Mathematical Modeling and Algorithm Application
ISSN: 3006-0842 | Vol. 2, No. 2, 2024

Clothing matching recommendation based on coordinated filtering algorithm

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Abstract: With the growing national economy, the living standards and conditions are constantly improving, and everyone's requirements for dress are also constantly improving. For some ordinary people who are usually busy with work or study, it is troublesome to choose and match clothes with fashion sense and conform to the current weather in a short time Aiming at how users can arrange their clothes when going out more reasonably according to the weather conditions and individualized clothes, we have developed this weather-based clothing recommendation matching system In this paper, a coordinated filtering algorithm is proposed for clothing matching recommendation. Firstly, the similarity of two clothing combinations is calculated, then the user's interest in candidate clothing combinations is estimated, and finally the user's interest in candidate clothing combinations is estimated to give suggestions so as to achieve the purpose of recommendation

Keywords: Coordinated filtering; Clothing matching recommendation.

1. Purpose and Significance of The Work

Weather-based clothing matching[0] Recommendation system for the user to provide the next week's weather forecast, and according to the forecast weather and the user's existing clothing to dress with, as well as displaying the next 6 hours of accurate temperature data for the user to provide more accurate weather information to facilitate the user in the pre-travel to their own attire adjustments, the daily user can be based on their own that day to the system recommended dress with the comfort feedback, the system will be based on the user's feedback Based on the user's feedback, the system will adjust the warmth coefficient of the user's attire accordingly, and form an individualized and precise recommendation on the user's attire through multiple feedbacks and adjustments. Let the user have a certain dress warmth coefficient at the same time to maximize the display of the user's dress sense of beauty.

2. Sources of the Problem

With the popularization of the network people can more convenient and fast access to all kinds of information, including the weather forecast is one of the main information we will pay attention to every time before going out, many people will go out according to the weather to decide what to wear, however, at present, the common weather forecast apps or software can not directly recommend to the user to wear suitable clothing or fuzzy recommendation to the user to wear which type of clothing, can not be individualized and accurate matching recommendations. Individualized and precise matching recommendation, at this time, the ordinary weather forecast recommended to wear has not been able to fully meet the user on the information and recommendation of the precise requirements, now users need more accurate weather forecast information and individualized and accurate dress with recommendations. Everyone's physique has differences, generalized dress recommendation can easily cause some users to dress inappropriately, causing diseases in the season of large temperature difference, affecting the user's daily life and work.

3. Technical Features

The main functions of this system: displaying weather information for the next five days; displaying the weather temperature in the next six hours; storing clothing data in the user's personal checkroom; recommending travel attire according to the weather forecast information and the user's clothing data; and receiving the user's daily feedback on the warmth coefficient of the clothing to make individualized adjustments.

The dataset used for this project is Weather Big Data[2][3][4] . Meteorological data is a typical class of big data, characterized by large data volume, high timeliness, and rich data variety. A large amount of data in meteorological data is spatio-temporal data, which records the observed or simulated quantities of various physical quantities at various points in time and space, and the amount of data generated every day is often in the scale of tens of terabytes to hundreds of terabytes, and is growing explosively.

Meteorological data acquisition: urban meteorological data via url; url:

https://www.tianqiapi.com/api?version=v1&appid=21375891&appsecret=fTYv7v5E&city=#{cityname}.

In this system, when the user does not upload information about his/her clothes in the checkroom, the system will not make recommendations for the user, but it will provide the user with small suggestions for his/her daily life based on the current weather conditions, so we can discard the user feedback situation in this case. When the user starts to use the system, we choose to set the feedback option next to the recommendation results, and to make it more user-friendly, we set up four feedback options. When the user gives feedback, the system goes home and processes the user's feedback and transfers it to the user's information, and when the recommendation for the current weather appears again, the system avoids unwanted clothing combinations for the user. Therefore, we use a coordinated filtering algorithm to recommend better results for the user after feedback to improve the practical function of this system and make it more convenient for the user.

The basic idea of collaborative filtering algorithm based on clothing matching combinations:

If a user likes the matching combination wear1, and the clothing combination wear1 is similar to the clothing combination wear2, then the user is likely to like the clothing combination wear2. taking this system as an example, suppose a user likes the matching combination of casual style, however, the matching combination belonging to the sports style, the matching combination of casual style and the matching combination of sportswear have the same degree of similarity, then the user is likely to like the sports style, so the system will recommend the sports style to the user's front home page intelligent recommendation page, and will also intelligently push the similarity of almost the same degree of clothing combinations.

Approximate steps of collaborative filtering algorithm based on clothing matching combinations:

Step 1: Calculate the similarity of the two clothing combinations.

Disregard the degree of liking like(user,item), the specific formula is shown in equation (1-1).

$$\mathrm{sim}(i_1, i_2) = \frac{|v|}{\sqrt{|w_1| \cdot |w_2|}} \tag{1-1}$$

Consider the degree of liking like(user,item), the specific formula is shown in equation (1-2).

$$\mathrm{sim}(i_1, i_2) = \frac{\sum_{v \in V} \mathrm{like}(v, i_1) \cdot (v, i_2)}{\sqrt{\sum_{u_1 \epsilon w_1} \mathrm{like}^2(u_1, i_1)} \cdot \sqrt{\sum_{u_2 \epsilon w_2} \mathrm{like}^2(u_2, i_2)}} \tag{1-2}$$

The users who like clothing combination i1 are denoted as the set W_1 , and the members who like clothing combination i2 are denoted as the set W_2 ,and the intersection set V=W1∩W2 is defined, where v, w_1 , w_2 are the specific values, v denotes the number of users who like both clothing combination i1 and i2, w_1 denotes the number of users who only like clothing combination i1, and w_2 denotes the number of users who only like clothing combination i2, and each combination is considered as a sparse vector, and each element in the sparse vector corresponds to a member. Considering each clothing combination as a sparse vector, each element in the sparse vector corresponds to one member, and the similarity sim is the cosine of the angle between the two vectors. The similarity sim is the cosine of the angle between the two vectors. The value of sim(i1,i2) between 0 and 1 (0 means no similarity, 1 means the same similarity) indicates the similarity of the two clothing combinations.

Step 2: Estimate the user's interest in the candidate clothing combinations, the specific formula is shown in equation (1-3).

$$\sum_j like(user, item_j) * sim(item_j, item) \tag{1-3}$$

like(user,item) represents the user's liking for the clothing combination, which is a specific value. It is assumed that the user's interest in clothing combinations and the similarity between clothing combinations are shown in Figure 1.

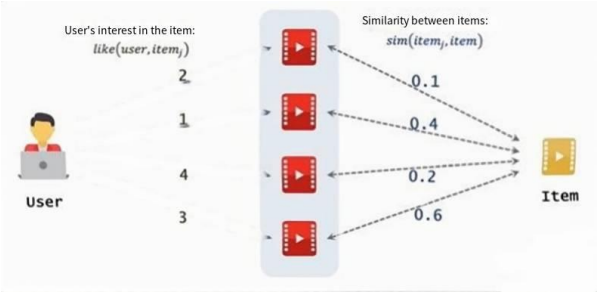

Figure 1 Graph of user interest in clothing combinations and similarity between clothing combinations

Step 3: Estimated user interest in candidate clothing combinations is computed.

Since the similarity has been given in picture 1, there is no need to calculate the similarity by formula (1-1) or formula (1-2), and the interest of clothing combinations is directly calculated by formula (1-3):

$$2 \times 0.1 + 1 \times 0.4 + 4 \times 0.2 + 3 \times 0.6 = 3.2$$

Implementation of Collaborative Filtering Algorithm for this Clothing Matching Recommendation System

Step 1: First get the user id in the session by request and use the toString method to convert it to a String type that can be easily viewed.

Step 2: Collect user feedback on the recommended results and clothing combinations through the list collection return, that is, the user's favorite clothing combinations to filter out, the system is directly through the type of clothing combinations to determine the similarity of the two clothing combinations, and does not need to be similarity calculation through the above formula.

Step 3: Use the for enhancement loop to de-emphasize the user-selected combination types, and re-save and sort the de-emphasized combination types.

Step 4: Query the list corresponding to the clothing combinations selected by the user, and display all the clothing combinations in the list on the front-end home page of the intelligent recommendation page. If the number of recommended clothing combinations is insufficient, the system will prioritize the recommendation of the most suitable combinations of clothing, so as to prevent the user from getting better recommendation results.

Step 5: The testimonials are displayed on the front page.

4. Sysrem Implementation

4.1. Login screen of the system

The weather data of this system is connected and crawled from the weather API and imported into the system page through data preprocessing, while the page is built according to layui framework and Vue framework, the login interface of this system is shown in Fig. 2:

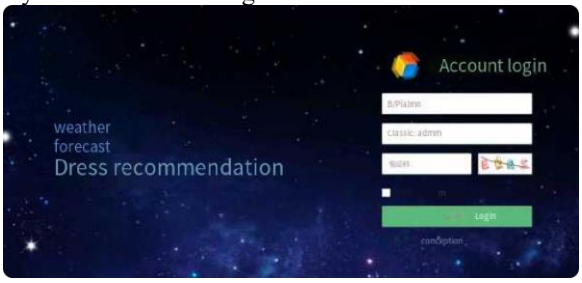

Figure 2 Login interface

When entering the home page from the login screen, we can directly see the weather conditions and the maximum and

minimum temperatures for today and the next five days, and the system will also make some small suggestions through today's weather and temperature conditions, as shown in Figures 3 and 4:

Figure 3 Weather data interface test

Figure 4 Weather data display test

From the figure, we can see that the system crawls the weather data for processing and analyzing, and displays the weather information for the next five days, and shows in detail the weather conditions and temperature of each time period today, and proposes a life index suggestion, which can provide users with a better basis for their clothes wearing.

4.2. Clothing matching recommendation function test interface

(1) Users need to add clothes information in My Cloakroom, which includes the name, color, type, applicable season, thickness and clothes photos. And the clothing information can be displayed through the print function, as shown in Figs. 5, 6:

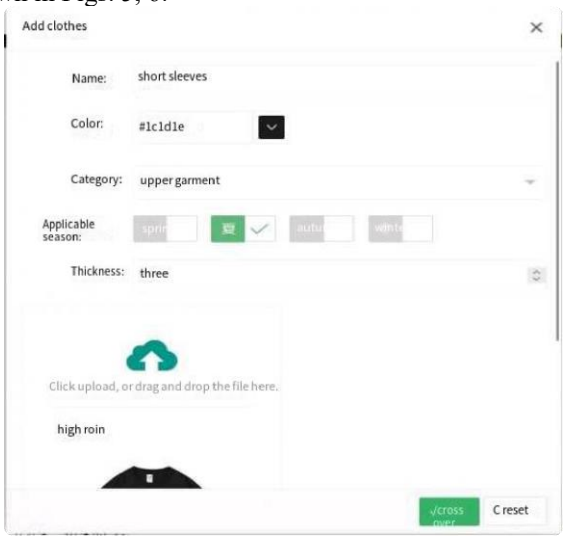

Figure 5 Upload clothes interface test

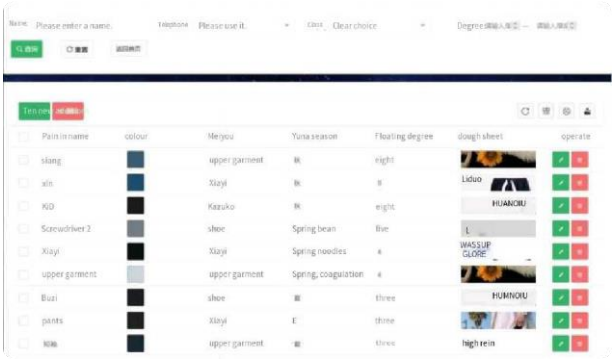

Figure 6 Cloakroom display test

From the figure we can see that the page will show the information of the clothes for the user can better choose the clothes suitable for the current temperature, the user experience has a more intuitive feeling.

(2) After uploading clothes in my checkroom, the system will perform a series of calculations based on the current weather conditions and temperature to derive the thickness coefficient space and applicable seasons, and dress recommendation, the user can give feedback based on the recommended results, in order to be more humanized, we have added four feedback options in the feedback. As shown in Figure 7:

Figure 7 Recommended Interface Test

We can see from the figure that the system does not only recommend a set of ways to wear, it will be calculated to give the user more options to wear, and the results can be fed back in order to get a more effective recommendation service experience later.

5. Summary

Nowadays, people have been in a data-driven era, everyone's life is data-driven, flight information, taxi information, medical information, courier information and so on are all data-driven, even individuals are data-driven. Facing the diverse choices of clothing matching recommendation, the infiltration of big data is extremely important. For this project, we have promoted and improved and optimized the research of clothing matching recommendation based on meteorological big data. However, due to time and other factors, there are still many ideas and work that can be prospected, so nowadays the following aspects will be studied:

(1) In order to meet the user for different weather conditions of clothing with the recommended, can further meet the user for the personalized demand for clothing, that is, for the style and color of the clothes for the user to tailor the clothing collocation.[5][6]

(2) Since the clothing of this project needs to be added by the users themselves, in order to meet more needs and intentions of the users, we can crawl some clothing wear data on the Internet to improve the clothing recommendation

system.[7][8][9]

(3) In order to meet the modern needs of the current users, you can add some AI technology to the project that can be carried out for the user to try on, that is, by uploading a personal full body photo image of the plane of the clothing will be embedded in order to observe the effect of the user's personal try on.

Acknowledgements

The authors gratefully acknowledge the financial support from Innovation and Entrepreneurship Training Program of Wuhan Business University (202311654193), Ministry of Education Industry-University Cooperative Education Project (220905181091456)

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