

## ABSTRAK

Banyaknya variasi produk skincare di pasaran menyebabkan konsumen mengalami kesulitan dalam menentukan produk yang sesuai dengan kebutuhan kulitnya. Kesalahan dalam pemilihan produk skincare dapat menimbulkan berbagai dampak negatif, seperti iritasi hingga kerusakan kulit. Ulasan pengguna yang bersifat subjektif, deskriptif, dan multibahasa juga menyulitkan proses analisis secara objektif. Penelitian ini mengembangkan sistem rekomendasi produk skincare berbasis *hybrid filtering*, yaitu penggabungan metode *content-based filtering* dan *collaborative filtering*, sebagai solusi untuk menghasilkan rekomendasi yang lebih relevan berdasarkan kemiripan makna ulasan pada tingkat kalimat yang direpresentasikan secara semantik serta preferensi pengguna.

Metode penelitian mencakup tahapan *preprocessing* data seperti *case folding*, *data cleaning*, normalisasi karakter berulang, dan normalisasi *whitespace*. Pendekatan *content-based filtering* dilakukan menggunakan Multilingual Sentence-BERT dan *cosine similarity* untuk menangkap kemiripan makna kalimat ulasan, sedangkan *collaborative filtering* menggunakan algoritma Item-Based K-Nearest Neighbor (KNN) berbasis data rating pengguna. Dataset yang digunakan terdiri dari 16.988 pengguna, 792 produk, dan 29.561 interaksi yang diperoleh melalui proses *scraping* dari platform FemaleDaily. Evaluasi dilakukan menggunakan metrik *precision*, *recall*, *Mean Average Precision* (MAP), dan *Mean Absolute Error* (MAE).

Hasil pengujian menunjukkan bahwa metode *hybrid filtering* memberikan performa yang lebih baik dibandingkan *content-based filtering*. Pada Top-3, diperoleh nilai *precision* sebesar 97,22% dan MAP sebesar 95,60%, sedangkan pada Top-6 diperoleh *precision* sebesar 90,28% dan MAP sebesar 96,61%. Nilai *recall* mencapai 100% pada Top-6, serta nilai MAE terbaik sebesar 3,017846. Hasil ini menunjukkan bahwa penggabungan representasi semantik ulasan dan pola interaksi pengguna mampu meningkatkan akurasi dan relevansi rekomendasi produk *skincare*, sehingga sistem dapat membantu pengguna dalam memilih produk yang sesuai secara lebih efektif.

**Kata kunci:** sistem rekomendasi, *skincare*, *hybrid filtering*, Multilingual Sentence-BERT, *collaborative filtering*

## ABSTRACT

*The wide variety of skincare products on the market makes it difficult for consumers to determine which products are suitable for their skin's needs. Choosing the wrong skincare product can lead to various negative effects, ranging from irritation to skin damage. User reviews, which are subjective, descriptive, and multilingual, also complicate the process of objective analysis. This study develops a skincare product recommendation system based on hybrid filtering a combination of content-based filtering and collaborative filtering as a solution to generate more relevant recommendations based on the semantic similarity of review meanings at the sentence level and user preferences.*

*The research methodology includes data preprocessing steps such as case folding, data cleaning, repetition normalization, and whitespace normalization. A content-based filtering approach was implemented using Multilingual Sentence-BERT and cosine similarity to capture semantic similarity among reviews, while collaborative filtering utilized the Item-Based K-Nearest Neighbor (KNN) algorithm based on user rating data. The dataset consists of 16,988 users, 792 products, and 29,561 interactions obtained through scraping from the FemaleDaily platform. Evaluation was performed using precision, recall, Mean Average Precision (MAP), and Mean Absolute Error (MAE) metrics.*

*The test results show that the hybrid filtering method performs better than content-based filtering. For Top-3, precision reached 97.22% and MAP was 95.60%, while for Top-6, precision reached 90.28% and MAP was 96.61%. Recall reached 100% for Top-6, and the best MAE was 3.017846. These results indicate that combining the semantic representation of reviews with user interaction patterns can improve the accuracy and relevance of skincare product recommendations, enabling the system to help users select suitable products more effectively.*

**Keywords:** *recommendation system, skincare, hybrid filtering, Multilingual Sentence-BERT, collaborative filtering*