

1. Introduction

In the era of rapid development of social media the role of recommendation systems is needed, the recommendation system acts as a system that provides advice or recommendations to users based on user preferences for certain items in order to make it easier for users to choose an item [1]. Recommendation systems have been implemented on various types of platforms such as, Netflix, Disney+, Youtube, e-Commerce, Twitter (X), and many other platforms. The recommendation system will be generated by adjusting based on several factors from users such as, preferences, past behavior, item characteristics, and social interactions [2][3]. In this study, we will implement a movie recommendation system which is the process of providing advice or recommendations to users regarding films that may match their preferences, interests, or audience history, to be able to generate recommendations by obtaining metadata information from user history in order to find similarities between films and produce a personalized recommendation for users [2]. To get user history information in this study using Twitter which can generate large amounts of data every day that is real-time so that it can be used to implement a movie recommendation system [4].

This recommendation system is to generate rating predictions that have been given a previous rating by certain users for certain items, the application of a movie recommendation system can improve the quality, constraints, and credibility of the system [5]. There are several techniques in implementing recommendation systems including Content-Based Filtering (CBF), Collaborative Filtering (CF), and Hybrid Approach. The method applied in this research is to produce CBF recommendations. CBF works by analyzing user preferences and behavior that can produce personalized recommendations to users based on the similarity value of an attribute, the CBF method can produce more accurate recommendations than CF, especially if users are limited or when recommended items have clear and identifiable features [1][3].

CBF in this research is applied with Term Frequency - Inverse Document Frequency (TF-IDF) which acts to generate weights on words by measuring how important a word is, words that have high weights are considered more important and relevant [6]. This research also applies the use of word embedding to present interactions between users and movie items to understand the content of movie plots from one another [7]. The word embedding method applied, Bidirectional Encoder Representations from transformers (BERT), Generative Pretrained Transformer 2 (GPT-2), Robustly Optimized BERT Pretraining Approach (RoBERTa), which applies the transformer architecture is a deep learning model that uses a self-attention mechanism to take into account the relationship between each element in the data sequence [8] in natural language processing, the four methods will be compared to be able to find the best algorithm in generating recommendations and also apply the use of classification for rating prediction results produced by these methods.

The classification method applied in this research with deep learning is the Recurrent Neural Network (RNN) model which has an important role in the process of calculating sequential data such as text, which has the ability to remember information from previous data and use it to predict the next class label in the sequence [9]. RNN is also capable of identifying flow patterns in the data used to provide recommendation results that are more tailored to user preferences [10].

In previous research [11] was conducted to develop a CBF recommendation system that predicts movie popularity and estimates audience interest in each age group, which applies the use of machine learning techniques such as TF-IDF, CNN, and SVM. The evaluation results of the study showed that the system successfully outperformed the basic model and achieved an accuracy of 87.5% in predicting movie popularity, and achieved an accuracy of 80% in predicting the target audience of the movie [11].

In other studies that apply the use of word embedding in research [12][13][14], research [13] applies the use of GPT-2 as a development of a conversation recommendation system framework that considers items and conversation context for recommendations, which results in an F1-Score evaluation value of 0.68 and Recall 0.63 [13]. In research [12] applied the use of BERT to develop a semantic-based

research literature and researcher recommendation system using a semi-supervised approach by utilizing the BERT and LDA models, to overcome the problem of information overload that hinders researchers in finding previous studies that are relevant or in accordance with the interests of researchers only. Based on the results of this study, it has shown better performance than other basic models [12]. In research [14] uses RoBERTa as the development of a new approach to produce document embedding using a combination of RoBERTa and Sentence-BERT (SBERT), which utilizes RoBERTa's ability to produce semantic richer and more accurate document embedding. This research successfully shows that RoBERTa assessment in MULTI-BERT approach is able to produce better document embedding for recommendation systems [14].

Other research that applies the use of (Recurrent Neural Network) RNN is research [4], which produces a movie recommendation system that uses RNN as sentiment analysis of multilingual tweets obtained from the Twitter API. Resulting in an evaluation metric of 91.67% accuracy, 92% precision, 90.2% recall, and 90.98% f-Measures [4].

The main contribution of this research is to apply several semantic feature methods as a comparison in order to find the best semantic method in generating CBF-based recommendation systems. The CBF method applied to generate recommendations, TF-IDF, and the application of word embedding BERT, GPT-2, RoBERTa, and apply the use of RNN models as classification and apply SGD optimization. RNN will produce results in the form of a label whether a movie is recommended or not, and measure the evaluation with confusion metric with accuracy, precision, recall, F1-Score. My motivation to apply these methods is because throughout the search that has been done, I have not found research that applies comparisons with the use of these methods in producing recommendation systems, and applies the classification process by applying the RNN model from the predicted rating results generated by the four semantic feature methods.

Based on the research I have done, I managed to improve the accuracy of the previous research, namely research [13], from the method I applied the GPT-2 method and I applied the use of classification with the RNN model I managed to improve the results of the F1-Score evaluation value of 89.46% and Recall 96.12%. In the application of the RNN model that I applied also resulted in a higher confusion matrix value than in research [4]. This research also managed to improve the accuracy results that can be seen in the TABLE by applying the use of word embedding can improve the accuracy in prediction ratings from research [11] which applies the use of TF-IDF, SVM and CNN. Since TF-IDF has the disadvantage of considering the context and relationship between words, it is limited in strengthening the vector representation of movies [2].

For further explanation related to this research will be presented in section 2 Research Method which will discuss the flow chart of the recommendation system that will be applied and about the explanation of the method that will be applied. In section 3 Result and Discussion will discuss the results that have been applied in this study. Section IV Conclusion which will summarize all the research results that have been applied.