ABSTRAK

PENERAPAN ALGORITMA *RESTRICTED BOLTZMANN MACHINE* DALAM SISTEM REKOMENDASI PRODUK PADA *WEBSITE E-COMMERCE* UKM KOPI

(2025:xv + 65 halaman + 23 gambar + 7 tabel + 11 lampiran)

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Perkembangan teknologi informasi mendorong pelaku Usaha Mikro, Kecil, dan Menengah (UMKM) untuk memanfaatkan platform digital seperti e-commerce guna memasarkan produk secara lebih luas dan efisien. Untuk meningkatkan pengalaman pengguna dan penjualan pada platform e-commerce kopi bagi UMKM, penelitian ini mengembangkan sistem rekomendasi produk berbasis algoritma *Restricted Boltzmann Machine* (RBM). Sistem ini dirancang untuk mengatasi masalah data terbatas (*sparse data*) yang umum terjadi pada tahap awal digitalisasi. Model RBM dilatih menggunakan data simulasi di Google Colaboratory dan dievaluasi menggunakan metrik *Mean Squared Error* (MSE), dibandingkan dengan baseline berupa rekomendasi populer dan acak. Hasil menunjukkan bahwa arsitektur RBM terbaik, dengan 10 unit tersembunyi, mencapai nilai MSE 0,0454, lebih rendah dari metode populer (0,0802) dan acak (0,0760). Model ini kemudian diintegrasikan ke dalam website berbasis Laravel dan mampu memberikan rekomendasi produk yang personal dan dinamis. Hasil penelitian menunjukkan potensi RBM dalam meningkatkan konversi penjualan UMKM melalui personalisasi, sekaligus menjadi dasar bagi pengembangan sistem rekomendasi lanjutan di sektor ini.

Kata Kunci: Sistem Rekomendasi, *Restricted Boltzmann Machine* (RBM), *E-Commerce, Cold-Start, Artificial Intelligence*.

ABSTRACT

APPLICATION OF RESTRICTED BOLTZMANN MACHINE ALGORITHM IN PRODUCT RECOMMENDATION SYSTEM ON E-COMMERCE WEBSITE OF SMALL COFFEE BUSINESS

(2025:xv + 65 pages + 23 pictures + 7 tables + 11 attachments)

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The advancement of information technology has encouraged Micro, Small, and Medium Enterprises (MSMEs) to utilize digital platforms such as e-commerce to market their products more broadly and efficiently. To enhance user experience and boost sales on a coffee-focused e-commerce platform for MSMEs, this study develops a product recommendation system based on the Restricted Boltzmann Machine (RBM) algorithm. The system is specifically designed to address sparse data issues commonly encountered during the early stages of digitalization. The RBM model was trained using simulated data in the Google Colaboratory environment and evaluated using the Mean Squared Error (MSE) metric, then compared to baseline methods including popular and random recommendations. Results show that the best RBM architecture, with 10 hidden units, achieved an MSE of 0.0454 significantly lower than the popular (0.0802) and random (0.0760) baselines. The model was then integrated into a fully functional Laravel-based website, providing personalized and dynamic product recommendations. This implementation demonstrates the potential of RBM to increase MSME sales conversions through personalization, while also laying a foundation for future research in MSME-focused recommendation systems.

Keywords**:** *Recommendation System, Restricted Boltzmann Machine (RBM), E-Commerce, Cold-Start, Artificial Intelligence.*