📘 PRODUCT REQUIREMENTS DOCUMENT (PRD)

FINVERSE

AI-Powered Personal Finance Intelligence & Decision Support System

1️⃣ Purpose & Vision

FINVERSE is an **AI-driven personal finance platform** designed to help users:

* Stay updated with **real-time financial news**
* Understand the **sentiment and impact** of market events
* Build a **behavior-based alternative credit score**
* Detect **unusual transactions** without accusatory language
* Interact with an **AI Financial Copilot** for insights, predictions, and smart saving/investment suggestions

The system focuses on **guidance, transparency, and personalization**, not judgment or enforcement.

2️⃣ Problem Statement

Users today face:

* Fragmented and overwhelming financial news
* Credit scores that ignore daily spending behavior
* Fraud alerts that feel accusatory and reactive
* No single system that connects **news + spending + predictions + advice**

FINVERSE solves this by **integrating NLP, ML/DL, and explainable AI** into one coherent platform.

3️⃣ Target Users

* Students & young professionals
* First-time investors
* Budget-conscious individuals
* Academic evaluators (DL in Fintech context)

4️⃣ Functional Requirements (Module-wise)

🔹 Module 1: Financial News Sentiment Intelligence

Objective

Provide **up-to-date financial news**, analyze **financial sentiment**, and explain **personal impact**.

Functionality

* Fetch finance-related news
* Perform sentiment analysis
* Classify news into topics (markets, funds, economy)
* Map news sentiment to user spending/saving profile

ML / NLP Model

* **FinBERT** (pre-trained transformer)

Input Columns

Column	Description
headline	News title
content	Full article text
published_date	Timestamp
source	News source

Output

Output	Meaning
sentiment_label	Positive / Neutral / Negative
sentiment_score	Confidence

🔹 Module 2: Alternative Credit Scoring (Behavioral)

Objective

Generate a **dynamic credit score** based on *how* users spend money daily.

ML Algorithm

* **XGBoost / Random Forest**

Input Features

Feature	Description
monthly_income	Income
total_spent	Monthly spend
essential_spend_ratio	Essentials %
discretionary_spend_ratio	Non-essentials %
luxury_spend_ratio	Luxury spend
investment_spend_ratio	Investments
savings_ratio	Savings / income
avg_transaction_amount	Mean spend
transaction_frequency	Count

Output

Output	Meaning
credit_score	Numeric score
risk_category	Low / Medium / High

🔹 Module 3: Personalized Fraud Detection (User Safety)

Objective

Detect **deviations from personal spending behavior** to prevent scams and unauthorized use.

ML Algorithm

* **Isolation Forest** (primary)
* Autoencoder (optional DL upgrade)

Input Features

Feature	Description
amount	Transaction value
transaction_time	Hour
merchant_category	Encoded
location	City
device_type	Web/Mobile
historical_avg_amount	User baseline
historical_frequency	User baseline

Output

Output	Meaning
anomaly_score	Deviation level
alert_level	Low / Medium / High

🔹 Module 4: Spending Forecasting

Objective

Predict **future spending trends** to help users plan ahead.

ML / DL Algorithm

* **LSTM (Time-Series DL)**

Input Features

Feature	Description
date	Date
daily_spend	Aggregated spend
category_spend	Per category
month	Seasonality
holiday_flag	Optional

Output

Output	Meaning
predicted_spend	Next month forecast
trend	Increase / Stable / Decrease

🔹 Module 5: Smart Savings & Investment Suggestions

Objective

Convert **saved money + market sentiment** into **actionable insights**.

Algorithm

* Rule-based engine

* K-Means (user profiling – optional)

Input Features

Feature	Description
monthly_savings	Saved amount
risk_profile	Low / Medium / High
news_sentiment_score	Market mood
investment_history	Optional

Output

Output	Meaning
suggested_fund_type	Equity / Debt / Index
allocation_amount	Suggested amount

🔹 Module 6: AI Financial Copilot

Objective

Provide a **conversational interface** that explains predictions, spending, and news impact.

Capabilities

* Answer “what-if” financial questions
* Explain ML outputs
* Suggest budgeting & savings
* Contextualize financial news

Design Principle

❌ LLM does NOT make predictions
✅ LLM explains model outputs via APIs

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5 System Architecture

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Frontend (HTML / CSS / JS)
        ↓
FastAPI Backend (JWT Secured)
        ↓
-----------------------------------------------
| News Engine | Credit Engine | Fraud Engine |
-----------------------------------------------
        ↓
ML/DL Models + SHAP Explainability
        ↓
AI Copilot (LLM – Explanation Layer)
```

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6 Technology Stack

Frontend

* HTML5
* CSS3
* JavaScript (Vanilla)
* Chart.js

Backend

* FastAPI
* SQLite / PostgreSQL

ML / DL

* Python
* Scikit-learn
* PyTorch / TensorFlow
* SHAP

NLP

* HuggingFace Transformers
* FinBERT

AI Copilot

* LLM (API or local)
* Prompt engineering
* Tool calling via backend APIs

7️⃣ Datasets

Purpose	Dataset
Fraud & Transactions	PaySim
Credit Behavior	Synthetic banking data
Financial News	Kaggle finance news datasets

8️⃣ Security & Ethics

* No raw transaction data sent to LLM
* Explainable predictions (SHAP)
* Privacy-preserving design
* Non-judgmental alerts
* Educational investment guidance

9️⃣ Non-Functional Requirements

* Scalable modular design
* Explainability-first ML
* Low-latency API responses
* User-centric UX

🔟 Project Scope (Academic)

✔ Covers DL + NLP + Fintech
✔ Real-world relevance
✔ Feasible in 2–3 months
✔ Strong viva & resume impact

1️⃣1️⃣ Future Enhancements

* Blockchain-based transaction logging
* RegTech compliance checks
* Personalized tax-saving suggestions
* Multi-language AI copilot

⭐ Final Panel One-Liner

> **“FINVERSE is an explainable, AI-powered personal finance intelligence system that combines behavioral credit scoring, personalized fraud detection, real-time financial news sentiment, and an AI copilot to guide users toward better financial decisions.”**