

News Recommendation System Using Collaborative Filtering Method

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News recommendation system using collaborative filtering method

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Abstract. In the era of Internet of Things (IoT), various facts, news, and up-to-date information are presented online that can be accessed quickly, anytime, and anywhere. However, sometimes the news which displayed is not up-to-date or not in accordance with the interests of the reader. This study aims to build a system that can recommend the latest news, which is most often accessed, and that is in accordance with the interests of the reader. The method that used in this study is Collaborative Filtering (CF) to rank news as the best recommendation for readers. Based on the results of experiments conducted on 19 examples of news, the percentage of accuracy results of the recommendations was around 84.2% compared to the manual calculation. This shows that CF capable to provide news recommendations good enough.

1. Introduction

In the digital era like today, the growth of digital content is increasing and growing every day. Digital items and even social media are growing rapidly. This makes the user deal with many choices, which directly or indirectly, forces the user to choose the item [1].

Collaborative Filtering Approach (CF) is one of the techniques for building hospitals by utilizing information from user interactions with an item such as purchase on e-commerce or rating on content distribution applications [2,3].

Collaborative filtering is the process of filtering or evaluating items using other people's opinions [4]. According to the theory and its use Schafer divides collaborative filtering algorithms into two different classes, namely by using probabilistic and non-probabilistic algorithms [5,6].

The rating model in the recommendation system based on collaborative filtering has two forms, namely user-based and item-based. User-based assumes that a good way to find items that are of interest to users is by looking for other users who have the same interests based on the similarity of users and then each rating value from the closest user will be used as recommendations for other users who are active while item-based more between items that are liked by users and correlate with other users [7,8].

2. Methodology

Collaborative filtering (item-based) is the process of filtering or evaluating items using other people's opinions by using adjusted cosine similarity which is used to calculate the similarity value between items.



2.1. Collaborative filtering

Collaborative filtering is the process of filtering or evaluating items using the opinions of others [4]. In the process the Collaborative filtering method performs filtering of data based on the behaviour of user characteristics so that it can provide new information to other users because the system provides information based on the pattern of one user group that is almost the same. Collaborative filtering that illustrated in Figure 1.

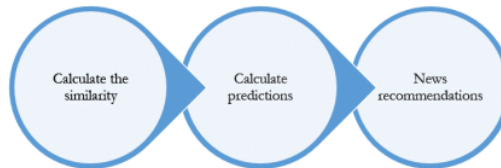


Figure 1. Collaborative filtering.

2.2. Cosine similarity

Cosine-based Similarity is the best way to calculate the similarity of two users. The most frequently used way to calculate predictive user ratings for item i is by calculating the average rating of other users [9].

3. Result and discussion

3.1. Analysis of collaborative filtering with cosine similarity

Similarity:

$$Sim(i,j) = \frac{\sum_{ue} u(Ru.i - \bar{x})(Ru.j - \bar{x})}{\sqrt{\sum_{ue} u(Ru.i - \bar{x})^2} \sqrt{\sum_{ue} u(Ru.j - \bar{x})^2}} \quad (1)$$

Prediction:

$$P(u,j) = \frac{\sum_{ie} I(Ru.i \times Si,j)}{\sum_{ie} I|Si,j|} \quad (2)$$

3.2. Data analysis

The news data / news that is read is rated as a scale between 1-5 by the user who given the rating.

Table 1. Rating scenario.

User	News						\bar{x}
	A	B	C	D	E	F	
U1	-	5	4	3	-	-	4
U2	-	-	3	2	4	1	2.5
U3	-	3	-	-	-	3	3
U4	4	-	-	1	-	-	2.5
U5	-	2	2	4	-	5	3.25
U6	-	5	-	4	-	-	4.5

U1-U6 : Users who have given ratings
 A-F : News that has been read and rated by the user

3.3. Experiment result

The experiment is conducted using 19 news.

Table 2. Similarity news.

News 1	News 2	Similarity
A	B	0.00
A	C	0.00
A	D	-1.00
A	E	0.00
A	F	0.00
B	C	0.78
B	D	-0.96
B	E	0.00
B	F	-1.00
C	D	-0.66
C	E	1.00
C	F	-0.95
D	E	-1.00
D	F	0.99
E	F	-1.00

Data after obtaining similarity values are then calculated predictive values to provide news recommendations for other users.

Table 3. Similarity news.

User	News	Prediction
1	A	-3.00
1	E	0.33
1	F	-1.50
2	A	-2.00
2	B	-0.06
3	A	0.00
3	C	-0.14
3	D	0.04
3	E	-1.00
4	B	-0.34
4	C	-0.30
4	E	-0.33
4	F	0.25
5	A	0.40
5	E	-2.33
6	A	-4.00
6	C	0.37
6	E	-1.33
6	F	-0.75

In table 3, the prediction value is obtained, user 1 gets E news recommendation, user 4 gets F news recommendation, 6 user gets C news recommendation.

4. Conclusion

Provide recommendations in accordance with what is expected and with predetermined variables. News recommendations to users who describe rating values on each news. Correct accuracy value in this study that is equal to 84.2% taken from 19 prediction output data and then has an error value of 15.8% taken from 19 output data that is less precise with manual values.

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