

ABSTRAK

Tingginya angka keterlambatan kelulusan mahasiswa di Indonesia mendorong kebutuhan sistem pemantauan akademik yang lebih proaktif dan berbasis data. Penelitian ini bertujuan merancang dan membangun aplikasi MyPrediction sebagai sistem *early warning* berbasis web untuk memprediksi risiko keterlambatan kelulusan mahasiswa di UPN "Veteran" Jakarta. Metode yang digunakan adalah *Random Forest* dengan pendekatan CRISP-DM dan pengembangan sistem menggunakan metode RAD. Sistem dibangun menggunakan arsitektur Next.js dan FastAPI, dilengkapi fitur autentikasi JWT, *dashboard monitoring* berbasis peran, prediksi massal via CSV, laporan ekspor PDF dan Excel, *alert* risiko tinggi, serta *audit log*. Evaluasi model menunjukkan performa sangat baik dengan *Accuracy* 99,9%, *Balanced Accuracy* 97,8%, *F1-Score* 98,7%, dan *High Risk Recall* 96,3%. Pengujian fungsional *Black Box Testing* terhadap 93 skenario pada 14 fitur menunjukkan seluruh skenario berjalan sesuai spesifikasi. Pengujian *User Acceptance Testing* (UAT) yang melibatkan tiga aktor nyata dari UPNVJ menghasilkan *Task Success Rate* 100% dan *Usability Score* 4,33 dari 5,00 (kategori Sangat Baik), membuktikan sistem layak diimplementasikan. Aplikasi MyPrediction diharapkan mendukung pengambilan keputusan strategis berbasis data oleh pihak BAKK guna meningkatkan angka kelulusan tepat waktu.

Kata Kunci: Early Warning System, Random Forest, Prediksi Kelulusan, Machine Learning, Monitoring Akademik

ABSTRACT

The high rate of delayed graduation among students in Indonesia underscores the urgent need for a more proactive and data-driven academic monitoring system. This study aims to design and develop the MyPrediction application as a web-based early warning system to predict the risk of delayed graduation among students at UPN "Veteran" Jakarta. The method applied is Random Forest using the CRISP-DM approach, with system development following the RAD methodology. The system is built using a Next.js and FastAPI architecture, equipped with JWT authentication, role-based monitoring dashboards, batch prediction via CSV upload, PDF and Excel export reports, high-risk alerts, and an audit log. Model evaluation results demonstrate excellent performance, with an Accuracy of 99.9%, Balanced Accuracy of 97.8%, F1-Score of 98.7%, and a High Risk Recall of 96.3%. Black Box Testing across 93 scenarios on 14 features confirmed all scenarios performed according to specifications. User Acceptance Testing (UAT) involving three real stakeholders from UPNVJ yielded a Task Success Rate of 100% and a Usability Score of 4.33 out of 5.00 (classified as Very Good), confirming the system's readiness for real-world deployment. MyPrediction is expected to support data-driven strategic decision-making by the BAKK to improve the on-time graduation rate.

Keywords: Early Warning System, Random Forest, Graduation Prediction, Machine Learning, Academic Monitoring