

**DASHBOARD MONITORING DAN PREDIKSI KETERLAMBATAN
PEMBAYARAN UKT MENGGUNAKAN ALGORITMA *GRADIENT
BOOSTING* (STUDI KASUS: UPN “VETERAN” JAKARTA)**

AFIFI RUFAIDA

ABSTRAK

Keterlambatan pembayaran Uang Kuliah Tunggal (UKT) di UPN “Veteran” Jakarta memerlukan pemantauan yang terstruktur agar mahasiswa yang berpotensi terlambat dapat diidentifikasi lebih awal. Penelitian ini bertujuan membangun *dashboard* monitoring dan prediksi keterlambatan pembayaran UKT menggunakan algoritma *Gradient Boosting*. Data penelitian terdiri atas 164.355 baris data historis pembayaran periode 2020-2025. Setelah pembersihan data, rekayasa fitur, seleksi periode pemodelan, pembagian data *training-testing*, dan penerapan SMOTE pada *data training*, diperoleh 104.630 baris data dari sembilan semester untuk pemodelan. Model terbaik menggunakan rasio 80:20 dengan *Accuracy* 77,44%, *Precision* 78,54%, *Recall* 68,54%, *F1-score* 73,20%, dan AUC-ROC 85,04%. Pengujian *threshold* menetapkan 0,28 sebagai batas awal prediksi Berpotensi Terlambat karena merupakan *threshold* tertinggi yang masih mempertahankan *Recall* sekurang-kurangnya 90%, yaitu 90,29%. Nilai 0,42 digunakan sebagai batas awal risiko Sedang karena menghasilkan *F1-score* tertinggi, sedangkan 0,67 digunakan sebagai batas awal risiko Tinggi karena menjadi *threshold* pertama dengan *Precision* sekurang-kurangnya 90%. *Dashboard* berbasis Flask menyediakan fitur *Overview*, *Monitoring*, *Analytics*, *Prediksi Risiko*, dan daftar risiko per fakultas. Seluruh 30 skenario *Black Box Testing* dinyatakan valid dan UAT memperoleh nilai 78,33% dengan kategori layak. Sistem ini dapat membantu LKU menentukan prioritas pemantauan pembayaran secara lebih terarah.

Kata Kunci: *Dashboard*, *Gradient Boosting*, *Monitoring*, *Prediksi Keterlambatan*, *Pembayaran UKT*.

**DASHBOARD FOR MONITORING AND PREDICTING LATE SINGLE
TUITION FEE PAYMENTS USING THE GRADIENT BOOSTING
ALGORITHM (CASE STUDY: UPN “VETERAN” JAKARTA)**

AFIFI RUFAIDA

ABSTRACT

Late payment of the Single Tuition Fee (UKT) at UPN “Veteran” Jakarta require structured monitoring so that students at risk of late payment can be identified earlier. This study develops a monitoring dashboard and a late-payment prediction system using the Gradient Boosting algorithm. The dataset comprised 164,355 historical payment records from 2020–2025. After data cleaning, feature engineering, modeling-period selection, train-test splitting, and SMOTE application to the training data, 104,630 records from nine semesters were used for modeling. The best model used an 80:20 split and achieved 77.44% Accuracy, 78.54% Precision, 68.54% Recall, 73.20% F1-score, and 85.04% AUC-ROC. Threshold testing selected 0.28 as the initial operational threshold for a Potentially Late prediction because it was the highest threshold that retained at least 90% Recall, namely 90.29%. The 0.42 threshold was used as the lower boundary of Medium risk because it produced the highest F1-score, while 0.67 was used as the lower boundary of High risk because it was the first threshold to reach at least 90% Precision. The Flask dashboard provides Overview, Monitoring, Analytics, Risk Prediction, and faculty-level risk list features. All 30 Black Box Testing scenarios were valid, and UAT reached 78.33% and was categorized as feasible.

Keywords: *Dashboard, Gradient Boosting, Late Payment Prediction, Monitoring, Single Tuition Fee.*