ABSTRAK

Banyaknya pilihan produk *skincare* dengan kandungan dan fungsi yang beragam sering menyulitkan pengguna dalam menentukan produk yang sesuai dengan kondisi kulit. Permasalahan ini semakin kompleks karena keluhan kulit umumnya disampaikan menggunakan bahasa sehari-hari yang tidak selalu dapat dipahami oleh sistem rekomendasi konvensional. Oleh karena itu, penelitian ini mengembangkan GlowAI, sistem rekomendasi *skincare* berbasis *Retrieval-Augmented Generation (RAG)* yang dirancang untuk memahami kebutuhan pengguna dan menghasilkan rekomendasi yang relevan. Penelitian menggunakan metodologi *CRISP-DM* yang meliputi tahapan *business understanding*, *data understanding*, *data preparation*, *modeling*, *evaluation*, dan *deployment*. Basis pengetahuan sistem terdiri atas 400 produk *skincare* hasil *web scraping* serta literatur dermatologi. Proses pencarian informasi memanfaatkan model *SentenceTransformer all-MiniLM-L6-v2* dan *FAISS*, yang dipadukan dengan mekanisme *filtering*, *re-ranking*, dan *guardrails*. Berdasarkan hasil seleksi, *LLaMA 3.3 70B* dipilih sebagai model utama dengan nilai akhir 3.900. Evaluasi *retrieval* pada *Top-K* = 5 menghasilkan nilai *Precision* 0.9667, *Recall* 0.0978, *F1-Score* 0.1507, dan *MRR* 0.9583. Selain itu, evaluasi ahli memperoleh skor rata-rata 4.60 dan *user study* yang melibatkan 30 responden memperoleh skor 4.26. Hasil tersebut menunjukkan bahwa GlowAI mampu memberikan rekomendasi *skincare* yang relevan, informatif, dan layak digunakan sebagai pendukung keputusan dalam pemilihan produk.

Kata Kunci: RAG, *Large Language Model*, *Semantic Retrieval*, *Rule-Based Validation*, Sistem Rekomendasi, *Skincare*.

ABSTRACT

The wide variety of skincare products with different ingredients and functions often makes it difficult for users to identify products that match their skin conditions. This challenge is further complicated by the fact that skin concerns are commonly expressed in everyday language, which may not be effectively interpreted by conventional recommendation systems. Therefore, this study developed GlowAI, a skincare recommendation system based on Retrieval-Augmented Generation (RAG) to understand user needs and provide relevant product recommendations. The study adopted the CRISP-DM methodology, which consists of business understanding, data understanding, data preparation, modeling, evaluation, and deployment phases. The system was built using a knowledge base containing 400 skincare products collected through web scraping and supported by dermatological literature. Information retrieval was performed using the SentenceTransformer all-MiniLM-L6-v2 model and FAISS, combined with filtering, re-ranking, and guardrails mechanisms. Based on the model selection results, LLaMA 3.3 70B achieved the highest final score of 3.900 and was selected as the primary model. Retrieval evaluation at Top-K = 5 yielded a Precision of 0.9667, *Recall of* 0.0978, *F1-Score of* 0.1507, dan *MRR of* 0.9583. *In addition, the expert evaluation achieved an average score of 4.60, while the user study involving 30 participants obtained an average score of 4.26. These findings indicate that GlowAI is capable of providing relevant and informative skincare recommendations and can serve as a decision-support tool for skincare product selection.*

Keywords: *Retrieval-Augmented Generation, Large Language Model, Semantic Retrieval, Rule-Based Validation, Recommender System, Skincare*