ABSTRAK

Penelitian ini mengkaji permasalahan kelulusan mahasiswa Program Studi S1 Teknik Informatika Institut Teknologi PLN dengan membandingkan kinerja algoritma Decision Tree C4.5 dan K-Nearest Neighbors (KNN), kedua metode tersebut digunakan untuk memperoleh perbandingan yang komprehensif antara dua pendekatan klasifikasi yang memiliki karakteristik berbeda berdasarkan data akademik angkatan periode 2016 dengan sejumlah sampel data sebanyak 305 data. Analisis dilakukan dengan memproses data terlebih dahulu, lalu membaginya menjadi data latih dan uji. Metode penelitian yang digunakan adalah *Cross Industry Standard Process for Data Mining (CRISP-DM)* yang meliputi tahapan pemahaman bisnis, pemahaman data, persiapan data, pemodelan, dan evaluasi. Akurasi setiap model diukur menggunakan evaluasi *Confusion Matrix* dengan parameter akurasi, presisi, recall, dan F1-score. Hasil penelitian menunjukkan bahwa algoritma K-Nearest Neighbors (KNN) memiliki performa prediksi yang lebih baik dengan nilai akurasi sebesar 90%, presisi sebesar 93%, *recall* sebesar 90% sebesar dan F1-score sebesar 91% sehingga unggul dalam fungsi deteksi dini. Sementara itu, algoritma Decision Tree C4.5 memperoleh nilai akurasi sebesar 85%, presisi sebesar 86%, *recall* sebesar 89% dan F1-score sebesar 85%, serta memiliki keunggulan dalam menghasilkan aturan keputusan yang mudah dipahami dan bersifat interpretatif. Kesimpulannya, bahwa algoritma KNN lebih sesuai digunakan untuk tujuan prediksi dan monitoring dini risiko keterlambatan kelulusan mahasiswa, sedangkan Decision Tree C4.5 lebih sesuai digunakan sebagai alat pendukung keputusan akademik yang membutuhkan transparansi dan kemudahan interpretasi hasil. Hasil penelitian ini diharapkan dapat menjadi dasar dalam pengembangan sistem pendukung keputusan akademik untuk mendukung proses monitoring dan intervensi dini mahasiswa.

Kata kunci: Kelulusan Mahasiswa, *Machine Leraning*, CRISP-DM, *K-Nearest Neighbors*, *Decision Tree* C4.5.

ABSTRACT

This study examines the graduation problem of Informatics Engineering Undergraduate Program students at the PLN Institute of Technology by comparing the performance of the Decision Tree C4.5 and K-Nearest Neighbors (KNN) algorithms. Both methods are used to obtain a comprehensive comparison between two classification approaches that have different characteristics based on academic data from the 2016 intake with a total of 305 data samples. The analysis was carried out by processing the data first, then dividing it into training and testing data. The research method used is the Cross Industry Standard Process for Data Mining (CRISP-DM) which includes the stages of business understanding, data understanding, data preparation, modeling, and evaluation. The accuracy of each model is measured using a Confusion Matrix evaluation with parameters of accuracy, precision, recall, and F1-score. The results show that the K-Nearest Neighbors (KNN) algorithm has better prediction performance with an accuracy value of 90%, precision of 93%, recall of 90% and F1-score of 91% so that it excels in early detection functions. Meanwhile, the Decision Tree C4.5 algorithm achieved an accuracy of 85%, a precision of 86%, a recall of 89%, and an F1-score of 85%, and has the advantage of producing decision rules that are easy to understand and interpretative. In conclusion, the KNN algorithm is more suitable for use for the purpose of predicting and early monitoring the risk of student graduation delays, while Decision Tree C4.5 is more suitable for use as an academic decision support tool that requires transparency and ease of interpretation of results. The results of this study are expected to be the basis for the development of an academic decision support system to support the process of monitoring and early intervention of students.

Keywords: *Student Graduation, Machine Learning, CRISP-DM, K-Nearest Neighbors, Decision Tree C4.5.*