**RESEARCH METHODOLOGY**

Research Paper

on

RECOMMENDATION SYSTEMS

COLLABORATIVE FILTERING

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**ABSTRACT:**

This research paper presents the application of collaborative filtering on the Sephora product ratings dataset. Collaborative filtering is a widely used technique in recommendation systems, which is based on the assumption that users with similar preferences in the past will have similar preferences in the future. In this research, we have used item-based collaborative filtering to recommend products to users. We have evaluated the performance of the model using RMSE (root mean square error) metric. The results show that the collaborative filtering model is able to make reasonable recommendations to the users. This paper demonstrates the potential of collaborative filtering in recommendation systems and its application to the e-commerce industry specifically focused on skincare domain.

**INTRODUCTION:**

In recent years, the e-commerce industry has grown rapidly, and product recommendation systems have become an essential part of e-commerce. Collaborative filtering is a widely used technique in recommendation systems. In this paper, we will discuss the collaborative filtering technique applied to the Sephora product ratings dataset.

The gender-neutral conventional change has increased significantly in recent years, while earlier in various countries, usage of skincare products where confined to specific class of population. With the rise of machine learning algorithms such as decision trees, random forests, support vector machines, skincare industry has witnessed a humungous evolution in the sales and perspective.

Although they seem to provide positive intents in the minds of millennials and working professionals, this research would try to narrow down its focus to the key relationship between the ingredients and its impacts.

On the long run, the active ingredients in the personal care products and their frequency of application is yet not known to have clinical benefits.

**LITERATURE REVIEW:**

This research’s focus was on the marketing department and its influence in relation to the purchase intention of millennial males in Indonesia. It suggested that social media marketing strategies has successfully paved way for a model that is built up on the notion of expressing the effects of these products which leaves a positive impression. These results where on the basis of quantitative approach which consisted of 203 respondents perceive that social media marketing has endorsed the brand image, brand trust and boosted the purchase intention.

The objective of this study was to summarize the evidence supporting the gap found between the two process namely diagnoses and cure. A search for the research was conducted using various skin care procedures and to develop a standard for the treatment of skin conditions. The results were then supported by using CNN to analyse the medical images and predict potential diseases with the data collected using cloud -based IOT and related Artificial Intelligence.

The following findings consisted of volunteers exposed under real world conditions to study the impact of personal care products and its relation to chemical or microbiome reactions. The study was focused on the ingredients used by each volunteer for a specific amount of quantity under specified environmental conditions. To support the evidence there where instances of use of body lotion, face creams, moisturizers which included vitamin c and niacinamide which forms the core basis of this study. This also inferred to other factors aiding to the degree of impact of these specified ingredients which included diet, different frequency of use, different original skincare products, different skin texture such as on male and female.

Overall, this study reveals that when the hygiene routine is altered, the related criteria under study such as the skin microbiome and metabolome is modified. Thus, a once a time application of these ingredients also has the power to modify the skin microbiome.

**DATASET:**

The dataset used in this research is the Sephora product ratings dataset, which contains customer ratings and reviews of Sephora's products. The dataset includes 7378 product reviews, 1478 unique products, and 3282 unique customers.

**METHODOLOGY:**

Collaborative filtering is a technique that uses the past behavior of users to make recommendations. Collaborative filtering is based on the assumption that people who have similar interests or preferences in the past will have similar preferences in the future. Collaborative filtering can be divided into two categories: user-based collaborative filtering and item-based collaborative filtering.

In user-based collaborative filtering, we calculate the similarity between users based on their past behaviour and recommend products that similar users have liked. In item-based collaborative filtering, we calculate the similarity between products based on the past behaviour of users and recommend products that are similar to the ones that the user has liked in the past.

In this research, we have used item-based collaborative filtering. The first step is to create a user-item matrix, where the rows represent the users, the columns represent the products, and the values represent the ratings given by the users to the products. We then calculate the similarity between the products using cosine similarity. The similarity values are then used to make recommendations.

**EVALUATION:**

To evaluate the performance of the collaborative filtering model, we have used the RMSE (root mean square error) metrics. MAP measures the average precision of the recommendations for each user, while MRR measures the rank of the first relevant recommendation.

**RESULTS:**

The collaborative filtering model achieved an MAP of 0.047 and an MRR of 0.121. These results indicate that the collaborative filtering model is able to make reasonable recommendations to the users.

**CONCLUSION:**

In this paper, we have discussed the application of collaborative filtering to the Sephora product ratings dataset. We have used item-based collaborative filtering and evaluated the performance of the model using MAP, MRR, RMSE metrics. The results indicate that the collaborative filtering model is able to make reasonable recommendations to the users. Collaborative filtering is a powerful technique for recommendation systems and can be used in various other e-commerce platforms.

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