

감정과 날씨 정보에 따른 의상 추천 시스템

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Clothing-Recommendation system based on emotion and weather information

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Abstract

Nowadays recommendation systems are so ubiquitous, where our many decisions are being done by the means of them. We can see recommendation systems in all areas of our daily life. Therefore the research of this sphere is still so active. So far many research papers were published for clothing recommendations as well. In this paper, we propose the clothing-recommendation system according to user emotion and weather information. We used social media to analyze users' 6 basic emotions according to Paul Eckman theory and match the colour of clothing. Moreover, getting weather information using visualcrossing.com API to predict the kind of clothing. For sentiment analysis, we used Emotion Lexicon that was created by using Mechanical Turk. And matching the emotion and colour was done by applying Hayashi's Quantification Method III.

1. Introduction

As the digital era evolving, human life is becoming more convenient and easier in terms of manual work. And even sometimes making decisions and selections are being done by artificial systems than humans. Especially, whenever we buy something, recommendation systems come to help us make more accurate and proper decisions or purchases. The Fashion field is also inclusive in terms of automated and personalized recommendation systems. Many giant and popular companies like Adidas, Nike, Louis Vuitton and

others have already applied automated recommendation models to their online shops. This attracts more customers with its high-level recommendations and meanwhile brings more benefits to a fashion company itself.

But so far, huge efforts and research were done by many people behind the scene. In each platform, different approaches were applied. Some of them focus on an item, while others may pay more attention to the user itself. And certainly, the outer factors are also as important as user and item. For example, the weather information is one

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of the leading factors which may highly affect while choosing clothes to wear. For this reason, we take this property for our clothing-recommendation approach. Apart from this, we also used user comments on social media to analyze emotion and tried to match it with the specific colour.

Section 2 discusses some background subjects related to this research; Section 3 discusses the proposed method and describes the work in greater depth; Section 4 concludes with a proposal for the performance.

2. Related work

This proposal is an intersection of various domains. We tried to analyze human emotions according to the comments posted on social media. And in terms of emotion, we referred to Paul Eckman theory. In his study, it was revealed that human nature contains 6 basic types of emotions. There are anger, disgust, fear, happiness, sadness and surprise. Even though, afterwards, other researchers found that there are far more basic emotions than previously believed[1].

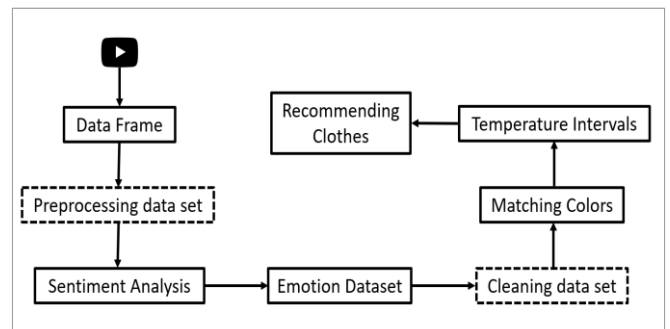
The relationship between basic emotions and colours is also a hot topic around the research world. Social Science researchers made concerted efforts to describe this hidden connection for humanity. Many research papers study the effect of colour on emotion. Even some colours have been found to increase a person's arousal[2]. In our approach, we used Hayashi's Quantification Method III[3][4] which matches the emotions to colours.

For sentiment analysis, we actively used the method which was introduced by Saif M. Mohammad and Peter D. Turney[5]. They did a great experiment to create Emotion Lexicon. First, they created word choice problems automatically using the Macquarie Thesaurus[6]. They first checked the annotators are they familiar with the target word(correct answer). They gave them the synonym of the target word and another 3 words that were not related. Then they gave them two multiple-choice questions that represent the level of the negativeness or positiveness of the target word. The final 8 questions were directly related to 8 different emotions. More precisely, it contained joy, sadness, fear, anger, trust, disgust, surprise and anticipation. So the annotator was given 11 multiple-choice questions in a row. The annotators were hired by the Mechanical Turk platform which is provided by Amazon.com, Inc. It is a service where a large amount of human annotation can be obtained in an efficient and inexpensive manner. Each annotator got the

specific amount of money per HITs(Human Intelligence Tasks) or simply for answering the 11 questions. As a result, a totally of 2081 target terms were tested by approximately 1000 annotators. Clothing by temperature was provided by the site[7].

3. Design of clothing-recommendation system

Figure 1 is an architecture of the recommendation system proposed in this paper.



<Figure 1> Architecture of the recommendation

In our experiment, we used the R programming language as a tool to analyze, preprocess and recommend clothes. As an environment, we used the R studio to run our code.

Moreover, we used YouTube to collect comments from different random users. In Developer Platform from YouTube, we got an access key and tokens to legally collect comments and posts. We selected the most popular tags to scrape from posts. According to that tags, our automated web-scraper accessed YouTube and collected comments from different users. After several minutes we gathered more than 19,000 rows of the data frame which contains 12 columns. Each row represents different comments from users in text format. And each column shows us the attributes of that comment. To make it easy, we preprocessed the original data set by removing unnecessary rows and columns. We only maintained the columns which contain the user ID, comment text and created time.

As we mentioned above we used the prebuilt Emotion Lexicon. And in the R library, there is a function that analyses the given text by applying the NRC sentiment dictionary. It returns 10 attributes for each text. 8 attributes represent different types of emotion including the 6 basic emotions which we need and 2 attributes tell us about the level of texts in terms of positiveness and negativeness. After we got this data set we

merged time and user ID information to it. In our experiment, we removed any text(row) which contains more than two types of emotions. This step helps us to recommend a more specific colour of clothing. Because each emotion has its respective colour. So if the type of emotion exceeds our limit it may give us strange results. Once this process has been finished we moved to the next part where colour-matching needed to be done. We removed emotion columns from the data frame to keep it small and accurate. Because in this step we had already matched the proper colours for each user according to their emotions.

After all, we moved to handle weather information in our data set. According to the date, we got the information from visualcrossing.com. From there we used their API to obtain a very explicit data set that contains weather information for each date which we needed. According to the degree of temperature, we divided it into 8 distinct intervals. More precisely we convert our continuous data to discrete one. The reason why we divided it in such a manner, that we had the 8 kinds of clothing which can be recommended. Figure 2 represents that kind of clothing.

27° C~	sleeveless, shorts, one-piece dress
23° C~26° C	Short-sleeved and thin shirt, long-sleeved shorts, cotton pants.
20° C~22° C	Long sleeves, cardigan, hoodie, cotton pants, slacks, skinny jeans.
17° C~19° C	Knitwear, cardigan, hoodie, sweatshirt, jeans, cotton pants.
12° C~16° C	Jacket, shirt, cardigan, bomber jacket, skin-coloured stockings.
10° C~11° C	Trench coats, bomber jackets, wearing many layers.
6° C~9° C	Coat, leather jacket.
-5° C	Winter clothes, chilly weather goods

<Figure 2> Outfit by temperature

The recommendation was given to a user contains the colour and type of clothing according to Figure 2.

The final recommendation for each user is represented in Figure 3.

AuthorDisplayName	Comment	UpdatedAt	color1	color2	temp	temp_in	rec_cloth
João Pedro Santos	Perisic's handball wasn't a penalty? And this team have amazing run and comes against France in the final and loses by 4 goals. I think there is no one saying a word for	7/15/2018	black	brown	27.666667		1 sleeveless, shorts, one-piece dress
Shadow Ghost	1:44 African uprising against French	10/6/2021	black	purple	-7.111111		8 Winter clothes, cold weather goods
Zahid Kossain	Bravo les bleu je vous souhaite l'Underserved for "France"... Croatia the true champions. Never a	9/25/2018	black	brown	16.944444		5 Jacket, shirt, cardigan, bomber jacket, skin colored stockings
Slapski	Congrats France. Greetings from England. Wish we played you guys in the final. I know France would have	9/22/2018	yellow	orange	20.833333		3 Long sleeves, cardigan, hoodie, cotton pants, slacks, skinny jeans
Mathieu Urbinatti	Finally I got the second opportunity to see France handing trophies. I am	9/22/2018	purple	yellow	20.833333		3 Long sleeves, cardigan, hoodie, cotton pants, slacks, skinny jeans
Marshall Brennan	As- RR. Heck of a surprise DE- KR. The unexpected BE- JP. Great comeback PT- ES. No retreat	9/14/2018	brown	yellow	23.222222		2 Short-sleeved and thin shirt, long-sleeved shorts, cotton pants
mujibur rahman	France will pay!!! What a bad destiny for croatia in the final, croatia played and france	8/23/2018	black	purple	29.333333		1 sleeveless, shorts, one-piece dress
D 1993	I am still watching this cause i am	8/23/2018	yellow		29.333333		1 sleeveless, shorts, one-piece dress

<Figure 3> The final result

In figure 3 above, the user “João Pedro Santos” has commented as “Perisic's handball wasn't a penalty?”. And after analysis, this comment was given two types of colour which are black and brown. In the time when the comment was posted the average temperature was probably 27° C. That is why the type of clothing is sleeveless, shorts, one-piece dress. Another user whose AuthorDisplayName is “D 1993” posted a positive comment and yellow and orange were predicted. The temperature was approximately 16° C cool. Therefore Long sleeves, cardigan, hoodie, cotton pants, slacks, skinny jeans were recommended. “Slapski” has commented as “1:44 African uprising against French Colonies - colorized”. And colours were predicted as black and brown. According to 17° C temperature knitwear, cardigan, hoodie, sweatshirt, jeans, cotton pants were suggested.

4. Conclusion

In our proposal, we used social media comments to analyze the emotion of the user and match it with colour. Then we got the weather information from the website and give proper clothing to a user including its colour.

In the future, we will try to add image classification methods to detect the colour from the fashion image data set.

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