From Transactions to Trust: An Explainable AI Platform for Creditworthiness Assessment and Earned Wage Access Decisions

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Abstract

The rapid growth of digital banking has created new opportunities to assess financial capacity through behavioral signals embedded in transaction data. This paper presents TeñPay, an explainable artificial intelligence platform designed to support both creditworthiness assessment and earned wage access (EWA) decisions by combining banking transaction histories and credit bureau information within a unified analytical framework. The proposed architecture consists of three interconnected modules. ML-3 constructs a financial profile by parsing bank statements, identifying salary flows, calculating income and expenses, estimating debt burden, and generating behavioral financial indicators. ML-2 performs explainable credit-risk ranking using structured credit-history features, monotonic risk rules, and configurable decision thresholds. ML-1 estimates a financially sustainable advance amount by combining recognized income, salary evidence, debt obligations, and product constraints. The platform was developed and evaluated using large-scale financial datasets that include 108,670 customer transaction histories with approximately 186.8 million banking transactions, 14,486 credit bureau reports, and multi-bank statement samples from major Kazakhstani financial institutions. The results demonstrate that transaction-based analytics can generate transparent and actionable financial insights while preserving explainability throughout the decision process. The proposed approach provides a richer view of a person's financial capacity than traditional credit records alone and supports more personalized credit and payroll-advance decisions. The study shows how large-scale financial data can be transformed into interpretable decision-support tools that promote responsible lending, financial inclusion, and data-driven digital financial services.

Keywords

Explainable artificial intelligence, creditworthiness assessment, earned wage access, banking transaction analytics, alternative credit scoring, financial behavior profiling.