

What to Wear in Different Situations? A Content-based Recommendation System for Fashion Coordination

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ABSTRACT

This paper presents a solution of what people should wear in different situations by using the content-based method. There is a selection problem everyday for many people about what to wear and how to coordinate their own clothes. In this system, it provides a user two options in image of their clothes matching including hat, shirt, pants, shoes and so on. The system uses persistent user profiles and get to know user's preferences, which can automatically suggests current season clothes by user's schedule. Basically, schedules providing us the situation information such as meeting, dinner, holiday and so forth that the system uses to generate the appropriate dress coordination. An experiment with several human subjects indicates that this recommendation system in the way of help decision making on clothes is promising.

Author Keywords

Content-based recommendation system, fashion coordination, user preference.

1. INTRODUCTION

For some people, selecting what kind of clothes to wear is sometimes difficult by everyday's different occasions. Indeed, we have to attend different social activities like meeting, work, party, ceremony and so on. While many people having a selection problem about remembering clothes they have and coordinate them properly. There are several common questions come to our mind, such as "What should I wear?", "Which tie match my suit for the interview?" and "Do I look attractive in my dress?" In our daily life social activities, a person's clothes showed his/her respect to other people. We proposed a system can store users' clothes information and select style matched clothes for them every day, so that users do not need to spend time on making decision about what to wear for the right situation. Recent years, there are many popular applications on different platforms focus on fashion coordination area which showed the numerous interests by users especially female users. On the other hand, these applications are only for entertainments which do not provide users available clothes coordination for their daily use automatically. This system can automatically coordinate users' clothes and suggest two options both including hat, shirt, pants shoes and accessories based on the situation users needed. We used content-based recommendation method that suggests fashion items based on season, situation, user profile and preference. Since the main target audiences is female user, we conducted an experiment with 10 Asian females to test their satisfaction of the system.

2. FASHION RECOMMENDATION SYSTEM

Content-based recommendation systems analyze item descriptions to identify items that are of particular interest to the user [1]. This system suggests two different options of clothes coordination images at the same time based on user's fashion database they uploaded. These databases divided into four seasons currently like the weather in Japan and China. When the system gives suggestions, it first find the data on season and shows them by four parts from top to bottom of the body that are hat, shirt, pants, and shoes. These parts are flexible for users to put other fashion items such as hair accessory to the hat category. Besides, female users may have a certain amount of one-piece dress; in this case the system would only show three parts of the coordination (Fig.1). There are several situation categories available such as formal, casual and formal (Fig.2 and 3). A user can also select their favorite fashion items from the current item list. It provides users a digital wardrobe that can manage their fashion items together and get a clear image of what they have.

3. SYSTEM DESCRIPTION

This fashion coordination recommendation system makes suggestions based on the content of the fashion items. Each of them is described by users own opinion that added to the comment area when user upload a new fashion item image. It contains key words such as color, material, patterns and so on. The system suggests new fashion item first since a user just bought it and it is on trend. We designed this system mainly for female users, so there are several aspects we considered on building this system. They are user's needs, user's preference, user's relationship, user input, item layout and recommendation output.

3.1 USER NEEDS

There are certain amount of female users have the problem of selecting things such as what to wear for the day. It is user's needs to create this system for providing suggestions and control the items they have. We found from our survey that over 50% of Japanese female have the question of what kind of clothes to wear. The survey conducted in Hokkaido University with 20 female students aged from 23 to 28 years old.

3.2 USER'S PREFERENCE

What kind of clothes user likes to wear is a personal issue, so that analyze what user's likes is one of the most key issue for the system. The system generates coordination base on user's favorite item, user's schedule, and user's previous coordination.

3.3 USER'S RELATIONSHIP

In this system, it maintains long-term relationship with the user and access to persistent user profiles. The user has to spend more effort in order to get more accurate recommendations. Moreover, the system has a relationship with a user to know their nationality, age, occupation, gender, e-mail address and so on. However, it does not have very deep relationship with the user to know user's marital status, bank account, and so forth.

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Fashion Coordination System

The screenshot shows the 'Fashion Coordination System' interface. At the top left, there is a 'LOG IN' section with a user profile: 'LOGGED IN: WELCOME', 'NAME: zhaoying', and a 'Signout' button. Below this is a 'SEASON' section with 'DATE: 2011-06-30', 'SEASON: Summer', and 'OCCASION: 宴会' (Party).

The main content area is divided into two sections: 'First Suggestion' and 'Second Suggestion'. The 'First Suggestion' row contains three items: a 'gold bold hair band', a 'silk pink onepiece', and 'silky pink sandle'. The 'Second Suggestion' row contains four items: a 'green necklace', a 'blue T', a 'transparent black long skirt', and 'blue and brown sandle'.

Figure 1. Example of a coordination suggestion for a female user on the situation of party in summer

3.4 USER INPUT

Every suggestion making based on the user input. In this system, the main input type is explicit type which includes the name, season, type, brand, occasion, and free comment of fashion items. Since implicit inputs are naturally noisy because they are inferred from user behavior and are thus not suitable for critical or expert domains which need explainable recommendations [2].

3.5 ITEM LAYOUT

The system is not only suggesting user what to wear, but helping user to categorize their fashion items. Fig. 4 is the example of checking shoes by a user. Besides, since Web shopping is familiar with a lot of female users, the system layout is similar to a Web store which makes user easy to adapt.

The screenshot shows the 'Fashion Coordination System' interface for a casual summer look. The 'SEASON' section shows 'DATE: 2011-06-30', 'SEASON: Summer', and 'OCCASION: 宴会' (Party).

The main content area is divided into two sections: 'First Suggestion' and 'Second Suggestion'. The 'First Suggestion' row contains three items: a 'brown wide hat', a 'blue denim one piece', and 'brown sandle'. The 'Second Suggestion' row contains four items: a 'gold cross necklace', a 'white tattoo shirt', 'leopard leggings', and 'black cool sandel'.

Figure 2. Example of a coordination suggestion for a female user on the situation of casual in summer.

3.6 RECOMMENDATION OUTPUT

The system suggests two lines of fashion items. And it shows them directly and clearly. The layout designed similar to a Web store because it is straightforward for a user and easy to operate. An accurate output is a very important part in establishing trust between a user and the system. Moreover, the suggestions output speed is within 3 seconds so that users do not need to wait for long time.

4. RECOMMENDATION PROCEDURE

The system uses user profiles and the recommendation engine to give suggestions. A user profile describes the interests of a given user, while the recommendation engine is the computational method that computes the predictions of how much interest a given item will be to a particular user. The computation performed by the recommendation engine employs the user profiles stored in the system [3]. The user first has to register in to the system, at this step, detailed personal information needed. Next, the user can upload their fashion item images one by one and describe their color, style, occasion, function, season and so on. Thirdly, the user has to input the schedule in order to generate the suitable clothes. Fourthly, when the user goes back to the top page, the two options of clothes coordination would be shown. Besides, the user can directly select situations from top page without input of user's schedule. If the user does not satisfied by the suggestions, he/she can directly go to the favorite list and choose their favorite item. The persistent user profile includes user's personal interests and preferences inferred from user inputs accumulated over time.

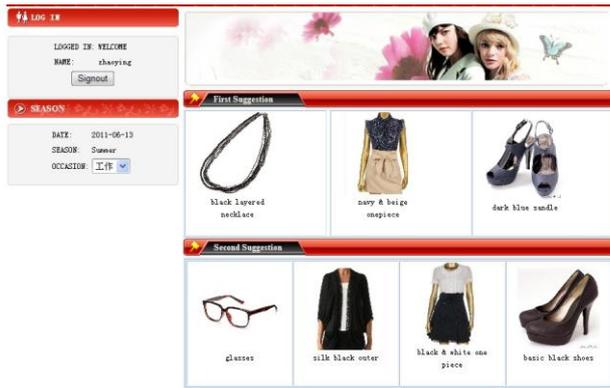


Figure 3. Example of a coordination suggestion for a female user on the situation of formal in summer.

5. EXPERIMENT

The experiment conducted in Sapporo with 10 female participants. There are 7 Japanese, 2 Chinese and 1 Korean female as shown in Table 1. It was an offline experiment and we asked subjects to use the system in a controlled environment, and they reported their experience afterwards. The users prepared their own fashion item images and start the experiment by register to the system. Most of the female users feel comfortable with the system and easy to use. They liked the function of viewing all their clothes images, especially the coordination images lined together give them a clear image of the final effect. 8 out of 10 users think the system is useful and need to be developed. There is a user think the system is better to be used with Internet shopping that coordinate users' clothes with online clothes. The number of users and their number of their clothes database shows in Table1, and it also shows the ratings from 10 female users. The average rate is 7.6 that shows most of them are satisfied with this system.

6. CONCLUSION

In this paper, we proposed a fashion coordination system to help users save their time and get a new way to coordinate their

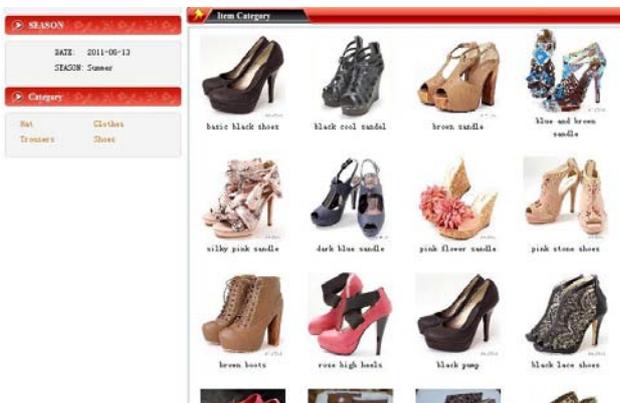


Figure 4. The category of shoes for user to check all items in four seasons

Table 1. Female users' rating and amount of clothes database.

Users	Database and Ratings			
	Nationality	Age	Number of items	Rating(10)
A	Japanese	26	65	8
B	Japanese	25	80	7
C	Japanese	26	70	9
D	Japanese	29	90	8
E	Japanese	35	85	7
F	Japanese	32	70	7
G	Japanese	23	95	8
H	Chinese	28	90	6
I	Chinese	31	80	8
J	Korean	27	70	8

clothes based on the schedule. The experiment also shows the system is valuable to be developed in the next step. The original idea of this system is having color and style matching functions to give users professional recommendations which act like a personal stylist. Moreover, we like to use web mining method to gain the latest fashion trend by learning the user style and color preference.

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