

ABSTRAK

Perkembangan gaya hidup modern memberikan dampak signifikan terhadap kondisi kesehatan mahasiswa. Aktivitas akademik padat, pola makan tidak teratur, rendahnya aktivitas fisik, serta konsumsi makanan cepat saji menjadi faktor yang berkontribusi terhadap perubahan berat badan, mulai dari kekurangan berat badan hingga obesitas. Penelitian ini menerapkan metode K-Means Clustering untuk mengelompokkan tingkat risiko berat badan Mahasiswa Teknik Universitas Malikussaleh berdasarkan faktor gaya hidup dan kondisi fisik, sekaligus merancang sistem rekomendasi edukasi otomatis dan program pembinaan kesehatan berbasis hasil clustering. Data dikumpulkan dari 228 mahasiswa aktif Fakultas Teknik melalui kuesioner daring, mencakup variabel demografi, kondisi fisik, dan gaya hidup. Proses clustering dilakukan menggunakan Python (Pandas, Scikit-learn, Matplotlib) dan diimplementasikan pada sistem berbasis web. Metode Elbow dan Silhouette Score menghasilkan $K=3$ sebagai jumlah cluster optimal, dengan SSE 2714,32, Silhouette Score 0,1416, dan Davies-Bouldin Index 2,1698. Model konvergen setelah 9 iterasi dan membentuk tiga kelompok: Cluster Risiko Rendah (105 mahasiswa, 46,1%, IMT rata-rata 21,15 kg/m²), Cluster Risiko Normal (99 mahasiswa, 43,4%, IMT rata-rata 22,25 kg/m²), dan Cluster Risiko Tinggi (24 mahasiswa, 10,5%, IMT rata-rata 23,27 kg/m²). Riwayat keluarga menjadi faktor pembeda kuat pada Cluster Risiko Tinggi, di mana seluruh anggotanya memiliki riwayat keluarga dengan risiko berat badan. Berdasarkan hasil tersebut, sistem memberikan rekomendasi berbeda per kluster: pola makan rendah kalori dan aktivitas aerobik bagi Cluster Risiko Tinggi, edukasi gizi seimbang bagi Cluster Risiko Rendah, serta anjuran pemeliharaan pola hidup bagi Cluster Risiko Normal. Rekomendasi ini diimplementasikan dalam program pembinaan kesehatan berdurasi satu bulan, mencakup asesmen awal, intervensi sesuai kluster, pendampingan mingguan, dan evaluasi akhir. Hasil penelitian diharapkan menjadi dasar perencanaan program pembinaan kesehatan mahasiswa berbasis data secara berkelanjutan di kampus.

Kata Kunci – *K-Means Clustering*, risiko berat badan, gaya hidup, data mining, segmentasi mahasiswa

ABSTRACT

The development of modern lifestyles has a significant impact on students' health conditions. Heavy academic workloads, irregular eating patterns, low physical activity, and fast food consumption are contributing factors to weight changes, ranging from underweight, overweight, to obesity. This study aims to apply the K-Means Clustering method to classify the weight risk levels of Engineering students at Universitas Malikussaleh based on lifestyle factors and physical condition. Data were obtained from 228 active student respondents from the Faculty of Engineering through an online questionnaire (Google Form) covering demographic, physical condition, and lifestyle variables, including gender, age, height, weight, family history of obesity, eating patterns, and physical activity. The clustering process was carried out using Python with the Pandas, Scikit-learn, and Matplotlib libraries, and implemented in a web-based system. Determination of the optimal number of clusters using the Elbow Method and Silhouette Score resulted in $K=3$ as the best number, with an SSE value of 2714.32, a Silhouette Score of 0.1416, and a Davies-Bouldin Index of 2.1698. The K-Means model converged after 9 iterations and formed three groups, namely the Low Risk Cluster with 105 students (46.1%) and an average BMI of 21.15 kg/m², the Normal Risk Cluster with 99 students (43.4%) and an average BMI of 22.25 kg/m², and the High Risk Cluster with 24 students (10.5%) and the highest average BMI of 23.27 kg/m². Family history proved to be a strong distinguishing factor in the High Risk Cluster, where all members had a family history of weight-related risk, while neither of the other two clusters contained a single member with such history. The results of this study are expected to serve as a basis for planning data-driven student health development programs on campus.

Keywords – K-Means Clustering, weight risk, lifestyle, data mining, student segmentation