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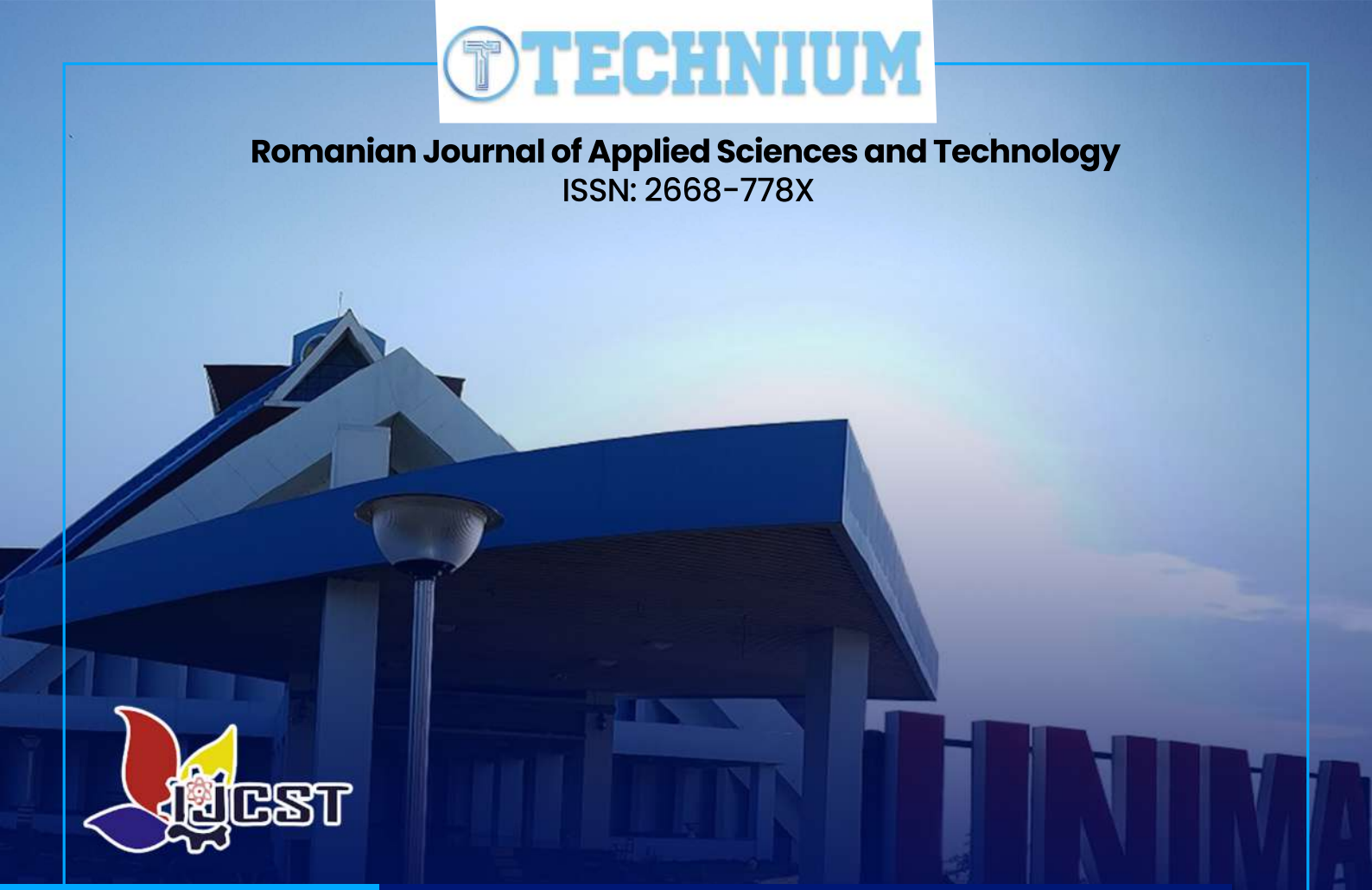

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Sentiment Analysis of Madura Tourism Opinion Using Support Vector Machine (SVM)

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Abstract. Madura is one of the most popular tourist destinations in Indonesia. It offers a variety of interesting attractions such as beaches, islands and a unique traditional culture. However, like other tourist destinations, Madura tourism also receives different opinions from the community. Some public opinions can be in the form of positive, negative and neutral feelings towards Madura tourism. To find out the public opinion, it is necessary to conduct sentiment analysis using the Support Vector Machine (SVM) method. In this analysis, data was collected from various social media platforms discussing Madura tourism. Reviews from the community are divided into three categories into positive, negative, neutral, which are processed by the SVM method. The purpose of using the Support Vector Machine method for sentiment analysis of public opinion about Madura tourism where the results can be analysed to provide recommendations for improvements to Madura tourism that are useful for improving the quality of Madura tourism based on public sentiment. From the test results carried out using K = 5 fold cross validation, positive sentiment is obtained from as many as 192 tweets and an accuracy of 92.592% using Confusion Matrix.

1 Introduction

Tourism is an economic sector related to travel, accommodation, and recreational or business activities carried out by tourists in a region or country. According to the World Tourism Organization (WTO), tourism includes the activities of tourists who travel for recreation, business, or other interests, which are carried out temporarily and exceed a distance of 80 km from their place of origin [1].

Tourism is one of the fastest-growing economic sectors in various countries, including Indonesia. According to data from the Central Statistics Agency (BPS), the number of foreign tourist visits (Wisman) to Indonesia in 2019 reached 16.1 million people, with the contribution of the tourism sector to the Gross Domestic Product (GDP) reaching 5.9%. In addition, tourism is also a sector that can absorb labor with a total of around 13.4 million people in 2019 [2].

Madura is an island in Indonesia located in the northeast of Java. The island has a variety of interesting attractions that can attract tourists. Tourism destinations in Madura include natural charm, culture, history, and culinary specialties that offer different experiences for visitors, for example from [3], [4]:

a. Beach Charm: Madura has some stunning beaches with white sand, clear sea water, and waves suitable for surfing. Some popular beaches include Tanjung Bumi Beach, Lombang Beach, Sembilan Beach, and Giliyang Beach.
b. Uniqueness of the Kangean Islands: Kangean Island is a group of islands that presents a unique natural charm and community life. This destination offers exotic beaches, coral reefs, and an interesting remote island atmosphere.
c. Historical Tourism: Madura has interesting historical sites to visit, such as the Tomb of Sunan Muria in Sumenep and the Asta Tinggi Tomb in Asta Tinggi, Sumenep. These sites have historical and religious significance to the local community.
d. Batik Crafts: Batik Kamal Village is the center of batik handicrafts in Madura, where one can witness the traditional Madurese batik-making process and purchase a variety of quality batik products.
e. Typical Madurese Culinary: Pecel Madiun, Sate Madura, Soto Madura, and Rujak Madura are some of the culinary specialties that must be tasted when visiting Madura. Culinary tours in Madura will satisfy visitors' taste buds with unique flavors.
f. Sembilang Waterfall: This natural attraction presents a beautiful waterfall and natural pools that are interesting for swimming or just relaxing.
g. Tongke-Tongke Traditional Village: This village has traditional Madurese houses that are still preserved and provides an opportunity for visitors to experience Madurese rural life.
h. Kampoeng Pamekasan: A cultural tourism area featuring various Madurese cultures and arts.

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Visitors can enjoy traditional art performances and shop for Madurese souvenirs here.

Madura Island offers beautiful natural charm, unique culture, and rich history. In addition, the hospitality of the local people is also a special attraction for tourists. Sentiment analysis is a process to determine an opinion or opinion conveyed in writing in the form of text or documents and whether it has a positive or negative sentiment [5]. Research related to sentiment analysis has recently become a concern because it produces data such as public opinion, political promotion, and decision-making [6]. The purpose of sentiment analysis is to analyze a comment and classify it as a positive or negative sentiment [7]. Sentiment analysis itself can be applied in classifying public opinions on social media towards Madura tourism in Indonesia.

Sentiment analysis is used to get a text from information and classify the text as positive, negative, or neutral sentiment. The goal is to classify public opinion, the data used is crawling results from social media. Public comments or responses on social media are often used as an expression of the community. The responses or comments of the community can be analyzed by crawling and will get positive, negative, and neutral comments [8].

Support Vector Machine is a method that can be applied to predict and as a classifier or with regression called Support Vector Machine. This stage is applied to the Support Vector Machine method using the training data process after that proceeds to the test data process. The Support Vector Machine classifier uses the concept of finding the best hyperlink and can be used for three-class classification. Support Vector Machine aims to give the value of the appearance of a word and can classify it into positive, negative, and neutral forms. For the Support Vector Machine stage, namely to edit data in the form of text to vector form and put together with TF-IDF [9].

Based on the description above, this research is carried out with sentiment analysis to determine public opinion on Madura tourism. Data sampling or crawling and crawling results will be preprocessed, then word weighting and data labeling manually, by applying Support Vector Machine as the main method. Where Support Vector Machine has the advantage of being able to obtain a model with better classification even though it is processed with relatively less crawling data. The disadvantage of the Support Vector Machine method is that it is more difficult to apply to crawling a very large number of rooms. This research requires a method that aims to facilitate research and find out positive, negative, and neutral comments. Therefore, the method used is Support Vector Machine as the main method of the research conducted. So that in this study can get a high accuracy value related to sentiment analysis of public opinion and this research, is expected to provide a better understanding of public opinion related to Madura tourism whether the opinion is positive, negative, or neutral, and can help policymakers to understand what are the strengths and weaknesses of Madura tourism, so that it can be used as a recommendation for improvement measures to Madura tourism.

Some of the research that has been described previously and related research that supports this research, including research on sentiment analysis of opinions on the performance of football clubs on Twitter documents using a Support Vector Machine with Improvement of Non-Standard Words. This research examines non-standard words for sentiment analysis of public opinion on football clubs by applying Support Vector Machine classification on Twitter. Data collection of as much as 400 tweet data, sorted into 2 including 360 training data and 40 test data. After that, repairing an unstandardized word with the Levenshtein Distance algorithm. The accuracy obtained from Support Vector Machine with Levenshtein Distance reaches 83.25% and the accuracy that does not use Levenshtein Distance is 82.75% [10].

Research on sentiment analysis of online loans on Twitter using the Support Vector Machine (SVM) algorithm. This study examines the level of accuracy of online loans with the SVM algorithm method, the data taken is 200 opinions from the public. The results of the accuracy of 62.00%. the results show that negative opinions have more ratings than positive opinions, with as much as 59% negative opinions and 41% positive opinions [11].

Research on sentiment analysis of southeast asian games (sea games) in the Philippines 2019 Based on Opinion of Internet Users of Social Media Twitter with K-Nearest Neighbor and Support Vector Machine. This research examines the best level of accuracy between K-NN Classification and SVM with data taken from as many as 20,600 tweets. The results obtained using Support Vector Machine and polynomial results reached 92.96% [12].

Research on sentiment analysis of the discourse on moving the capital city of Indonesia using the Support Vector Machine (SVM) algorithm. This research examines public opinion about moving the capital city by applying SVM to Twitter media. The data used was 1,236 tweets. With the results of the total accuracy of 96.68%, the acquisition of precision is 95.82%, the acquisition of recall is 94.04%, and AUC is 0.979 [13].

Another study on the use of three methods for sentiment analysis, namely SVM, K-NN, and NBC methods on tourism in Bali, where its extraordinary beauty makes many people argue that without Bali, a trip to Indonesia is incomplete. However, most still conduct surveys. The drawbacks of survey-based approaches include a lack of comprehensiveness, possible data duplication, and operational costs. Using Jatiluwih traveler comment data, analyze the impression of natural attractions by classifying positive and negative reviews. The focus of this panel sentiment analysis was comments on the Nature Tourism Attraction Criteria set by the Directorate General of Forest Protection and Nature Conservation in 2003. These criteria include tourist attraction, market potential, accessibility, socio-economic environmental conditions, public services, climatic conditions, supporting facilities and infrastructure, availability, and safety of clean water. This research compares SVM, K-

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NN, and NBC methods to provide analysis. Using Confusion Matrix evaluation, this research aims to provide a thorough analysis of the performance of each method. The results show that the K-NN method has higher accuracy and testing precision than SVM and NBC. The K-NN method provides a value of 93.4%, SVM 93.1%, and NBC 87.9% [14].

Research on using the K-Means method to apply clustering and sentiment analysis of Twitter data on beach tourism opinions, the focus of this analysis is to analyze the opinion of a text document, thus helping efforts to conduct market research on public opinion. Opinion data about beaches was obtained from the social network Twitter in Indonesia. Comments are categorized to make it easier for users to see positive, negative, or neutral reviews. In this study, the Support Vector Machine algorithm was used to cluster beaches based on various factors, including resource availability, facilities, access, community readiness, market potential, and tourism position. Data from questionnaires were also used to cluster beaches based on various factors, including a classification accuracy of 74.39%, this data was clustered using the K-Means method [15].

2 Methods

2.1. System Design

To get an overview of the system used, the author analyses the system and models it. At this stage of the system design flow, it is necessary to carry out various designs of sentiment analysis of public opinion.

2.2. Needs Analysis

a. Hardware Requirements

Computer Hardware (Hardware) is a string of computer components that can be touched and touched. The hardware on the computer functions to run and process commands that have been run by the computer system. The hardware applied to sentiment analysis system processing with the naïve Bayes method includes (1). Processor: AMD Ryzen 5 2500U with Radeon Vega Mobile Gfx 2.00 GHz (2). Memory: 8.00 GB RAM

b. Software Requirements

Software is an important component of a computer. The computer can be operated properly when the software is installed. The software can also be interpreted as a set of data that is executed by computer hardware. The software used in processing sentiment analysis systems with the naïve Bayes method includes: (1). OS: Windows 8/10 64-bit (2). Python version 3.7 or Google Colab Python programming language.

2.3. Data Preprocessing

To make the data collection ready for use, the raw data is processed at the preprocessing stage. Text preprocessing is used in tidying up the data to reduce noise, equalize word forms, and reduce data volume. To become data ready for processing, the data obtained from crawling will be removed. As in the figure below, which is the stage of data preprocessing.

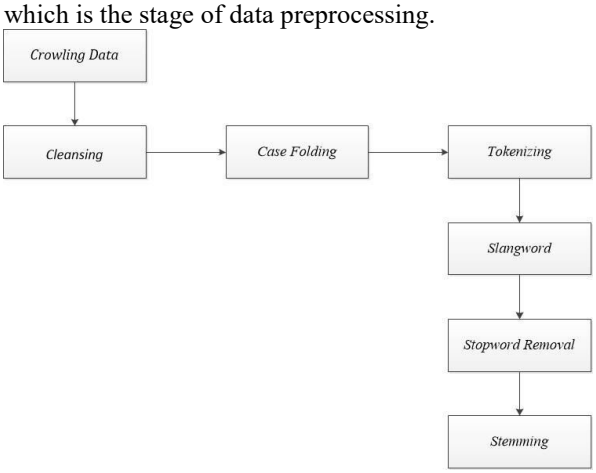

Fig. 1. *Data Preprocessing Phase*

2.3.1. Cleansing

The method to remove many unnecessary words from the document is to remove HTML characters, RT, URL, hashtag (#), mention username (@username), symbols, emoticons, two-letter spaces, and one-letter characters. An example is in the table below:

Table 1. Cleansing Example

The word before Cleansing	***Cleansing***
Lombang Beach is nice but still dirty with various instant food wrappers, such as Popmie, etc., the application of not throwing garbage on the beach is minimal, visitors casually throw garbage on the beach.#Lombang Beach #Madura Tourism	Lombang Beach is nice but still dirty with a variety of instant food wrappers such as pope etc the application or don't throw garbage on the Beach is still minimal visitors with as much as possible to throw garbage on the beach

2.3.2. Case Folding

This process is used to convert uppercase letters into lowercase letters. The following is an example of the case folding results below:

Table 2. Example of Case Folding

The word before *Case Folding*	***Case Folding***
Lombang Beach is nice but still dirty with a variety of instant food wrappers such as Pope etc. the application or don't throw garbage on the Beach is still minimal visitors with as much as possible to throw garbage on the beach	lombang beach is good but still dirty with various instant food wrappers such as popmie etc the application or don't throw rubbish on the beach is still minimal visitors with as much as they want to throw rubbish on the edge of the

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	beach

2.3.3. Tokenizing

At this stage, tokenizing is performed, which is the process of selecting, cutting, and truncating words in the document that will be used as terms based on spaces. Here's an example of the tokenizing results below:

Table 3. Example of Tokenizing

The word before *Tokenizing*	*Tokenizing*
lombang beach is good but still dirty with various instant food wrappers such as popmie etc. the application or don't throw rubbish on the beach is still minimal visitors with as much as they want to throw rubbish on the edge of the beach	['beach', 'lombang', 'nice', 'but', 'still', 'dirty', 'with', 'various', 'wrap', 'food', 'instant', 'like', 'pope', 'etc', 'application', 'don't', 'throw', 'rubbish', 'litter', 'still', 'minimal', 'visitors', 'with', 'se', 'delicious', 'throw', 'rubbish', 'on', 'edge', 'beach']

2.3.4. Slang word

In this step, the shortened or lengthened word should be adjusted to the KKBI dictionary. Using a slang dictionary for nonstandard words will help. Here's an example of the slang word results below.

Table 4. Example of Slang Word

The word before Slang Word	*Slangword*
['beach', 'lombang', 'nice', 'but', 'still', 'dirty', 'with', 'various', 'wrap', 'food', 'instant', 'like', 'pope', 'etc', 'application', 'don't', 'throw', 'rubbish', 'litter', 'still', 'minimal', 'visitors', 'with', 'se', 'delicious', 'throw', 'rubbish', 'on', 'edge', 'beach']	['beach', 'lombang', 'nice', 'but', 'still', 'dirty', 'with', 'various', 'wrap', 'food', 'instant', 'like', 'pope', 'etc', 'application', 'don't', 'throw', 'rubbish', 'litter', 'still', 'minimal', 'visitors', 'with', 'se', 'delicious', 'throw', 'rubbish', 'on', 'edge', 'beach']

2.3.5. Stopword Removal

The stopword removal process involves selecting words in the document that are not related to the sentiment analysis process. This is done because these words appear frequently, but do not make the expected contribution to interfere with the classification process. Here's an example of the stopword removal results below.

Table 5. Example of Stopword Removal

The word before *Stopword Removal*	*Stopword Removal*
['beach', 'lombang', 'nice', 'but', 'still', 'dirty', 'with', 'various', 'wrap', 'food',	['beach', 'lombang', 'nice', 'dirty', 'wrapper', 'food', 'instant', 'pope', 'application',
'instant', 'like', 'pope', 'etc', 'application', 'don't', 'throw', 'rubbish', 'litter', 'still', 'minimal', 'visitors', 'with', 'se', 'delicious', 'throw', 'rubbish', 'on', 'edge', 'beach']	'throw away', 'rubbish', 'indiscriminate', 'minimal', 'visitor', 'delicious', 'throw away', 'rubbish', 'edge', 'beach']

2.3.6. Stemming

In the process of converting verbs into nouns, affixes are removed. As a result, the word that is converted into a base word is called stemming. Here's an example of the stemming results below.

TABLE 6. Example of Stemming

The word before *Stemming*	*Stemming*
['beach', 'lombang', 'nice', 'dirty', 'wrapper', 'food', 'instant', 'pope', 'application', 'throw away', 'rubbish', 'indiscriminate', 'minimal', 'visitor', 'delicious', 'throw away', 'rubbish', 'edge', 'beach']	['beach', 'lombang', 'nice', 'dirty', 'wrap', 'eat', 'instant', 'pope', 'terap', 'throw away', 'rubbish', 'litter', 'minimal', 'unjung', 'tasty', 'throw away', 'rubbish', 'edge', 'beach']

2.4. Support Vector Machine Classification

The last process in this study uses SVM, this process receives 3 classes of data that have been labeled manually. The purpose of SVM is to classify training data in three classes, namely positive, negative, and neutral, from the train data obtained and then tested into testing data and the results can be known through evaluation based on accuracy, precision, recall, and F1 score.

3 Result and Discussion

3.1. System Implementation

The program implementation discusses the design and creation of the analysis system. The process flow that has been designed in the previous chapter is applied at this stage. This process flow includes crawling which works to collect data on Twitter, duplicate filtering, manual labeling, TF-IDF preprocessing for word weighting, Support Vector Machine classification, and finally, model evaluation using a confusion matrix.

3.2. Crawling Process

Crawling is the beginning of making a system for retrieving data on Twitter. The data collected from the crawling process still contains a lot of unclear data such as the presence of hashtags, the same tweet, and other elements. Therefore, cleaning or preprocessing is necessary so that the data collected can be used. Before preprocessing is done, researchers will perform duplicate filtering and manual labeling.

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3.3. Duplicate Filtering

The purpose of the duplicate tweet filtering process is to avoid the same tweet. The program code as follows shows the duplicate filter stage:

```
# delete duplicate
df.drop_duplicates(subset=["tweet"],
inplace=True)

df.to_csv('hasil_duplicate.csv')
df
```

Fig 2. Duplicate Filtering Process

In the above code, remove rows or entries in DataFrame "df" that have duplicates in column "tweet". The "drop_duplicates()" function is used to remove duplicates with the "subset" parameter indicating which columns should be checked for duplicates.

3.4. Data Labelling

This process labels the tweet data that has been subjected to the duplicate filtering process by labeling it according to its sentiment, whether the sentiment is positive, negative, or neutral.

3.5. Application of Preprocessing

Preprocessing is the second process after data collection, which aims to process and clean words. In the preprocessing process, stages are carried out, namely cleansing (removing characters), case folding (changing uppercase letters to small), tokenizing (breaking and cutting words), slang words (for words that are abbreviated/extended into normal words according to KBBI), stopword removal (filtering words in documents), and stemming (removing affix words).

3.6. Application of TF IDF

After preprocessing the next word cleaning process is the word weighting process. TF-IDF word weighting is a process where to convert data into numeric form so that it can be read by machine learning. The TF-IDF object and the weighting results will later appear as the result of the weighted data.

3.7. Application of Support Vector Machine

The Support Vector Machine process aims to classify data whether it belongs to a positive, negative, or neutral class, and see the resulting accuracy. This stage requires the sklearn library for the SVM method.

3.8. Accuracy Results

This stage is a test scenario activity where this activity is to see the results of accuracy, precision, recall, and F1-Score that are appropriate or the most optimal, the following test scenarios are carried out:

1) Scenario 1 Results

In scenario 1, namely testing the C and Gamma parameters in SVM, where the parameter value C = 0.01 gamma = 1 produces an average accuracy, precision, recall, and F1. Where accuracy = 72.222, precision = 33.333, recall = 24.074, F1 Score = 27.956.

2) Scenario 2 Results

In scenario 2, namely testing the C and Gamma parameters in SVM, where the parameter value C = 0.01 gamma = 5 and produces average accuracy, precision, recall, F1. Where accuracy = 72.222, precision = 33.333, recall = 24.074, F1 Score = 27.956. Analysis of the results of this scenario test results in the same accuracy as the scenario above.

3) Scenario 3 Results

In scenario 3, namely testing the parameters C and Gamma in SVM, where the parameter value C = 1 gamma = 0.5 and produces an average accuracy, precision, recall, F1. Where accuracy = 92.592, precision = 33.333, recall = 30.864, F1 Score = 32.051. For most classification is positive with the amount of data 192. While for the average calculation using K-Folding 5 gets the results of Average Precision = 41.666%, Average Recall = 29.702%, Average F-1 Score = 34.320%, and Average Accuracy = 89.107%.

4) Scenario 4 Results

In scenario 4, namely testing the C and Gamma parameters in SVM, where the parameter value C = 5 gamma = 10 and produces average accuracy, precision, recall, F1. Where accuracy = 70.370, precision = 33.333, recall = 23.456, F1 Score = 27.536.

5) Scenario 5 Results

In scenario 5, namely testing the C and Gamma parameters in SVM, where the parameter value C = 10 gamma = 5 produces an average accuracy, precision, recall, and F1. Where accuracy = 74.074, precision = 33.333, recall = 24.691, F1 Score = 28.368.

From the 5 trial scenarios, it can be concluded that the greatest accuracy was obtained in the 3rd experiment with accuracy = 92.592, precision = 33.333, recall = 30.864, F1 Score = 32.051, using parameters C = 1 gamma = 0.5.

3.9. Comparison Results

After conducting 5 experiments using SVM parameters, namely C and Gamma parameters, a comparison will be made of the experiments that have been carried out. The following is a comparison of SVM parameters in the figure below:

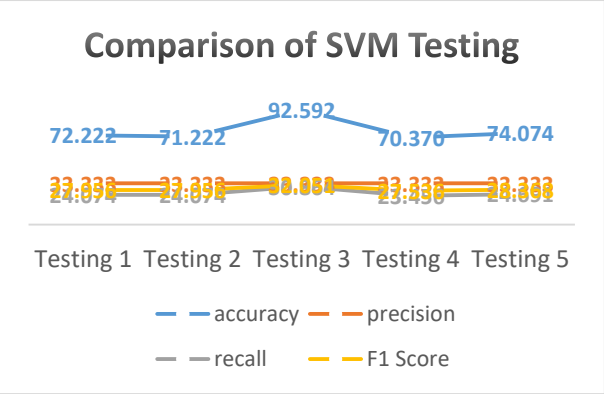

Fig 3. SVM Experiment Comparison Result

Based on the data above, a result is obtained, namely the best value obtained in the third experiment. With accuracy accuracy = 92.592, precision = 33.333, recall = 30.864, F1 Score = 32.051, with the most classification is positive as much as 192 data.

4 Conclusion

Based on the results of research conducted on public opinion on Madura tourism using the support vector machine (SVM) method taken from Twitter with a total of 1814 tweet data. After preprocessing the data used into 270 tweet data using the Support Vector Machine method, in classifying positive, negative and neutral opinions, 5 trials were conducted, with the best trial found in the 3rd trial using parameter C = 1 and gamma 0.5, which resulted in a positive sentiment of 192 tweets. And get an average accuracy value of 92.592% using the Confusion Matrix.

References

1. "World Tourism Organisation," pp. 337-337, 2022, doi 10.18356/9789210558693c228.
2. BPS Jakarta Province, "Jakarta in Figure of the Year 2020," p. 798, 2020, [Online]. Available: https://jakarta.bps.go.id/publication/2020/04/27/20f5a58abcb80a0ad2a88725/provinsi-dki-jakarta-dalam-angka-2020.html.
3. S. Arifin, "Digitalisation of Madura Tourism," J. Komun., vol. 11, no. 1, p. 53, 2017, doi: 10.21107/ilkom.v11i1.2835.
4. D. Qosdus Sabil, "Stigma and Positive Labelling of Madura Tourism," Dialekt. KOMUNIKA J. Kaji. Komun. And Pembang. Drh., vol. 10, no. 1, pp. 64-67, 2022, doi: https://doi.org/10.335956/dk.v10i1.2305.
5. S. Rizkia, E. Budi Setiawan, and D. Puspandari, "Sentiment Analysis of Customer Satisfaction towards Internet Provider Indihome on Twitter Using Decision Tree Method and TF-IDF Weighting," e-Proceeding Eng., vol. 6, no. August, pp. 9683-9693, 2019.
6. J. Zhou, Y. Lu, H.-N. Dai, H. Wang, and H. Xiao, "Sentiment Analysis of Chinese Microblog Based on Stacked Bidirectional LSTM," IEEE Access, vol. 7, pp. 38856-38866, 2019, doi: 10.1109/ACCESS.2019.2905048.
7. D. P. M. Artanti, "Syukur A Prihandono A and Setiadi DRIM, 2018 Sentiment Analysis for Online Shopping Site Service Assessment Using Naıve Bayes Algorithm," Nas. Sist. Inf, pp. 8-9, 2018.
8. R. Tineges, A. Triayudi, and I. D. Sholihati, "Sentiment Analysis on Indihome Services Based on Twitter with Support Vector Machine (SVM) Classification Method," J. Media Inform. Budidarma, vol. 4, no. 3, p. 650, 2020, doi: 10.30865/mib.v4i3.2181.
9. I. P. Monika and M. T. Furqon, "Application of Support Vector Machine (SVM) Method on Classification of Child Growth and Development Deviations," J. Pengemb. Technol. Inf. and Comput. Science, vol. 2, no. 10, pp. 3165-3166, 2018, [Online]. Available: http://j-ptiik.ub.ac.id.
10. I. Indriati, M. Marji, and S. Pakpahan, "Sentiment Analysis of Football Club Performance Opinions on Twitter Documents Using Support Vector Machine with Non-Refined Word Repair," J. Pengemb. Technol. Inf. and Comput. Science, vol. 3, no. 7, pp. 7259-7267, 2019.
11. D. S. Utami and A. Erfina, "Sentiment Analysis of Online Loans on Twitter Using Support Vector Machine (SVM) Algorithm," SISMATIK (Seminar Nas. Sist. Inf. and Manaj. Inform., vol. 1, no. 1, pp. 299-305, 2021.
12. M. Riefky and W. Pramesti, "Sentiment Analysis of Southeast Asian Games (SEA Games) in the Philippines 2019 Based on Opinion of Internet Users of Social Media Twitter with K-Nearest Neighbor and Support Vector Machine," J. Mat. Stat. and Computation, vol. 17, no. 1, pp. 26-41, 2020, doi: 10.20956/jmsk.v17i1.9947.
13. P. Arsi and R. Waluyo, "Sentiment Analysis of the Discourse on the Relocation of the Indonesian Capital City Using the Support Vector Machine (SVM) Algorithm," J. Technol. Inf. and Comput. Science, vol. 8, no. 1, p. 147, 2021, doi: 10.25126/jtiik.0813944.
14. I. G. Hendrayana, D. G. H. Divayana, and M. W. A. Kesiman, "Comparison of Svm, K-Nn and Nbc Methods on Sentiment Analysis," J. Indonesia. Manaj. Inform. and Commun., vol. 4, no. 1, pp. 191-198, 2023, doi: 10.35870/jimik.v4i1.157.
15. Y. W. Syaifudin and R. A. Irawan, "Implementation of Clustering and Sentiment Analysis of Twitter Data on Beach Tourism Opinions Using the K-Means Method," J. Inform. Polinema, vol. 4, no. 3, p. 189, 2018, doi: 10.33795/jip.v4i3.205.
16. M. Z. Subarkah, M. Hilda, and E. Zukhronah, "Sentiment Analysis of Tourist Attraction Reviews on Online Travel Agency Data in Yogyakarta Using IndoBERTweet Fine Tuning Neural Network Model," Semin. Nas. Off. Stat., vol.

2022, no. 1, pp. 543-552, 2022, doi: 10.34123/semnasoffstat.v2022i1.1246.

17. Y. A. Singgalen, "Sentiment Analysis of Visitors to Komodo Island and Rinca Island on Tripadvisor Website Based on CRISP-DM," J. Inf. Syst. Res., vol. 4, no. 2, pp. 614-625, 2023, doi: 10.47065/josh.v4i2.2999.
18. M. R. Adrian, M. P. Putra, M. H. Rafialdy, and N. A. Rakhmawati, "Comparison of Random Forest and SVM Classification Methods on PSBB Sentiment Analysis," J. Inform. Upgris, vol. 7, no. 1, pp. 36-40, 2021, doi: 10.26877/jiu.v7i1.7099.
19. Y. T. Pratama, F. A. Bachtiar, and N. Y. Setiawan, "Sentiment Analysis of Customer Opinions on Tourism Aspects of South Malang Beach Using TF-IDF and Support Vector Machine," J. Pengemb. Technol. Inf. and Comput. Univ. Brawijaya, vol. 2, no. 12, pp. 6244-6252, 2018.
20. D. Siswanto, Z. Zamzami, L. Nijal, and S. Rajab, "Analysis of Public Sentiment Regarding the Indonesian Economy During the Covid-19 Pandemic on Twitter Using K-NN and SVM Classification Methods," J. Pus. Access Review. Technol. Artif. Intell., vol. 2, no. 1, pp. 1-9, 2022.
21. M. A. F. Umi Rofiqoh1, Rizal Setya Perdana2, and Program, "Sentiment Analysis of User Satisfaction Level of Indonesian Mobile Telecommunication Service Providers on Twitter with Support Vector Machine Method and Lexicon Based Features Twitter event detection View project Human Detection and Tracking View project," J. Pengemb. Technol. Inf. and Comput. Science, vol. 1(12), no. October, pp. 1725-1732, 2017.
22. R. H. Anggia, Jondri, and K. M. L, "Prediction of Retweets Based on Content Similarity and Content-Based Features Using the Support Vector Machine (SVM) Method," vol. 8, no. 5, pp. 11164-11173, 2021.
23. L. Ardiani, H. Sujaini, and T. Tursina, "Implementation of Sentiment Analysis of Public Responses to Development in Pontianak City," J. Sist. and Technol. Inf., vol. 8, no. 2, p. 183, 2020, doi: 10.26418/Justin.v8i2.36776.
24. Adhitya Karel Maulaya and Junadhi, "Sentiment Analysis Using Support Vector Machine of Indonesian People on Twitter Regarding Bjorka," J. CoSciTech (Computer Sci. Inf. Technol., vol. 3, no. 3, pp. 495-500, 2022, doi: 10.37859/coscitech.v3i3.4358.
25. H. Tuhuteru and A. Iriani, "Sentiment Analysis of Ambon Branch State Electricity Company Using Support Vector Machine and Naive Bayes Classifier Methods," J. Inform. J. Pengemb. IT, vol. 3, no. 3, pp. 394-401, 2018, doi: 10.30591/jpit.v3i3.977.
26. W. Setyobudi, A. Alwi, and I. P. Astuti, "Publishing Scientific Article of Students of Muhammadiyah Ponorogo University Sentiment Analysis of Twitter on The Organisation of Gojek Traveloka Liga 1 Indonesia," 2018.
27. J. Gaussian, "3 1,2,3," vol. 9, pp. 376-390, 2020.
28. M. I. Fikri, T. S. Sabrila, and Y. Azhar, "Comparison of Naïve Bayes and Support Vector Machine Methods on Twitter Sentiment Analysis," Smatika J., vol. 10, no. 02, pp. 71-76, 2020, doi: 10.32664/smatika.v10i02.455.
29. D. Y. Pratama, P. S. Informatika, F. Communication, D. A. N. Informatika, and U. M. Surakarta, "Implementation of Sentiment Analysis Using Naïve Bayes," 2020.