AI Asset Price Predictor - Product Requirements Document

Version: 2.0 | Date: 2026 | Status: ACTIVE

1. Executive Summary

AI Asset Price Predictor is a machine learning-powered trading assistant that predicts stock and cryptocurrency prices using advanced algorithms and technical analysis. The application fetches real-time market data, analyzes 25+ technical indicators, and provides AI-generated trading signals with risk management recommendations.

2. Problem Statement

Individual traders lack access to sophisticated AI tools that institutional investors have. They need:

- Accessible price predictions without complex setup

- Comprehensive technical analysis in one interface

- Risk-aware trading recommendations

- Real-time market data without expensive subscriptions

3. Solution Overview

A web-based AI trading assistant that:

✅ Predicts prices using XGBoost ML models

✅ Analyzes 25+ technical indicators

✅ Provides BUY/SELL/HOLD signals with confidence levels

✅ Fetches real-time data from multiple free APIs

✅ Offers complete risk management strategies

✅ Works 100% free with synthetic data fallback

4. Target Users

- Retail Investors: Individual stock/crypto traders

- Day Traders: Short-term position traders

- Swing Traders: Medium-term technical traders

- Educational Users: Finance students learning technical analysis

- Financial Analysts: Quick market analysis tool

5. Core Features

5.1 Data Management

- Real-time data fetching from 5+ free APIs (Finnhub, Alpha Vantage, Yahoo Finance)

- Automatic fallback to realistic synthetic data

- Smart caching system (1-hour TTL)

- Support for 1000+ stocks and cryptocurrencies

5.2 Technical Analysis

- 25+ technical indicators including:

  - Moving Averages (5, 10, 20, 50, 200 days)

  - RSI (Relative Strength Index)

  - MACD (Moving Average Convergence Divergence)

  - Bollinger Bands

  - Volume indicators

  - Volatility measures

  - Support/Resistance levels

5.3 AI Prediction Engine

- XGBoost machine learning model

- 7-day price predictions

- Accuracy tracking (70-85% on test data)

- Feature importance analysis

- Confidence scoring

5.4 Trading Recommendations

- Intelligent signal generation (STRONG BUY, MODERATE BUY, HOLD, MODERATE SELL, STRONG SELL)

- Risk score calculation (0-100 scale)

- Entry/Exit price targets

- Stop-loss and take-profit levels

- Position sizing advice

- Time horizon recommendations

5.5 Visualization

- Interactive candlestick charts with Plotly

- Multi-panel technical analysis dashboard

- Real-time price charts with predictions

- Volume analysis with color coding

- RSI and MACD indicator charts

5.6 User Interface

- Clean, professional Streamlit web interface

- Mobile-responsive design

- Quick prediction buttons for popular symbols

- Batch analysis for multiple symbols

- API key management panel

- Data source status indicators

6. Technical Architecture

6.1 Tech Stack

- Frontend: Streamlit (Python web framework)

- ML Models: XGBoost, Scikit-learn

- Data Processing: Pandas, NumPy

- Visualization: Plotly, Plotly Express

- Data Sources: Finnhub API, Alpha Vantage API, Yahoo Finance, Twelve Data API

- Caching: Local file-based cache with Parquet/CSV

6.2 System Flow

1. User inputs symbol → 2. Fetch data from APIs → 3. Calculate technical indicators → 4. Train/run ML model → 5. Generate predictions → 6. Create trading signals → 7. Display results with charts

6.3 Error Handling

- Multi-API fallback system

- Synthetic data generation when APIs fail

- Graceful degradation

- Comprehensive logging

7. Performance Requirements

- Prediction Time: < 5 seconds per symbol

- Cache Hit Rate: > 80% for repeated symbols

- API Success Rate: > 95% with valid keys

- Memory Usage: < 500MB

- Concurrent Users: Support 10+ simultaneous users

8. Security & Compliance

- API keys stored locally (not transmitted)

- No user data collection

- Educational purpose disclaimer

- No financial advice liability

- Open-source transparency

9. Success Metrics

- User Adoption: 100+ active users monthly

- Prediction Accuracy: > 75% on real data

- API Reliability: > 90% uptime

- User Satisfaction: > 4.5/5 rating

- Feature Usage: Technical indicators > 80% usage rate

10. Future Enhancements

- Portfolio tracking and management

- Backtesting engine

- Social sentiment analysis

- News integration

- Telegram/WhatsApp alerts

- Advanced ML models (LSTM, Transformers)

- Mobile app version

- Real-time WebSocket updates

- Paper trading simulator

11. Constraints & Limitations

- Free API rate limits (60 calls/min for Finnhub)

- Synthetic data for symbols without API access

- 7-day maximum prediction horizon

- Educational purpose only (not financial advice)

- No real-time execution capabilities

12. Dependencies

- Python 3.8+

- Free API keys (optional but recommended)

- Internet connection

- 2GB RAM minimum