APPLYING K-MEANS CLUSTERING IN A STUDY PROGRAM RECOMMENDATION SYSTEM BASED ON ACADEMIC GRADES AND COMPREHENSIVE ASSESSMENT (CASE STUDY: STATE SENIOR HIGH SCHOOL 3 BATANG HARI)

ARVELYNIA DERISKA
Program Studi Informatika, Fakultas Sains & Teknologi
Universitas Teknologi Yogyakarta
Jl. Ringroad Utara Jombor Sleman Yogyakarta
E-mail : arvelyniaderiska@gmail.com

ABSTRACT

Academic misalignment negatively impacts students' learning motivation and career readiness. Traditional major selection practices in Indonesia remain subjective, relying solely on academic grades and failing to consider students' multidimensional potential. This study presents a web-based Dream Major Recommendation System (SRJI) that integrates both academic and non-academic data to provide objective study program recommendations. The K-Means clustering algorithm, using Euclidean distance, was applied to cluster 123 student profiles from SMAN 3 Batang Hari based on six semesters of report card grades and four non-academic assessments (ability, learning style, interest, and personality). The system was developed using the Prototype Model with Python, the Flask framework, and an SQLite database. Results indicate that the optimal number of clusters is three (k = 3), validated by the Elbow Method, with a Silhouette Score of 0.6164 and a Davies-Bouldin Index of 0.5684. Black-box testing achieved 100% success, while recommendation suitability reached 80%, as validated by Guidance and Counseling teachers. The K-Means algorithm has proven effective for integrating multidimensional cognitive, affective, and conative variables. SRJI serves as an objective, data-driven decision-making tool to reduce the risk of selecting an inappropriate major and to enhance the quality of guidance and counseling services.

Keywords: K-Means Clustering, Recommendation System, Major Selection, Academic Grades, Comprehensive Assessment.