK, in order to ensure a healthy network environment of short videos, the company hires employees to review and delete videos that contain pornographic and violent information. In the future, the recognition capabilities of machines can be strengthened and reduce labor cost by screening videos automatically.

Machines can do tedious work more accurately in less time, improving work efficiency by learning more and more patterns. Strengthening the machine's sensitivity for screening information can both improve work efficiency and free part of the human work. At the same time, people will not be fully replaced, as the use of machines can liberate the labor force, and allow people do more creative and innovative work.

#### *Cognitive Computing*

After continuous reinforcement learning and deep learning, the machine forms a relatively accurate calculation model, which can provide a reliable basis for company operations. It can analyze the situation within the company and find the company's competitive advantage. Meanwhile, cognitive computing can analyze the social media industry to make companies fully aware of the threats they face and future growth opportunities, helping them better develop their development strategies and improve themselves.

The results of the cognitive calculation can be regarded as feedback to the general situation of the market, thus helping companies to intelligently classify different customers, and to adjust the way



they communicate with customers according to their different characteristics with the purpose of improving customers' sense of experience, thus gradually form a new business ecosystem. Eventually, digital commerce and artificial intelligence will be combined more perfectly gradually.

### 2.5.3. Impact on Value Delivery

The effective advanced analytics applications bring a large number of advantages generated as social media companies using data analytics tools. The advanced data analytics tools described above could deliver value mainly to three types of stakeholders: the customers, the employees, and the investors.

First, predictive analytics agents can help customers to find what they want to see in TIKTOK that matches their tastes. If ByteDance wants to enhance customer's happiness, it can use predictive analytics to help it create and sustain a good customer experience that is tailored to each individual's distinct preferences and needs. Using the example raised above, TIKTOK brings customers happiness because it can bring short videos that match with the customer's tastes by using the data analytics tools to remember and infer the customer's preference; thus, the next time when the customers open TIKTOK, they are only given the short videos that they like. This means the social media company can always deliver instant gratification to customers through personalized likeness and recommendations. Therefore, these functions or frameworks enhance the customer's interests since they can always find interesting short videos that they like.

Second, data analytics tools can improve employees' satisfaction. For example, the data analytics tools can be used by the social media company's Human Resource department. There are some data analytics tools that can help HR to analyze employee's needs or likenesses, such as whether the employees are satisfied with the current company's environment or training process. With the help of effective data analytics tools, HR can adjust some weaknesses and provide a training process or environment that is satisfied with employee's willingness. Hence, the use of data analytics tools is a way to meet employee's needs by analyzing their preferences.

Third, the data analytics tools can help investors receive comprehensive data from the market. The tools can provide the overall background information about a social media company or one of its products for the investors and help them make prudent decisions. For example, if an investor has the desire to invest in TIKTOK, the data analytics tools will provide information about TIKTOK in a short time, such as the monthly active users or whether TIKTOK has increased or decreased percent of consumers in recent years. This information will assist investors to have a full understanding of TIKTOK, thus helping the investors to see whether this product is worth the investment. In conclusion, the data analytics tools enable investors to have greater access to market information and allow them to pre-empt potential issues and resolve issues when they arise.

## 3. Conclusion

In conclusion, the topic of the paper focuses on applying the different data analytic tools in Social Media Industry to analyze the current performance and future implications of the Industry. The goal of the project is to understand how to use data analytics in a specific industry through several detailed information and analysis. The report starts from the value chain analysis, then discusses current applications of data analytics, and ends with the future applications of data analytics. During the process of analyzing, the use of two programming languages, which are Python and R, improves the effectiveness and accuracy of the project. The result of the project reflects that with the use of diverse data analytic tools to analyze the current performance and future outcomes of the Social Media Industry, the data analysis is a significant tool for social media industries to collect, organize and utilize the data, which allows them to make better decisions for the future.

## References

- [1] Statista Research Department. (Sep 10 , 2021) "Facebook Users by Country 2021." [www.statista.com/statistics/268136/top-15-countries-based-on-number-of-facebook-users/](https://www.statista.com/statistics/268136/top-15-countries-based-on-number-of-facebook-users/).
- [2] Vinicy Chan, Manuel Baigorri and Zheping Huang. (April 15, 2021) Yahoo! Finance. "ByteDance Kicks OFF Ipo Prep for China's Most Popular Video App, Other Assets." [https://finance.yahoo.com/news/bytedance-kicks-off-ipo-prep-083954217.html?fr=sycsrp\\_catchall](https://finance.yahoo.com/news/bytedance-kicks-off-ipo-prep-083954217.html?fr=sycsrp_catchall)
- [3] By Daniel, Brandastic | September 1, 2021. "What Is Tik Tok? Why Is It So Popular?" <https://brandastic.com/blog/what-is-TIKTOK-and-why-is-it-so-popular/>
- [4] Iqbal, M. (2021, August 4). "TIKTOK revenue and usage Statistics". Business of Apps. Retrieved September 12, 2021. <https://www.businessofapps.com/data/tik-tok-statistics/>.
- [5] Vivek Shah. Published in Capermint. "10 Major Challenges Faced By Mobile App Developers". <https://www.capermint.com/blog/10-major-challenges-faced-by-mobile-app-developers/>
- [6] Abhijeet Pratap. (January 9, 2018) Notesmatic. "HR management at Facebook: Amazing benefits for amazing talents". <https://notesmatic.com/hr-management-facebook-amazing-benefits-amazing-talents/>
- [7] By Editorial Team in February 9, 2019. inside BIGDATA. "The Role of Analytics in Product Development". <https://insidebigdata.com/2019/02/09/the-role-of-analytics-in-product-development/>
- [8] Bernard Marr, published in Linkedin. (Jan 26, 2017) "How Facebook Uses Data Analytics To Understand Your Posts And Recognize Your Face". <https://www.linkedin.com/pulse/how-facebook-uses-data-analytics-understand-your-posts-bernard-marr>
- [9] Nina Tudor. (Apr 27, 2020) Born fight. "7 real-world examples of how brands are using big data". <https://www.bornfight.com/blog/7-real-world-examples-of-how-brands-are-using-big-data-analytics/>
- [10] Blog: 7 real-world examples of how brands are using big data. Bornfight. (2020, April 27). Retrieved September 12, 2021, from <https://www.bornfight.com/blog/7-real-world-examples-of-how-brands-are-using-big-data-analytics/>.
- [11] Marr, B. (2018, March 9). How facebook uses data analytics to understand your posts and recognize your face. LinkedIn. Retrieved September 12, 2021, from <https://www.linkedin.com/pulse/how-facebook-uses-data-analytics-understand-your-posts-bernard-marr>.
- [12] The role of analytics in product development. insideBIGDATA. (2019, February 7). Retrieved September 12, 2021, from <https://insidebigdata.com/2019/02/09/the-role-of-analytics-in-product-development/>.
- [13] Xiao Gou. (2020, December 23) "How strong is ByteDance's AI technology?" <https://www.seoxiehui.cn/article-108898-1.html>.
- [14] Peter. (2018, October 22) "Why is KWAi not so popular as TIKTOK?" <https://www.zhihu.com/question/299599205>. Retrieved September 12, 2021.
- [15] RongLianQiMo. (Retrieved September 12, 2021) "How advertisement do data analysis?", from <https://zhuanlan.zhihu.com/p/387789163>.