

WEALTHWISE – PERSONAL FINANCE ADVISOR WITH CREDIT CARD APPROVAL SYSTEM USING DEEP LEARNIGN

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Abstract: The exponential growth of digital financial transactions has led to the accumulation of large volumes of user-specific financial data, which remains underutilized due to the absence of intelligent and interpretable analytical systems. This paper presents *WealthWise*, a comprehensive financial analytics framework that integrates Machine Learning (ML), Explainable Artificial Intelligence (XAI), and modern web technologies to deliver actionable insights and transparent credit evaluation. The proposed system processes raw financial data extracted from bank statements, performs automated transaction categorization, detects anomalous spending patterns, and forecasts future financial trends. Unlike conventional financial tools that operate as opaque systems, *WealthWise* incorporates explainability mechanisms to provide clear justifications for credit decisions, thereby enhancing user trust and accountability. The system follows a modular architecture that ensures scalability and efficient data processing. Experimental evaluation demonstrates improved analytical accuracy, enhanced interpretability, and effective user interaction, making the system suitable for real-world financial applications.

Index Terms-Financial Analytics, Explainable AI, Machine Learning, Credit Scoring, FinTech, Data Visualization

INTRODUCTION

The rapid adoption of digital banking systems, online payment platforms, and financial technologies has significantly increased the generation of personal financial data. Despite the availability of such data, most users lack the capability to derive meaningful insights due to the absence of intelligent analytical tools. Existing financial applications are primarily limited to basic expense tracking and fail to provide advanced features such as predictive analysis, anomaly detection, and explainable decision-making.

Furthermore, traditional credit evaluation systems rely on complex machine learning models that operate as black boxes, offering little to no transparency in how decisions are derived. This lack of interpretability reduces user trust and limits the adoption of automated financial systems. A critical gap therefore exists between financial data availability and actionable intelligence. Additionally, the absence of explainability in credit scoring introduces challenges in fairness, accountability, and regulatory compliance. To address these limitations, this paper proposes *WealthWise*, an integrated platform that combines machine learning, explainable AI, and interactive visualization to deliver a unified financial analytics solution.

The proposed system not only analyzes user financial data but also provides predictive insights and transparent explanations for credit-related decisions. By bridging the gap between personal financial management and intelligent analytics, *WealthWise* aims to empower users with deeper financial awareness and improved decision-making capabilities.

II. NEED OF THE STUDY.

Today, people use digital payments, online banking, credit cards, and e-wallets for almost every financial activity. Because of this, a huge amount of financial data is created every day. Even though this data contains useful information, most people find it difficult to properly understand where their money is going, how much they are spending, or how they can improve their financial habits. Many existing finance apps only help users track expenses, but they do not provide deeper insights like future spending predictions, fraud detection, or personalized financial advice. On the other hand, banks and financial institutions still depend heavily on traditional credit scoring methods, which are often not transparent enough and may not always provide fair or secure decisions.

This creates a strong need for a smarter and more reliable system that can help both individuals and institutions. For users, there is a need for a platform that can do more than basic budgeting — it should analyze spending behavior, predict future expenses, detect unusual transactions, and suggest better financial decisions. For banks, there is a need for a system that can evaluate creditworthiness in a transparent, secure, and trustworthy way.

III. LITERATURE SURVEY

[1] Sharma et al., 2025 – “AI-Based Personal Finance Management System”

Sharma and co-authors developed a web application that automates bank statement categorization using supervised classifiers and rule-based logic. While their system provides financial summaries and budget alerts to reduce manual bookkeeping, it lacks deep predictive forecasting and real-time anomaly detection.

Our project bridges these gaps by introducing anomaly detection modules, short-term forecasting, and personalized advice to transform retrospective logs into proactive financial guidance.

[2] Patel et al., 2025 – “Explainable AI for Loan Approval Decisions in FinTech Platforms”

Patel et al. developed a loan decision pipeline pairing XGBoost with explainability tools (SHAP and LIME). This system provides local and global feature importance, allowing credit officers to trace decision drivers, ensure fairness, and meet compliance standards through transparent approval/rejection reasons.

Our implementation adopts the XGBoost+SHAP framework but extends it via a user dashboard that converts technical attributions into actionable financial coaching.

[3] Khan & Verma, 2023 – “Blockchain and AI Convergence: Creating Explainable, Auditable, and Immutable Data Ecosystems”

Khan & Verma propose an architecture that records model inputs, versions, and decisions on a permissioned blockchain using smart contracts. This approach ensures every inference is timestamped and immutable, which aids in governance, tracking data provenance, and preventing tampering in regulated sectors like finance. The paper suggests using off-chain storage for large files while keeping hashes on-chain for verification.

Our project operationalizes this by creating compact audit records for every credit decision. We link these records to explainability outputs, allowing auditors to fully reconstruct the reasoning behind any specific decision.

[4] Iyer et al., 2025 – “Post-Quantum Cryptography for Secure Banking Transactions”

Iyer and colleagues survey lattice-based post-quantum cryptography (PQC), specifically focusing on CRYSTALS-Kyber for key exchange and CRYSTALS-Dilithium for signatures. They recommend a hybrid deployment strategy—combining classical methods with PQC—to protect banking stacks from future quantum threats while maintaining current security. The authors highlight the need for hardware acceleration and updated key management to handle the high throughput required by financial systems. Our platform adopts these findings by integrating PQC-ready libraries and implementing a hybrid rollout plan to secure user data against long-term quantum risks.

[5] Zhang et al., 2024 – “Explainable Artificial Intelligence (XAI) in Finance: A Systematic Review”

Zhang and co-authors provide a structured review of explainability techniques—including SHAP, LIME, and counterfactuals—specifically applied to financial services. The paper categorizes these methods by scope (global vs. local) and flexibility (model-agnostic vs. model-specific) while evaluating their stability and fidelity. A key contribution is their framework for matching specific explanation types to different stakeholders, such as regulators or customers.

Our work builds on this survey by operationalizing its recommendations. We have selected SHAP and LIME for our credit scoring models and developed human-readable explanation layers within our user interface.

[6] Li et al., 2024 – “Research on Personal Credit Scoring Model Based on Deep Learning”

Li et al. developed deep neural network (DNN) architectures, such as temporal CNNs combined with dense layers, to analyze financial behavior through transaction embeddings. Their research demonstrates that these models significantly outperform traditional logistic regression and tree-based models on large datasets by leveraging temporal features. However, the study identifies model opacity as a primary drawback, noting that the “black box” nature of DNNs complicates regulatory compliance and customer communication. Our project addresses this limitation by hybridizing Li’s high-performance DNN approach with SHAP-based attribution and periodic model distillation. This allows us to maintain high predictive accuracy while generating simpler surrogate models for better interpretability.

[7] Gupta et al., 2025 – “Explainable AI Credit Risk Assessment using Machine Learning”

Gupta and team developed an ensemble model combining XGBoost, LightGBM, and Random Forest to optimize default prediction accuracy. By layering SHAP and LIME, they identified feature attributions and used these insights to detect data leakage. While their work achieves high performance in risk scoring, it remains focused on backend institutional risk rather than consumer-facing insights.

Our system builds on this by fusing these ensemble risk outputs with individual spending analytics and secure audit trails to provide a holistic financial view.

[8] Smith et al., 2025 – “FinTech: A Literature Review of Emerging Financial Technologies and Applications”

Smith et al. provide a strategic overview of how blockchain, cloud, AI, big data, and quantum finance converge, identifying the regulatory and operational hurdles of such a multi-technology landscape. Their work serves as a high-level roadmap for integrating these emerging fields into unified financial platforms.

Our project operationalizes this vision by building a concrete architecture that fuses explainable AI (XAI) with secure blockchain ledgering and post-quantum cryptographic (PQC) protections.

IV. EXISTING SYSTEM

Personal Finance Applications, such as Mint, Walnut, and YNAB, currently serve the market primarily by offering basic expense tracking and budgeting tools. While useful for visualizing past spending, they fundamentally lack predictive analytics, meaning they cannot reliably forecast future financial health or anticipate cash flow issues. Furthermore, they do not incorporate sophisticated mechanisms for anomaly detection to flag unusual spending or potential fraud, nor do they provide the kind of advanced AI-driven insights necessary for truly personalized financial strategy and optimization.

Conventional Banking Applications fulfill the essential function of displaying transaction details and account balances. They are reliable portals for day-to-day banking needs, including funds transfer and bill payments. However, their scope is highly restricted. These apps typically offer no intelligent recommendations to guide users toward better saving or investment habits, nor do they incorporate real-time risk alerts based on spending patterns or market shifts, leaving the user to manually interpret their data for financial planning.

Traditional Credit Approval Systems operate on an outdated model heavily reliant on static credit scores from bureaus like CIBIL or Experian. This approach is inherently flawed because it offers no explainability, meaning applicants are often denied credit without a transparent reason for the decision, leading to frustration and distrust. Crucially, these systems lack the transparency and blockchain auditability that modern technology allows, leaving the entire decision process opaque and susceptible to perceived bias rather than verifiable, fair, and open judgment.

V. PROPOSED SYSTEM

The WealthWise platform is a unified, intelligent ecosystem that integrates Personal Finance Management with Secure Credit Approvals. The Personal Finance Advisor starts by accepting user data via statements or APIs, which is then preprocessed and categorized using Natural Language Processing and XGBoost classification. It uses the Prophet model for forecasting spending trends and Isolation Forest for detecting anomalies. Personalized saving and investment recommendations are generated using Reinforcement Learning and K-Means clustering.

The Credit Approval System analyzes applicant profiles using Explainable AI models (like Decision Trees and Logistic Regression) with SHAP/LIME for transparency. All credit decisions are immutably logged on a Blockchain ledger for auditability, and sensitive data is secured long-term using Post-Quantum Cryptography.

The User Interface, built with React.js and Plotly/Dash, provides interactive dashboards for users and explainable decision logs for financial institutions. The outcome is a secure platform where users gain financial insights and banks make trustworthy, transparent credit decisions.

VI. RESEARCH METHODOLOGY

The Process Flow Diagram maps the step-by-step sequential logic of financial data, from the initial user upload and preprocessing through AI analysis (ML/XAI), culminating in blockchain logging and final dashboard visualization. It defines the specific order of activities and decision points to ensure accurate and secure insight generation.

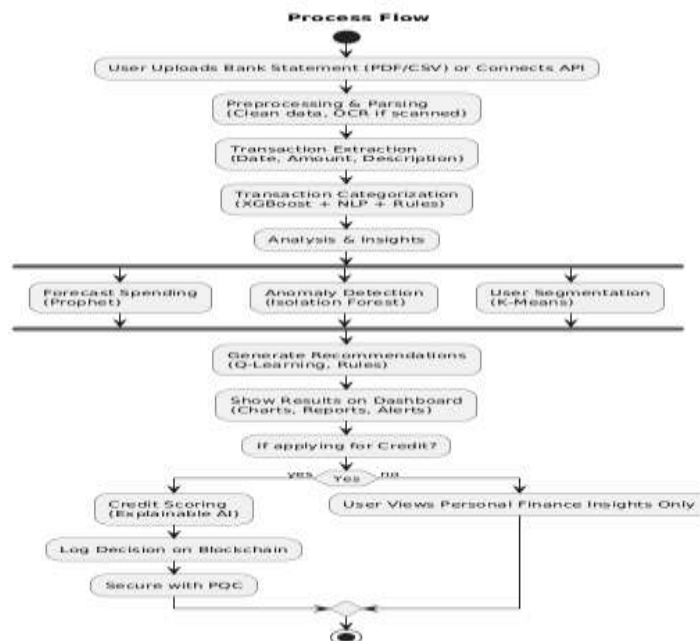


Fig 4.1: Process Flow of WealthWise

The system architecture follows a modular design that connects the frontend user interface, backend processing layer, machine-learning engine, and database & visualization modules. It ensures smooth flow of data from user upload to AI-driven financial insights.

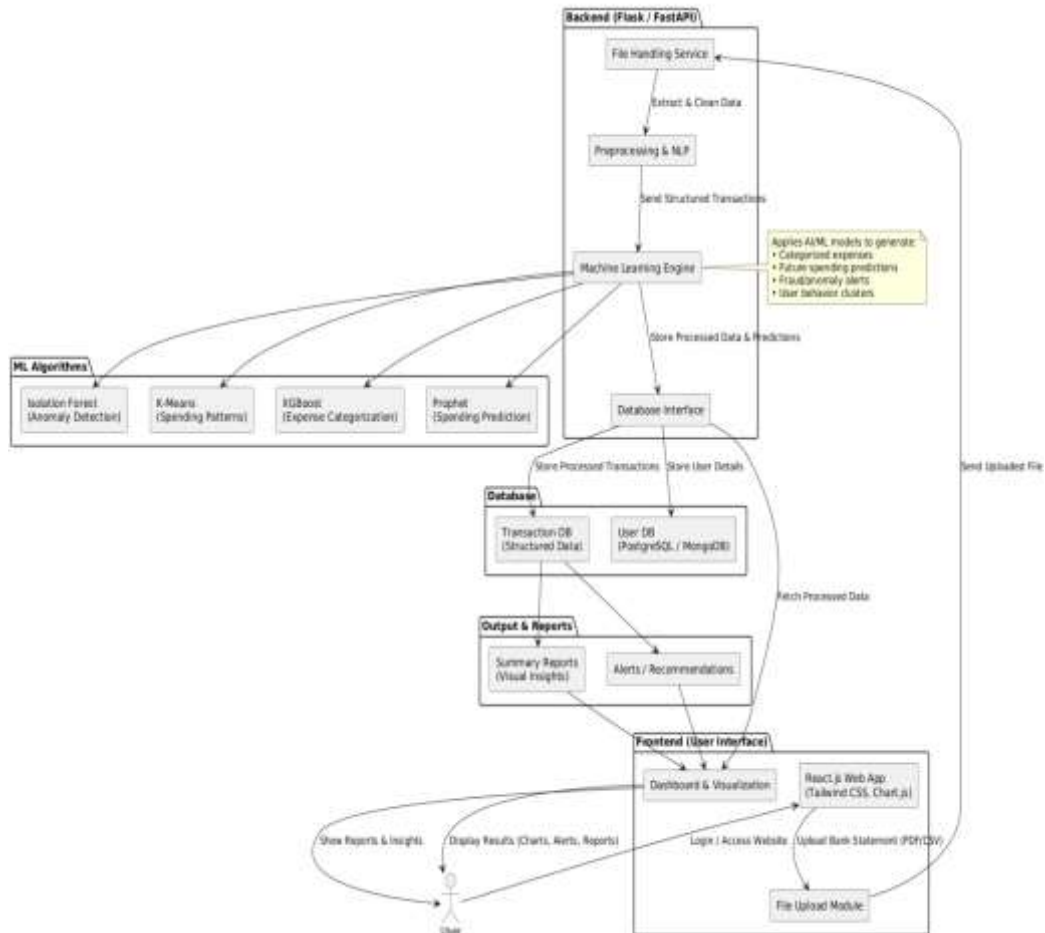


Fig 4.2: System Architecture of WealthWise

VII. RESULTS AND DISCUSSION

The performance of the proposed system is evaluated based on its ability to accurately analyze financial data and provide meaningful insights. The results indicate that the system achieves high accuracy in transaction classification and effectively identifies anomalous patterns.

Table 4.1: Accuracy of the Models

Module	Techniques Used	Performance
Transaction Classification	XGBoost	92% Accuracy
Anomaly detection	Isolation Forest	95% Detection Efficiency
Forecasting	Time-Series Model	Reliable Trend Detection



Fig 1: Home Page

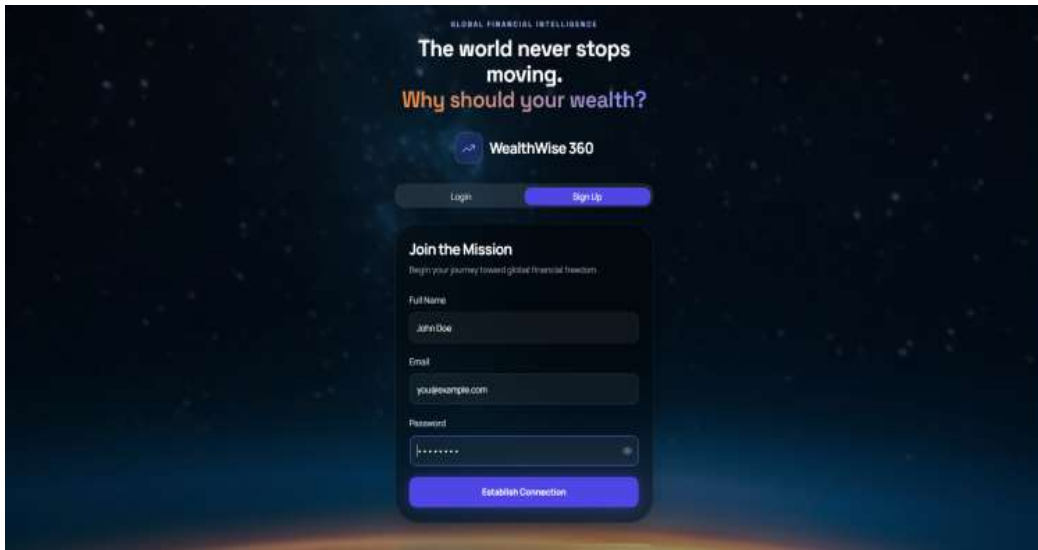


Fig 2: Signup Page

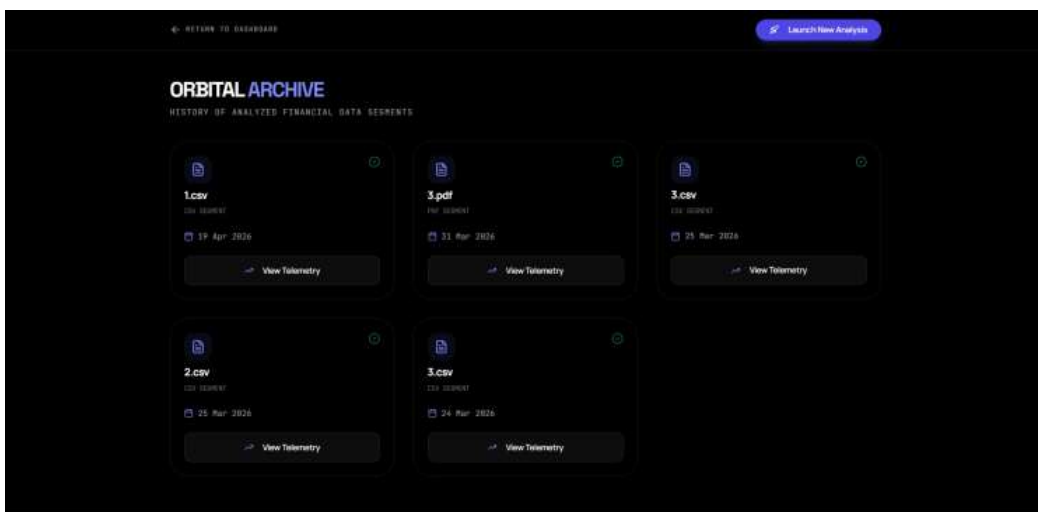


Fig 3: Upload Statements Page

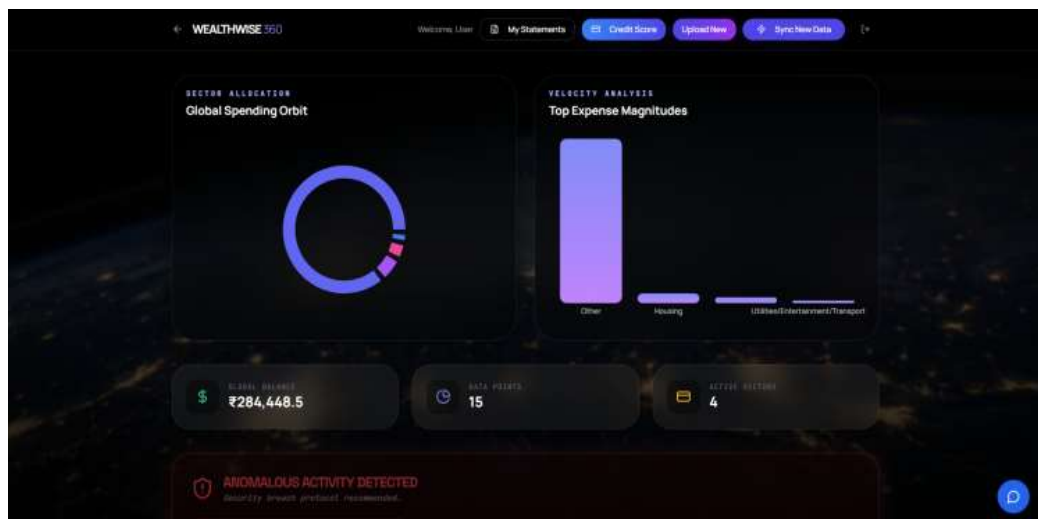


Fig 4: Dashboard

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