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APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) FOR HIJAB BUSINESS IN MOJOKERTO USING SENTIMENT ANALYSIS METHOD NATURAL LANGUAGE PROCESSING (NLP)

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ABSTRACT

Artificial Intelligence (AI) is an activity aimed at making machines intelligent. AI has been applied in various fields in the 4.0 digital era, including business and industry. As a country with Muslim majority, the hijab business is a promising business. The development of promotional aspects is also diverse, begin from manual promotions using brochures to the using social media and e-commerce marketing. AI can also be used to find out which hijab products are most in demand using the sentiment analysis method. Sentiment analysis data is obtained from reviews or comments of buyers or users of hijab products. Of course, the data form is text data. To process text data, grouping or labeling the comments into positive and negative comments. Then, the labeled data set is processed using machine learning that special for sentiment analysis, namely Natural Language Processing (NLP). NLP is a field of computer science which is a branch of artificial intelligence and language (linguistics) that deals with interactions between computers and human natural language. The hijab brand sample taken from social media is a brand that has been verified as an official brand. For example, Elzatta, Rabbani, and Zoya. The social media used as the data source comes from Instagram and the e-commerce is taken from Shopee. The accuracy of the NLP model is 96% with two classes, namely positive sentiment and negative sentiment. The results obtained can be recommended to hijab business entrepreneurs in Mojokerto City. The benefits of this research can be felt by entrepreneurs to determine the hijab brand that is most in demand by residents of Mojokerto City.

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1. INTRODUCTION

In the industrial era 4.0 in the fields of industry/manufacturing, economics, education and services about Artificial Intelligence (AI) has been widely used. This is due to the development of the marketplace business which has increased significantly [1]. In addition, the demands for innovation must adapt to existing developments, so that the current innovation process makes conventional technology obsolete. The existence of Artificial Intelligence (AI) is expected to improve technological performance in the evolution of industry 4.0 [2].

Artificial Intelligence (AI) is an activity aimed at making machines intelligent. Technically, artificial intelligence is an integration process between cloud computing, network devices, robots, computers, and digital content production in various business processes [3]. A study from the MIT Sloan Management Review explained that more than 80% of organizations see AI as a strategy and opportunity in achieving competitive advantage, so many organizations are investing in using AI technology [4], so AI technology allows computers to be involved. active in human decision-making, because AI is increasingly being used in business practices [5]. The use of social media in supporting the use of AI technology makes it easier for business people to become the target market [6].

The role of AI in the business is very large, it can be seen from the use of AI technology in various business fields such as medicine, cars, games, agriculture, sports equipment, property, clothing and so on, so that it can accelerate business growth and increase revenue [7]. Chairman of the Artificial Intelligence Industry Research and Innovation Collaboration (KORIKA) Hammam Riza stated that the launch of the AI Stranas document for 2020-2045 on August 10, 2020 signified that Indonesia had entered the world of

digital competition, so the need for an AI technology platform is to be able to optimize all potentials in realizing vision of Indonesia Gold in 2045 [8].

One of the business opportunities that are never deserted by current enthusiasts is the fashion business, because the fashion business is always growing and never dies. In addition, fashion is also part of a lifestyle, so that the rapid development and rotation of trends can become consumer confidence in shopping for fashion online, such as the hijab fashion trend for Muslim women which is packaged in a modern and trendy look that is suitable for hijab women who still look full. style [9]

In Mojokerto at this time there are also many stores that sell hijab using online marketing, with the many social media and e-commerce application services that can make it easier for people who want to access the latest hijab models, such as Instagram, Facebook, Twitter, Shopee, Lazada, Bukalapak and so on, so that the public does not need to worry about missing the hijab model because of the ease of mobile application services at this time [10]. One of the data on social media or e-commerce applications is the comment column. These comments can be used as a basis for evaluating a product. The method that can be used for the analysis of a sentence is sentiment analysis. Sentiment analysis is a method developed in the field of linguistics and computer science that automatically determines the sentiments contained in the text [11]. Sentiments can be characterized as positive or negative evaluations expressed through sentences. This sentence can certainly be seen from the reviews posted online on a product which in this case is the hijab.

The problem that occurs is that the use of AI technology in several Hijab products in Mojokerto is still not optimal even though social media already exists and e-commerce services have been widely used. In previous research conducted by [12] explained that the relevance of AI technology in sports activities, where AI can analyze and strategize how to play in sports that can be implemented on the field starting from the acquisition of scores, player movements, and fan habits can be easily predicted. by AI technology. Research conducted by (Lubis, 2021) states that AI technology in an integrated manufacturing system can provide many benefits such as obtaining optimal performance results, with fast processing times, and maximum results. For example, the Airbus company that creates thousands of component designs just by entering certain numbers into the computer, it can reduce the time Autodesk designers have to test new designs. While research conducted by [13] shows that the application of AI technology with the Simple Reflect Agent approach is a good approach because it can be used as an information medium that functions as a tourist attraction helpdesk, so that it can assist visitors in finding information. So, it can be seen that AI technology can provide many benefits for every business sector.

2. LITERATURE REVIEW

Artificial Intelligence

One of the drivers of the development of industry 4.0 in the world today includes AI (Artificial Intelligence), 5G (Fifth Generation), IoT (Internet of Things), Serverless Computing, Biometrics, AR / VR, Blockchain, Robotics, and so on. [14]. In several countries, the application of AI has almost reached 50%, especially in the industrial sector. There are several factors that can influence AI, such as leadership, management, analytical and systematic thinking skills, corporate culture, initiative, and entrepreneurship [15]. AI is basically a machine operated by humans, AI can understand human language commands, recognize a person's face, and the most sophisticated AI can operate production machines within the company. [13].

The big opportunity for AI in business is that it can make it easier for companies to understand and recognize consumers, because AI can present consumers with a different charm and motivate consumers to buy the products offered, so that marketers can interact with consumers to be able to build experiences for consumers. [16]. This is because the demands for selling products in business today have developed due to the shift in the practice of buying and selling goods or services from traditional markets to online stores, so companies need tools that make it easier to sell [17]. Therefore AI with all its underlying aspects can support increasing needs, so that it can also help companies improve their business [18].

Natural Language Processing

Advances in information technology require companies to be able to make new breakthroughs in selling their products in order to increase market competition. It is assumed that the use of the marketplace can support information technology systems in marketing products [19]. On the marketplace, buyers can search for goods in many people's stores. From the E-Commerce map data released by iPrice, it shows that Shopee had the most visitors in Indonesia in the first quarter of 2020 of 71 million visitors, this condition is used by sellers to reach potential buyers [20]. Apart from marketplaces, social media can also be used to

support product marketing, where the majority of consumers visit Instagram to buy the products they want on social media [21].

Reviews on marketing communication tools have a role for consumers in deciding purchases, where these tools can be used in identifying and evaluating needed products, as well as assisting manufacturers in developing their business. Review analysis can be done by looking at the stars and the contents of comments to find out the full intent of the review, and if you have a lot of reviews, it will be faster to use the sentiment analysis system [22]. The use of Natural Language Processing (NLP) is carried out in order to maximize performance in sentiment analysis, because Natural Language Processing (NLP) can be applied to the market in predicting product categories or sub-categories from product titles [20]

3. METHOD

The research method describes the steps taken in designing sentiment analysis based on opinions, reviews or comments from social media and e-commerce hijab brands. The data processing uses the spyder application version 3.6 in the python programming language. The data analysis technique uses sentiment analysis by labeling opinions, reviews or comments as positive or negative comments. Then a model was built using the Natural Language Processing (NLP) method so that an artificial intelligence system was realized to be used as a system for drawing conclusions about the hijab business recommendation in Mojokerto. The steps or research flow are described in Figure 3.1 below.

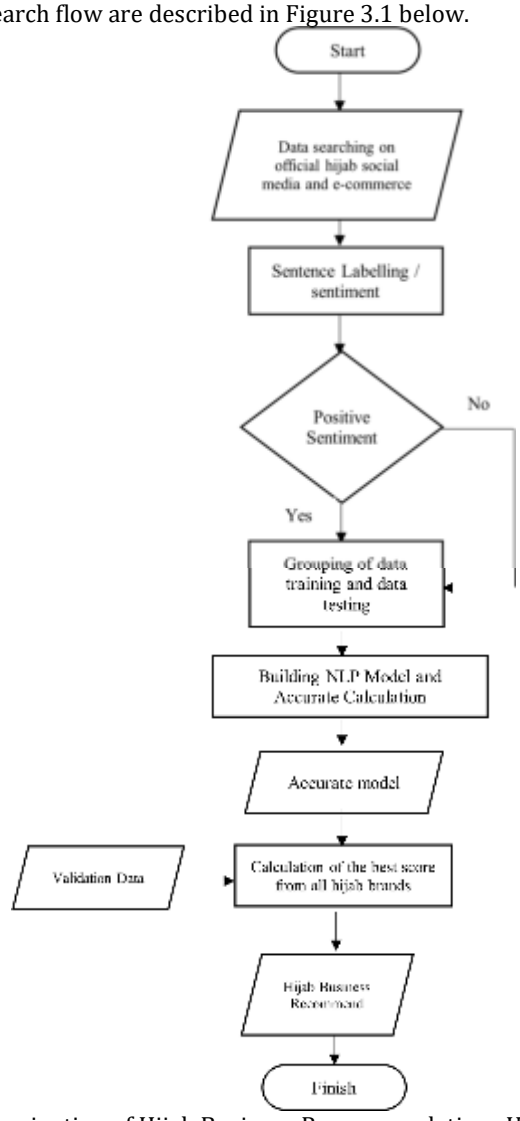

Figure 1. Flow chart Determination of Hijab Business Recommendations Using Artificial Intelligence

Sentiment analysis is a method for analyzing some data to determine human emotions. Sentiment analysis can be categorized into three tasks, namely informative text detection, information extraction and sentiment interestingness classification (emotional, polarity identification). Sentiment classification (negative or positive) is used to predict sentiment polarity based on sentiment data from users [23]. Textual sentiment analysis has been widely used, its use is not limited to the area of scientific research but also for business marketing and technology needs [24].

Artificial Intelligence built using machine learning with initial data in the form of text data. The text data in question are reviews, responses, ratings from consumers on the hijab brand under study. The data can be searched from the comment column either on Instagram social media or e-commerce from each hijab brand.

The machine learning method used to read sentiment is Natural Language Processing. Natural Language Processing (NLP) is a combination of computer science and the field of artificial intelligence related to linguistics. NLP is concerned with how machines understand human language to interact with each other. With NLP, computers can learn and understand human language, so computers can communicate with humans. Human language is unique because it is made specifically to convey a meaning. To make a computer able to understand human language is a difficult task, because human language has a complex structure. On the other hand, each language is unique and may have multiple meanings [25]. For example, it can be seen from the following sentence, "Look at the dog with one eye", where the sentence can have the meaning of "seeing the dog with one eye" or "seeing the dog with one eye".

The two main techniques for understanding NLP are syntactic analysis and semantic analysis. Both techniques are used to verify the structure of the language. Syntactic analysis refers to grammar, while semantic analysis refers to the interpretation of a sentence. Syntactic analysis is a technique of arranging a sentence so that the sentence has the correct grammar. Syntactic analysis involves determining sentence structures such as subject, predicate, noun, verb, pronoun, and so on. The system will be able to read the input sentences, which will be broken down into words, and in the end produce a structured description. This technique can be used to simplify sentences to make it easier to find information. In addition, the use of syntactic analysis can also help detect the presence of new or unusual words or sentences.

Semantic analysis is a technique used to understand the meaning and interpretation of language structures. A person can understand the words of others based on intuition and knowledge of the language itself. Computers do not have this kind of intuition and knowledge, so they need another method, namely semantics. Semantics is an important process because the expected semantic output is the meaning contained in an input.

4. RESULT AND DISCUSSION

Data

The data is sought from social media Instagram and e-commerce Shopee from each hijab brand that will be researched or recommended. The hijab brands in question are Elzatta, Rabbani and Zoya. The following is the search for data or Instagram social media accounts from each brand as shown in Figure 3-5 and from the Shopee e-commerce account in Figure 6-8.

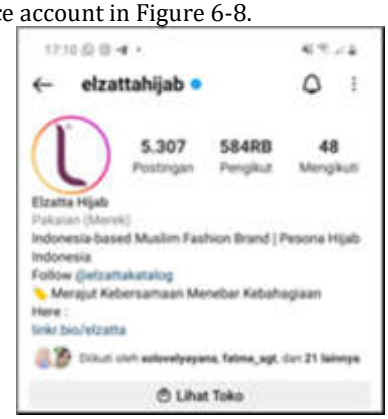

Figure 2 Instagram Account of Elzatta

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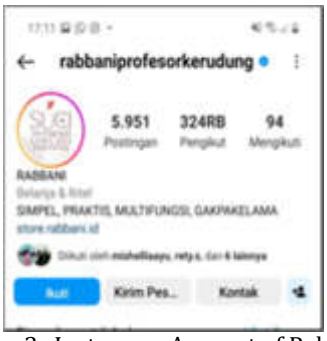

Figure 3. Instagram Account of Rabbani

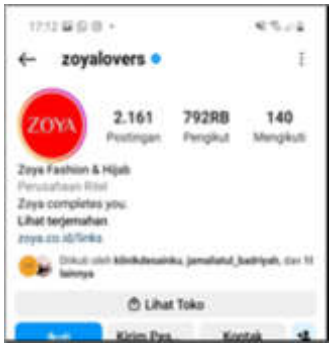

Figure 4. Instagram Account of Zoya

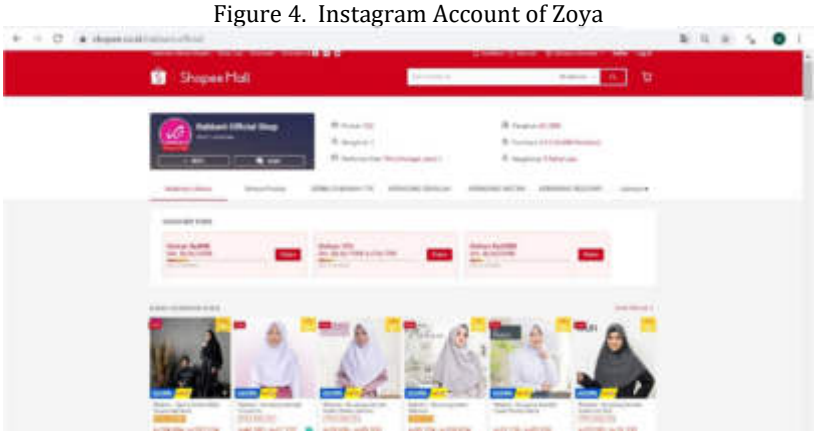

Figure 5. E-commerce account Shopee of Rabbani

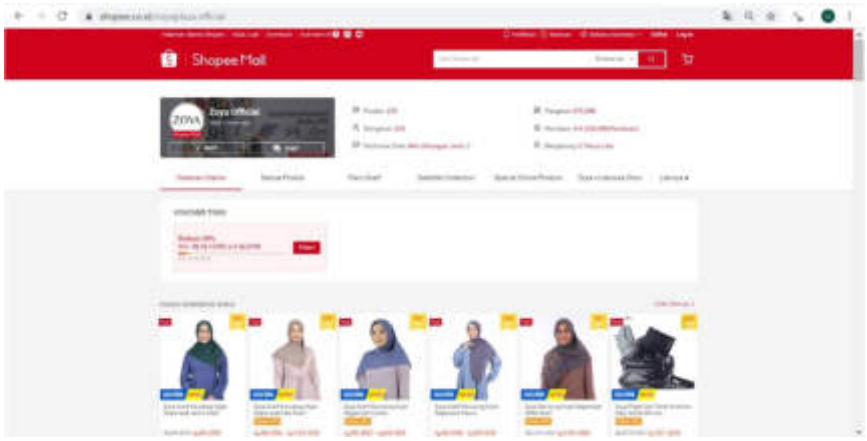

Figure 6. E-commerce account Shopee of Zoya

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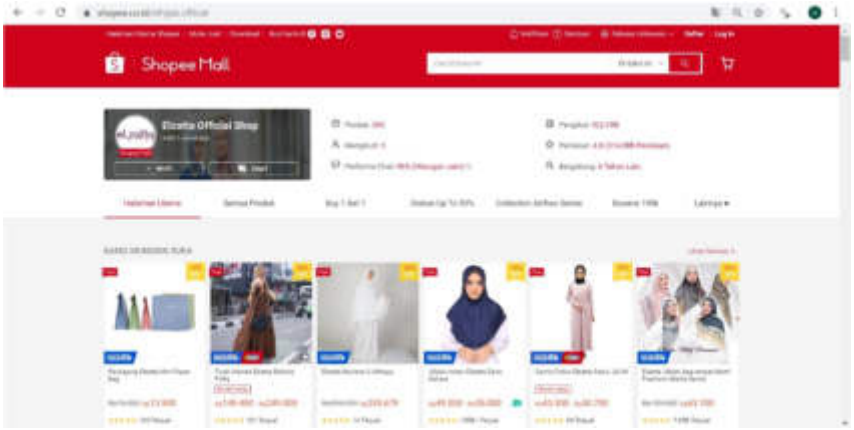

Figure 7 E-commerce account Shopee of Elzatta

Data Labelling

At this stage the researcher collects data from the comment column both on Instagram and E-commerce shopee. The comments data are labeled with positive sentiment or negative sentiment to be used as model development data. An example for the Elzatta hijab product, comments with positive sentiments are presented in Figure 4.7 while negative sentiments are presented in Figure 4.8

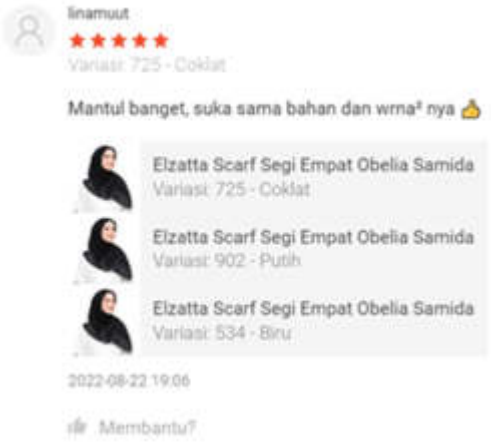

Figure 8. Example of Positive Sentiment of Elzatta

Figure 9. Example of Negative Sentiment of Elzatta

The total dataset is 120 data, consisting of 60 data from Shopee and 60 data from Instagram with more positive posts than negative comments. Additional data is taken from IndoNLU [26] so that vocabulary about positive and negative sentiments is more varied.

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Data Processing

The stages in data processing start from the pre-processing of data, model development and evaluation. The pre-processing stage of data (data preprocessing) is carried out by simplifying sentences such as removing emoticons, redundant punctuation marks and deleting empty data (missing values). Then the data is divided into training data and testing data with portions (80 training and 20 testing) with 5 epochs. The model development stage uses the Natural Language Processing method using training data. The next stage of evaluation uses data testing to calculate the accuracy or performance of the model. To guess the positive class or negative class and show the accuracy of the model, the method used is a confusion matrix. The confusion matrix is a tool for predictive analysis In machine learning. In order to check the performance of a classification based machine learning model, the confusion matrix is deployed. The illustration of the confusion matrix can be seen in Figure 4.9

		Predicted Class: Positive	Predicted Class: Negative	
Actual Class	Positive	True Positive (TP)	False Negative (FN) **Type II Error**	**Sensitivity** $\frac{TP}{(TP+FN)}$
	Negative	False Positive (FP) **Type I Error**	True Negative (TN)	**Specificity** $\frac{TN}{(TN+FP)}$
		Precision $\frac{TP}{(TP+FP)}$	**Negative Predictive Value** $\frac{TN}{(TN+FN)}$	**Accuracy** $\frac{TP+TN}{(TP+TN+FP+FN)}$

Figure 10 Confusion Matrix

The result is that the accuracy of the model reaches 96% from the 5th epoch (Figure 12) and is tested for 3 sentiments or comments that are able to guess correctly illustrated in Figure 4.10

Figure 11. Accurate Model NLP Hijab Business in Mojokerto City

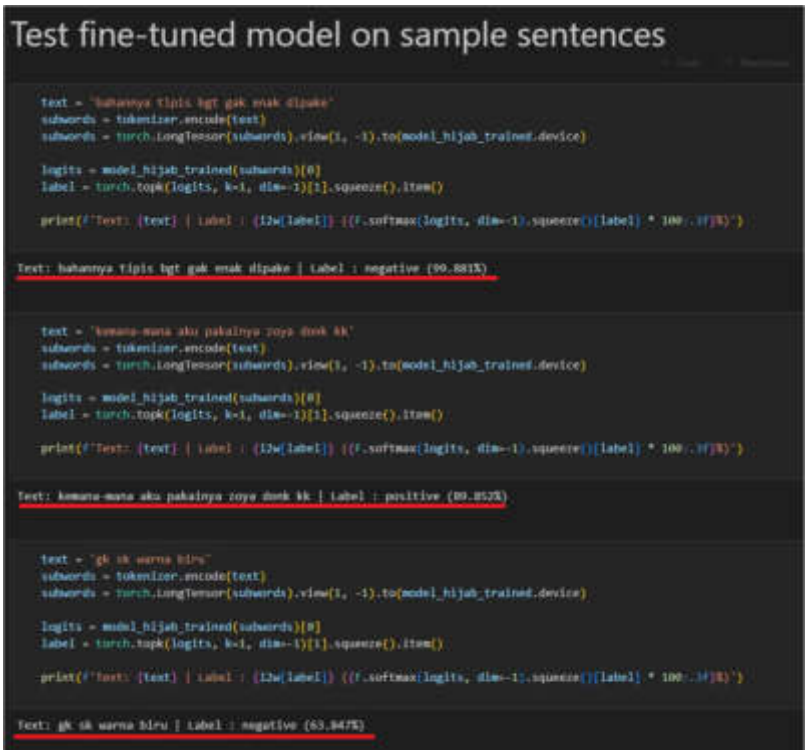

Figure 12 Tested for 3 sentiments

5. CONCLUSION

The finished NLP model with 96% accuracy can be an Artificial Intelligence system for hijab business recommendations in Mojokerto City. The recommendations are in the form of how many positive and negative comments obtained from social media or e-commerce are tested in a certain period for the hijab brands elzatta, zoya and Rabbani. Brands that received more positive comments during the research period can be considered for the next business brand.

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