



Application of the K-Nearest Neighbor Algorithm Method to Analyze Netizen Responses and Reactions Toward the Relocation of Capital City at social media

Muhamad Ziaul Haq^{1✉}, Suluh Sri Wahyuningsih², Nursalim³, Uli Wildan Nuryanto⁴, Andy Rachman⁵

^{1,2,3}Universitas Muhammadiyah Palu

⁴Universitas Bina Bangsa

⁵Institut Teknologi Adhi Tama Surabaya

muhziaulhaq1@gmail.com

Abstract

Sentiment analysis is a form of natural language processing that uses word analysis to ascertain people's thoughts, feelings, and views on a certain topic. In this study, word processing refers to the procedure used to categorize written texts into positive and negative emotion categories. Using data crawling techniques, information on public comments on the relocation of Indonesia's capital was gathered from Twitter social media. Keywords related to the move included "new capital," "moving capital," and "moving capital with 10,000 comments." The author of this work classified test data and training data using a lexical approach using the K-Nearest Neighbor (K-NN) method. The purpose of this study is to evaluate the K-NN algorithm's accuracy, error rate, precision, f-measure, and recall. In order to identify the ideal parameters, tests were also conducted on calculating the k value in the K-Nearest Neighbor (K-NN) method. Testing the K-Nearest Neighbor (K-NN) method yielded the greatest accuracy level of 60% with a k value of 9, concluding with the initial data collection. The K-Nearest Neighbor (K-NN) technique was evaluated in the second data collection, and with a k value of 5, it had the best accuracy level of 70%. Future scholars might create texts in languages other than Indonesian and categorize those that include visuals in them. Next, add more dictionaries to the collection and extract features from bigrams, trigrams, quadgrams, and other combinations. You may then employ several algorithmic techniques in the accuracy calculation feature.

Keywords: Social Media, Comparison, Twitter, Classification, K-Nearest Neighbor.

JIDT is licensed under a Creative Commons 4.0 International License.



1. Introduction

In actuality, the capital city of various nations does not house the center of government, despite the fact that practically all governmental levels have capital cities [1]. As the hub of governmental administration, the capital is a significant or major city or municipality in a nation, state, province, or other administrative territory. Law Number 10 established Jakarta as the capital of Indonesia according to the country's constitution [2]. Since the Dutch East Indies, when Jakarta was still known as Batavia, it has served as the seat of government. The Dutch East Indies government made greater attempts at the start of the 20th century to relocate Batavia's capital to Bandung, but these attempts were unsuccessful because of the Great Depression and World War II [3]. Then, in 2019, President Joko Widodo said that the nation's capital will relocate to East Kalimantan, following decades of discussion [4].

On April, 2019, President Joko Widodo made the decision to relocate the nation's capital to the island of Kalimantan at a limited government meeting. The national medium-term growth plan for 2020 – 2024 specifies the capital city's relocation [5]. A new capital city would be constructed in the East Kalimantan administrative regions of Kutai Kartanegara Regency and North Penajam Paser Regency, according to a statement made by President. President claims that the reason he selected Kutai Kartanegara Regency in East Kalimantan and North Penajam Paser Regency in Kalimantan is the possibility of minor catastrophes like floods, earthquakes, tsunamis, forest fires, and volcanoes happening [6]. The place is situated between two rapidly rising urban regions, Balikpapan and Samarinda, in the center of the Indonesian archipelago. 180 thousand hectares of land are already under government control [7]. Many comments supporting and against the phenomena of shifting the capital of Indonesia were posted on Twitter and other social media platforms. With microblogging seeing significant growth, Twitter is the ideal platform for idea sharing, idea banks, and information gathering [8]. As of 2018, the platform had more than 120 million daily active users during the fourth quarter (Q4). In Q4, there were more than 120 million daily users on average, an increase of 10% over the previous year. A lot of individuals share their thoughts and ideas about goods, services, politics, or topics that are trending right now. According to data made public by the Indonesian Internet Service Providers Association (APJII), 2% (3 million) of Indonesians were active Twitter

users in 2020. Twitter is ranked sixth based on this data [9]. Other popular social media platforms in Indonesia are YouTube with 15% (26 million views), Facebook with 50% (86 million), Instagram with 18% (30 million), and Linked with as little as 0.5% (680 thousand). Tweets are brief text messages that users may share on Twitter [10]. Twitter is a popular platform for expressing feelings, whether positive or negative. Positive and negative emotions are two categories into which emotions can be divided [11]. There are five fundamental emotions that make up human emotions: fear, rage, sorrow, happiness, and love. Positive emotions encompass feelings of love and pleasure. Negative emotions include fear, rage, and sadness [12]. One of the social media platforms that a lot of people frequently use to express their thoughts on different topics is Twitter, where individuals may express their opinions regarding the phenomena of shifting the capital of Indonesia. Through tweets on Twitter, the people shared their ideas, agreeing or disapproving for a variety of reasons [13]. Twitter is working on creating a sentiment analysis methodology tailored to tweets. In order to observe opinions or opinion patterns about accuracy values, sentiment analysis on Twitter is conducted. The proportion of the total of the training and test sets is used to determine accuracy [14]. Sentiment analysis is a field of study that analyzes a person's opinions, sentiments, evaluations, judgments, attitudes and emotions towards a product, organization, individual, issue, event or topic [15]. Sentiment analysis is carried out to see opinions on an issue, or can also be used to see opinions on an issue, or can also be used to identify trends in things that are the topic of discussion. Sentiment analysis in this research is the process of grouping tweets into five emotions, namely happy emotions, love emotions, sad emotions, angry emotions and fearful emotions [16]. The influence and benefits of sentiment analysis have caused research on sentiment analysis to grow rapidly. In America, there are approximately 20-30 companies that focus on sentiment analysis services [17]. The benefits of sentiment analysis in the business world include monitoring a product. It can quickly be used as a tool to see the public's response to a product, so that the next strategic steps can be taken [18]. In general, sentiment analysis is a classification, but in reality it is not as easy as the usual qualification process because it is related to language use, where there is ambiguity in the use of words and the development of the language itself [19].

Twitter sentiment analysis is defined primarily as the views expressed in comments on social media. Because Twitter tweets are restricted in length, they are simpler to interpret [20]. Although it's not a given that every phrase has a single opinion, sentences frequently have one. This is just a tiny portion of the statements that have several opinions in various situations. Sentiment analysis is essentially a level of categorization [21]. Still, compared to structured document categorization, the unstructured sentiment classification step on Twitter is marginally more challenging [22]. Sorting out whether or not the text represents an opinion is the first stage. Sorting opinion statements into positive and negative classifications is the second phase [23]. This research also adapts Natural Language Processing (NLP), which is a field of computer science which is a branch of artificial intelligence, and language (linguistics) which is related to the interaction between computers and natural human languages, such as Indonesian or English. The main goal of NLP studies is to create machines that are able to understand and understand the meaning of human language and then provide appropriate responses [24]. Natural Language Processing (NLP) is a branch of AI that focuses on natural language processing. Natural language is language that is generally used by humans to communicate with each other. The language received by the computer needs to be processed and understood first so that the user's intentions can be understood properly by the computer. There are various applications of NLP [24]. Among them are chatbots (applications that allow users to communicate as if they were communicating with a computer), stemming or lemmatization (cutting words in a particular language into basic forms of recognizing the function of each word in a sentence), summarization (summarizing the reading), translation tools and other applications that enable computers to understand language instructions entered by the user [25].

K-Nearest Neighbor is the classification method used by researchers. The study team selected K-Nearest Neighbor because they had previously reviewed the literature on a number of related techniques, such as the study published in 2020, previous researcher examined how well the lexicon method performed while analyzing sentiment analysis utilizing the Naïve Bayes and K-Nearest Neighbor algorithms [26]. The Twitter API is the social media platform used to extract sentiment. Case folding, filtering, tokenizing, normalization, stopwords, and stemming are the NLP procedures that are employed. by having the benefit of the K-NN value at $k=5$ accuracy level, which may achieve up to 77% accuracy. In 2018, previous researcher did study on Android games using sentiment analysis. The accuracy as a consequence was 75%. The results of the tests conducted indicate that the K-NN algorithm is a high-performing approach that is appropriate for text categorization [27]. Previous study used K-NN to assess public opinion on Twitter to determine how people felt about television shows. The Twitter API is the social media platform used to extract sentiment [28]. Tokenizing, case folding, cleaning, filtering, and stemming are the NLP procedures that are employed [29]. With the benefit that textual weighting accuracy achieves 82.50% and non-textual accuracy reaches 60%, and the combination of both reaches 80%. The values $\alpha=0.8$ and $\beta=0.2$ are utilized, and the best k value is $k = 3$. This research aims to determine netizens' opinions regarding moving the capital from Twitter social media as well as the level of accuracy of the K-Nearest Neighbor (K-NN) method in predicting netizens' opinions regarding moving the Indonesian capital on Twitter social media.

2. Research Methods

This study analyzes and extracts sentiment information from training data using a lexical approach to sentiment classification. The prototype technique was chosen for system development because it allows for progressive development and ongoing improvement through an iterative process. Prototyping allows for adaptability to evolving requirements or potential enhancements found during system development. PHP was chosen as the primary programming language for this solution's implementation because it offers flexibility and ease of development. MySQL was used to organize and store the data needed for this study, offering a strong basis for information management. This research aims to give a thorough and detailed approach to technological implementation in resolving sentiment classification issues on training data by describing the usage of programming languages and data storage techniques.

3. Results and Discussion

In this research, the author formulated a research problem using the K-Nearest Neighbor algorithm as a classification of sentiment orientation results with training data sentiment classification using a lexicon based method. Then, netizens' opinions regarding the relocation of Indonesia's capital city on Twitter social media were obtained and also the level of accuracy of the K-Nearest Neighbor (K-NN) method in predicting netizens' opinions regarding the relocation of Indonesia's capital city on Twitter social media. The test carried out is to classify test data into positive, negative or neutral classes using the K-NN algorithm. The process of classifying test data will be carried out into 5 scenarios, namely based on determining the k value in the K-NN algorithm with the values $k=1$, $k=3$, $k=5$, $k=9$ and $k=10$. At this stage there is information regarding the success rate of the algorithm combination in classifying test data into classes which are calculated based on the level of accuracy, error rate, precision, recall and f-measure. Based on the test, it is divided into two, namely the K-NN testing stage with the first data collection on October 2021 and the second data collection on February 2022. Verification is carried out to ensure that each stage in the previous chapters is related to each other, in this case each stage of the chapter will be reviewed again to ensure that each stage is related to each other.

From the problem formulation stage, a discussion is carried out regarding how to identify problems to be formulated in writing a thesis, so that these problems can be developed into concept modeling as a solution. Next, at the conceptual model stage, the overall concept is discussed in the orientation analysis application, including input, process, experiments and expected output. At the data input/output collection stage, discussing data input and output. Continuing to the modeling phase, this phase is related to processing the input and output data that was created in the previous stage. Sample calculations and sentiment classification construction of training data were carried out using the lexicon approach, sample calculations and test data classification construction using the K-NN algorithm method manually to be used as a reference in creating applications in this thesis. Next, the final stage is simulation, namely by carrying out simulations on the sentiment orientation analysis application whose function is to implement the previous manual modeling. Therefore, each stage can be ensured to be related, because each stage created will have an influence on creating the next stage. So the stages discussed in the previous chapter must have been verified in accordance with existing verification provisions.

In the validation process, system correctness testing was carried out by comparing the performance of the K-NN algorithm with that calculated manually and the results of the sentiment orientation analysis application, resulting in system accuracy. Then an experiment was carried out by comparing the scenario results, namely the results of sentiment classification of test data using the K-NN algorithm by comparing the results of existing scenarios. From this experiment, an output analysis was carried out which will be discussed in the next stage, namely the output analysis phase.

Based on the results obtained from testing, the results of the analysis showed that in the first experiment, K-NN with parameter $k=1$ produced an accuracy rate of 60% with an error rate of 40%, f-measure of 0.6, precision of 0.7 and recall of 55%. In the second experiment, K-NN with parameter $k=3$ produced an accuracy rate of 55% with an error rate of 45%, f-measure of 0.5, precision of 0.56 and recall of 45%. In the second experiment the level of accuracy decreased by 3% at parameter $k=3$. In the third experiment, K-NN with parameter $k=5$ produced an accuracy rate of 60% with an error rate of 40%, f-measure of 0.6, precision of 0.6 and recall of 62%. The third experiment experienced a 5% increase in accuracy compared to the previous one. In the fourth experiment, K-NN with parameter $k=9$ produced an accuracy rate of 60% with an error rate of 40%, f-measure of 0.6, precision of 0.59 and recall of 60%. The fourth experiment increased accuracy by 1% from the third experiment.

In the fifth experiment, K-NN with parameter $k=10$ produced an accuracy rate of 59% with an error rate of 41%, f-measure of 0.63, precision of 0.6 and recall of 68%. The fifth experiment experienced a decrease in accuracy of 4% from the previous experiment in the K-NN algorithm. Of the five K-NN experiments/scenarios carried out by researchers, the highest level of accuracy was in the fourth experiment of the K-NN algorithm with an accuracy level of 64% at parameter $k=9$. Meanwhile, the lowest level of accuracy fell in the second experiment of the K-NN algorithm with parameter $k=3$ with an accuracy rate of 57%. The highest recall calculation in K-NN fell in the fifth experiment at 68%. The higher the recall value produced, the system can predict the identified class

correctly. The highest f-measure calculation for the K-NN algorithm for the five experiments was in the fifth experiment at 0.63. Meanwhile, the smallest f-measure value was in the second experiment at 0.6, followed by the lowest level of accuracy. This means that the f-measure value shows that the higher the f-measure value (closer to 1), the better the classification works in predicting.

Then in the second test, the results of the analysis showed that in the first experiment, K-NN with parameter $k=1$ produced an accuracy rate of 60% in the first scenario, an error rate of 40%, recall of 79%, precision of 0.7 and f-measure of 0.8. In the second experiment, K-NN with parameter $k=3$ produced an accuracy rate of 59% in the second scenario, an error rate of 41%, recall of 80%, precision of 0.7 and f-measure of 0.8. In the second experiment, accuracy was stable or the same as the first. In the third experiment, K-NN with parameter $k=5$ produced an accuracy rate of 63% in the third scenario, an error rate of 37%, recall of 72%, precision of 0.8 and f-measure of 0.77. The third experiment experienced a 5% increase in accuracy compared to the previous one. In the fourth experiment, K-NN with parameter $k=9$ produced an accuracy rate of 60% in the fourth scenario, an error rate of 40%, recall of 78%, precision of 0.82 and f-measure of 0.8. The fourth experiment decreased accuracy by 3% from the third experiment.

In the fifth experiment, K-NN with parameter $k=10$ produced an accuracy rate of 63% in the fifth scenario, an error rate of 37%, recall of 78%, precision of 0.82 and f-measure of 0.81. The fifth experiment experienced an increase in accuracy of 2% from the previous experiment in the K-NN algorithm. Of the five K-NN experiments/scenarios carried out by researchers, the highest level of accuracy was in the fourth experiment of the K-NN algorithm with an accuracy level of 64% at parameter $k = 5$. Meanwhile, the lowest level of accuracy fell in the second experiment of the K-NN algorithm with parameter $k = 1$ and 3 with an accuracy rate of 58%. The highest recall calculations on K-NN fell on the first, third and ninth experiments at 80%. The higher the recall value produced, the system can predict the identified class correctly. The highest f-measure calculation for the K-NN algorithm for the five experiments was in the fourth and fifth experiments at 0.8. Meanwhile, the smallest f-measure value was in the first and second experiments at 0.77, followed by the lowest level of accuracy. This means that the f-measure value shows that the higher the f-measure value (closer to 1), the better the classification work in predicting.

4. Conclusion

The researcher can draw conclusions about the opinions of netizens regarding the relocation of the Indonesian capital based on the results of the research that has been conducted. Of the data collected, 64 have a neutral sentiment, and 36 have a positive sentiment. There are those who are in favor of the relocation of the Indonesian capital, as well as those who are indifferent or unconcerned about it. This system can only classify Indonesian text data and cannot classify images. Future research is expected to develop a system that can clarify various languages and images. Future researchers are also expected to be able to develop a system that can be used on all platforms. This study can offer recommendations for future system development, such as the addition of bigram, trigram, quadgram, and other extraction characteristics. Accuracy is predicted to rise with the addition of a feature that allows for the calculation of accuracy using alternative techniques, as well as an increase in the collection of sentiment dictionaries, particularly in English.

References

- [1] Krisandi, N., & Helmi, B. P. (2023). k-Nearest Neighbor Algorithm in Classifying Palm Oil Production Data at PT. Minamas, Parindu District. *Bimaster: Scientific Bulletin of Mathematics, Statistics and Its Applications*, 2(1).
- [2] Matulatuwa, F. M. (2017). Text mining using a lexicon based method for sentiment analysis of PT services. Pos Indonesia via Twitter social media (Doctoral dissertation, Master of Information Systems FTI-UKSW Postgraduate Program).
- [3] Turyadi, I., Zulkifli, Z., Tawil, M. R., Ali, H., & Sadikin, A. (2023). The Role Of Digital Leadership In Organizations To Improve Employee Performance And Business Success. *Jurnal Ekonomi*, 12(02), 1671-1677.
- [4] Suriadi, S., Rafid, M., Zulkifli, Z., Abdurohim, A., & Damirah, D. (2023). The Influence of Organizational Culture, Work Environment and Work Discipline on Job Satisfaction of Teachers at Boarding School. *Journal on Education*, 5(4), 14777-14781.
- [5] Aziz, F., Mayasari, N., Sabhan, S., Zulkifli, Z., & Yasin, M. F. (2022). The Future of Human Rights in the Digital Age: Indonesian Perspectives and Challenges. *Journal of Digital Law and Policy*, 2(1), 29-40.
- [6] Hendriyanto, D., Setiamika, M., & Primadewi, N. (2020). The effect of Ginkgo biloba against ototoxic hearing loss on advanced stage undifferentiated nasopharyngeal carcinoma receiving cisplatin chemotherapy. *INTERNATIONAL JOURNAL OF NASOPHARYNGEAL CARCINOMA*, 2(02), 44-46.
- [7] Nurcahyo, V. E., & Hendriyanto, D. (2020). The depression level effect on the QOL of patients with obstructive sleep apnea syndrome. *Oto Rhino Laryngologica Indonesiana (ORLI)*, 50(2), 135-40.

- [8] Haddar, G. A. H., Hendriyanto, D. ., Munandar, H. ., Kelibia, M. U. ., & Muhammadijah, M. . (2023). ANALYSIS OF THE EFFECTIVENESS OF PROJECT STEAM-BASED LEARNING MODEL TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS. *Community Development Journal : Jurnal Pengabdian Masyarakat*, 4(5), 10519–10525.
- [9] Hendriyanto, D., & Helmi, H. Protective role of Nigella sativa oil against cisplatin-induced ototoxicity: a literature review. *Journal of the Medical Sciences (Berkala Ilmu Kedokteran)*, 55(2).
- [10] Sarah, S., Aswita, D., Ainun, N., Maulidar, M., & Azzarkasyi, M. (2022). The development of HOTS-based assessment instruments on educational statistics. *International Journal of Trends in Mathematics Education Research*, 5(1), 38-43.
- [11] Setyawan, A. A., Prabowo, H., Simatupang, B., & Pradipto, Y. D. (2023). The Influence of Quality Management Practices and Digital Innovation on Organizational Performance Mediated by Competitiveness Strategy and Moderated Industrial Collaboration in Vocational Higher Education in Indonesia. *Tec Empresarial*, 18(1), 398-403.
- [12] Jefriyanto, J., Ainun, N., & Al Ardha, M. A. (2023). Application of Naïve Bayes Classification to Analyze Performance Using Stopwords. *Journal of Information System, Technology and Engineering*, 1(2), 49-53.
- [13] Ainun, N., & Jefriyanto, J. (2023). Development of Kirchoff's Law Drawing Tools to Improve Student's Science Skills in Learning Process of Direct Flow Circuits. *Journal of Information System, Technology and Engineering*, 1(2), 32-37.
- [14] Mardiah, A. (2019). The Influence Of Store Layout, Interior Display, And Human Variable Related To Shopping Orientation At Matahari Basko Grand Mall Padang. *Jurnal Ecogen*, 2(1), 27-33.
- [15] Sudirjo, F., Syamsuri, H., Mardiah, A., Widarman, A., & Novita, Y. (2023). Analysis of The Influence of Customer Perceived Benefit, Ease of Use and Sales Promotion on The Decision to Use Digital Wallets for ShopeePay Customers. *Jurnal Sistim Informasi dan Teknologi*, 63-68.
- [16] Budiarto, B. W., Haes, P. E., Nawarcono, W., Mardiah, A., & Apriyono, T. (2023). The Influence Of E-Customer Satisfaction, E-Service Quality And Sales Promotion On E-Customer Loyalty Of Tokopedia Customers. *JEMSI (Jurnal Ekonomi, Manajemen, dan Akuntansi)*, 9(6), 2472-2479.
- [17] Nursanti, S., Dharta, F. Y., Chaerudin, C., Syam, S. P., & Purnama, R. N. (2022). Generation z's perceptions of health information about the Covid-19. *Jurnal Studi Komunikasi*, 6(2), 587-602.
- [18] Siswanto, A., Pratiwi, R., Rokhmawati, D., & Dharta, F. Y. (2023). Analysis Of Determinant Factors Employee Performance Of Directorate General Of Intellectual Property Rights Republic Of Indonesia. *JEMSI (Jurnal Ekonomi, Manajemen, dan Akuntansi)*, 9(6), 2493-2498.
- [19] Bilgies, A. F., Tawil, M. R., Mardiah, A., & Arief, I. (2023). Analysis of The Influence of Online Consumer Reviews, Seasonal Digital Advertising and Celebrity Endorsers on Repurchase Intention of E-Commerce Consumers. *Jurnal Informasi dan Teknologi*, 26-32.
- [20] Ariawan, J., Tarigan, B. A., Mardiah, A., & Siahaan, F. S. (2023). Analysis of The Influence of Burnout, Job Satisfaction and Organizational Commitment on Turnover Intention of Electronic Manufacturer Employees in Indonesia. *JEMSI (Jurnal Ekonomi, Manajemen, dan Akuntansi)*, 9(5), 2016-2020.
- [21] Setyawan, A. A. (2022). Effect of Quality Management Practices, and Digital Innovation on Organizational Performance Mediated by Competitiveness Strategy and Moderated by Industrial Collaboration at Vocational Colleges in Indonesia. *ITALIENISCH*, 12(2), 1096-1100.
- [22] Widjayanti, C. E., Setyawan, A. A., & Racma, D. F. (2021, December). Philanthropy Model with Income Redistribution as an Alternative Solution for Women Victims of Layoffs Affected by Covid-19. In *Prosiding University Research Colloquium* (pp. 509-516).
- [23] Wijayanti, C. E., Wibowo, A., Suyudi, S., & Setyawan, A. (2020). Hubungan Efisiensi dan Efektivitas dengan Kepuasan Pengguna Sistem Pendukung Keputusan Pemberian Penghargaan Bagi Karyawan Pada Pabrik Plastik "Sukses Mandiri" di Sokaraja Wetan. *Jurnal HUMMANSI (Humaniora, Manajemen, Akuntansi)*, 3(1), 47-55.
- [24] Dharta, F. Y., & Chaerudin, D. R. (2023, June). Using Digital Marketing Communications to Boost SMEs' Local Economic Growth in Karawang Regency. In *ICEMBA 2022: Proceedings of the International Conference on Economic, Management, Business and Accounting, ICEMBA 2022, 17 December 2022, Tanjungpinang, Riau Islands, Indonesia* (p. 101). European Alliance for Innovation.
- [25] Dharta, F. Y., Prasetyo, H., & Dema, Y. (2021). Influence of attitude on online impulse buying: perspective on marketing communication. *Jurnal Studi Komunikasi*, 5(3), 729-745.
- [26] Mahdalela, R., Ainun, N., & Roslina, R. (2022, December). An Analysis of Students' Mathematical Communicative Skills in Solving Sets Problems at SMP Negeri 1 Darul Hikma Aceh Jaya. In *Proceedings of International Conference on Multidisciplinary Research* (Vol. 5, No. 2, pp. 70-81).
- [27] Suryawati, I., Rahmani, R., & Ainun, N. (2022, November). Students' Mathematical Communication Ability through Blended Learning Model for Elementary School Students in Banda Aceh. In *Proceedings of International Conference on Multidisciplinary Research* (Vol. 5, No. 1, pp. 53-57).

- [28] Nurjanah, W. E., Perdana, R. S., & Fauzi, M. A. (2017). Sentiment Analysis of Television Shows Based on Public Opinion on Twitter Social Media using the K-Nearest Neighbor Method and Weighting the Number of Retweets. *Journal of Information Technology and Computer Science Development*, 1(12), 1750-1757.
- [29] Sahara, S. (2016). Application of the K-Nearest Neighbors Method for Game Review Sentiment Analysis on Android. *Journal of Evolution Volume*, 4, 38-41.