

ABSTRAK

Faisal, Ramadhani Rizqi. 2026. Sistem Rekomendasi Produk Elektronik Berbasis *Semantic Content-Based Filtering* dan *Collaborative Filtering* Menggunakan Pendekatan *Hybrid Weighted*.

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Banyaknya produk elektronik yang tersedia pada platform *e-commerce* dapat menyebabkan pengguna mengalami kesulitan dalam menemukan produk yang sesuai dengan kebutuhan. Penggunaan satu metode rekomendasi masih memiliki keterbatasan, seperti ketergantungan terhadap informasi produk pada *Content-Based Filtering* serta permasalahan *data sparsity* dan *cold-start* pada *Collaborative Filtering*. Penelitian ini bertujuan untuk merancang, mengimplementasikan, dan mengevaluasi sistem rekomendasi produk elektronik dengan menggabungkan *Semantic Content-Based Filtering* dan *Collaborative Filtering* menggunakan pendekatan *Hybrid Weighted*. Data yang digunakan sebanyak 90.640 ulasan produk elektronik yang diperoleh dari Amazon Reviews 2023. Pada metode *Semantic Content-Based Filtering*, nama, deskripsi, dan kategori produk direpresentasikan menggunakan *Word2Vec*, kemudian kemiripan antarproduk dihitung menggunakan *cosine similarity*. Sementara itu, *Collaborative Filtering* menggunakan algoritma *Singular Value Decomposition* (SVD) untuk mempelajari pola laten interaksi pengguna dan produk berdasarkan data *rating*. Kedua skor selanjutnya dinormalisasi dan digabungkan menggunakan parameter *alpha*. Evaluasi dilakukan menggunakan metrik *Precision*, *Recall*, dan Normalized Discounted Cumulative Gain (NDCG) pada *Top-5*, *Top-10*, dan *Top-15*. Hasil pengujian menunjukkan bahwa nilai *alpha* terbaik adalah 0,3, yaitu kontribusi *Semantic Content-Based Filtering* sebesar 30% dan *Collaborative Filtering* SVD sebesar 70%. Pada pengujian *Top-10*, model menghasilkan nilai *Precision* sebesar 0,008343, *Recall* sebesar 0,035075, dan NDCG sebesar 0,023725. Hasil tersebut menunjukkan bahwa pendekatan *Hybrid Weighted* mampu meningkatkan ketepatan dan kualitas pemeringkatan rekomendasi dibandingkan metode tunggal SVD, meskipun peningkatan belum terjadi pada seluruh metrik. Sistem kemudian diimplementasikan dalam bentuk *website* berbasis *Flask* agar pengguna dapat mencari produk, memilih produk acuan, dan memperoleh daftar rekomendasi berdasarkan nilai *hybrid score* tertinggi.

Kata kunci: Sistem Rekomendasi, Produk Elektronik, *Semantic Content-Based Filtering*, *Collaborative Filtering*, SVD, *Hybrid Weighted*.

ABSTRACT

Faisal, Ramadhani Rizqi. 2026. *Electronic Product Recommendation System Based on Semantic Content-Based Filtering and Collaborative Filtering Using a Hybrid Weighted Approach*.

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The large number of electronic products available on e-commerce platforms may make it difficult for users to find products that match their needs. The use of a single recommendation method still has several limitations, including dependence on product information in Content-Based Filtering and data sparsity and cold-start problems in Collaborative Filtering. This study aims to design, implement, and evaluate an electronic product recommendation system by combining Semantic Content-Based Filtering and Collaborative Filtering using a Hybrid Weighted approach. The dataset used in this study consisted of 90,640 electronic product reviews obtained from Amazon Reviews 2023. In the Semantic Content-Based Filtering method, product names, descriptions, and categories were represented using Word2Vec, while product similarity was calculated using cosine similarity. Meanwhile, Collaborative Filtering employed the Singular Value Decomposition (SVD) algorithm to identify latent interaction patterns between users and products based on rating data. The scores generated by both methods were normalized and combined using an alpha parameter. The system was evaluated using Precision, Recall, and Normalized Discounted Cumulative Gain (NDCG) metrics at Top-5, Top-10, and Top-15. The results showed that the best alpha value was 0.3, representing a 30% contribution from Semantic Content-Based Filtering and a 70% contribution from SVD-based Collaborative Filtering. At Top-10, the model achieved a Precision score of 0.008343, a Recall score of 0.035075, and an NDCG score of 0.023725. These results indicate that the Hybrid Weighted approach improved recommendation accuracy and ranking quality compared with the standalone SVD method, although improvements were not achieved across all evaluation metrics. The system was subsequently implemented as a Flask-based website that allows users to search for products, select a seed product, and obtain a list of recommendations based on the highest Hybrid Score.

Keywords: Recommendation System, Electronic Products, Semantic Content-Based Filtering, Collaborative Filtering, SVD, Hybrid Weighted.