

ABSTRAK

IMPLEMENTASI TEORI ENTROPI UNTUK OPTIMALISASI SELEKSI FITUR PADA ALGORITMA *K-MEANS* DAN *NAIVE BAYES*

DALAM PREDIKSI STOK PENJUALAN

(2025: xvii + 98 halaman + 29 gambar + 13 tabel + Daftar Pustaka + Lampiran)

FADHILAH DWI WULANDARI

062140352392

JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI SARJANA TERAPAN TEKNIK TELEKOMUNIKASI
POLITEKNIK NEGERI SRIWIJAYA

Di era Revolusi Industri 4.0, digitalisasi berperan penting dalam meningkatkan efisiensi manajemen bisnis, khususnya bagi usaha mikro, kecil, dan menengah (UMKM). Salah satu tantangan utama pada industri ritel adalah pengelolaan stok manual yang berisiko menimbulkan *overstock* dan *stockout*. Penelitian ini bertujuan mengembangkan sistem prediksi stok berbasis web dengan optimalisasi seleksi fitur menggunakan teori entropi (*Shannon Entropy* dan *Information Gain*). Seleksi fitur menghasilkan atribut paling relevan, yaitu Kode Barang, Nama Barang, dan Total Belanja, sedangkan atribut seperti Ukuran, Harga, dan Stok dieliminasi karena kontribusinya rendah. Algoritma *K-Means* mengelompokkan produk ke tiga cluster (0, 1, dan 2) dengan distribusi 58, 282, dan 193 data, pada jumlah cluster optimal $K = 3$ berdasarkan kombinasi *Elbow Method* dan *Silhouette Score* yang cukup baik (tertinggi 0.6275). *Naive Bayes* untuk klasifikasi menunjukkan peningkatan akurasi dari 95.63% menjadi 97.50% setelah seleksi fitur terhadap Jumlah Terjual. Sistem web yang dikembangkan berhasil mengintegrasikan seleksi fitur, *clustering*, dan klasifikasi secara *real-time*. Hasil pengujian menunjukkan sistem berjalan stabil ($\text{error rate} \leq 0.57\%$, $\text{response time} < 3$ detik) dan memberikan rekomendasi stok yang akurat. Temuan ini menunjukkan sistem mampu mendukung pengambilan keputusan pengelolaan inventaris berbasis data secara adaptif bagi UMKM.

Kata Kunci: Manajemen Stok, Entropi, *Information Gain*, Seleksi Fitur, *K-Means*, *Naive Bayes*, Sistem Berbasis Web.

ABSTRACT

IMPLEMENTATION OF ENTROPY THEORY FOR FEATURE SELECTION OPTIMIZATION IN *K-MEANS* AND *NAIVE BAYES* ALGORITHMS FOR SALES STOCK PREDICTION

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FADHILAH DWI WULANDARI

062140352392

DEPARTMENT OF ELECTRICAL ENGINEERING

BACHELOR OF APPLIED TELECOMMUNICATION ENGINEERING
PROGRAM

POLYTECHNIC STATE OF SRIWIJAYA

In the era of the Fourth Industrial Revolution, digitalization has played a crucial role in enhancing business management efficiency, particularly for micro, small, and medium-sized enterprises (MSMEs). One of the primary challenges in the retail industry has been manual stock management, which often leads to overstocking and stockouts. This study has developed a web-based stock prediction system by optimizing feature selection using entropy theory (Shannon Entropy and Information Gain). The feature selection process identified the most relevant attributes—Product Code, Product Name, and Total Spending—while eliminating less significant attributes such as Size, Price, and Stock. The K-Means algorithm has clustered the products into three clusters (0, 1, and 2) with distributions of 58, 282, and 193 data points, respectively, at the optimal number of clusters $K=3$, determined based on the combination of the Elbow Method and a reasonably good Silhouette Score (highest at 0.6275). The Naive Bayes classification model achieved an accuracy improvement from 95.63% to 97.50% after feature selection on the target variable, Quantity Sold. The developed web system has successfully integrated feature selection, clustering, and classification in real time. Testing results have shown that the system operates stably (error rate $\leq 0.57\%$, response time < 3 seconds) and provides accurate stock recommendations. These findings indicate that the system can serve as an adaptive, data-driven decision-support tool for inventory management in MSMEs.

Keywords: Stock Management, Entropy, Information Gain, Feature Selection, K-Means, Naive Bayes, Web-Based System.