

Team - Exception

FinBot: Personal Finance Advisor & Market Sentiment Dashboard

Objectives

- **Personalized Investment Recommendations**
Deliver tailored portfolio suggestions based on user risk profile, financial goals, and live market signals using hybrid AI models.
- **Market Sentiment & Trend Analysis**
Extract and track sentiment from financial news, social media (e.g., Twitter/X), and forums to support proactive investing.
- **Anomaly & Risk Detection**
Detect sudden market movements or asset volatility using statistical and ML-based anomaly detection to alert users instantly.
- **Goal Forecasting & Financial Planning**
Estimate savings requirements for personal goals like buying a home, travel, or retirement, and project capital growth accordingly.
- **AI-Powered Voice Assistant**
Provide a conversational interface that allows users to ask questions and receive real-time insights and investment suggestions through natural language.
- **Interactive Financial Dashboard**
Visualize portfolio composition, sentiment scores, anomaly alerts, and goal progress through dynamic charts and metrics.

Project Description

FinBot ingests user portfolios, real-time asset data, financial news, and social media sentiment to generate personalized recommendations, detect risk events, and help users stay on top of market movements. We'll build ETL pipelines, develop hybrid recommender systems, forecast future savings goals, and integrate LLM-powered voice interaction. The platform culminates in a real-time, analytics-rich dashboard tailored for investors and financial product teams.

Deliverables

Data Ingestion & ETL

- Ingest data from APIs like **Alpaca**, **Yahoo Finance**, **CoinGecko**, **NewsAPI**, **Twitter/X**.
 - Clean and merge price, sentiment, and portfolio data.
 - Normalize asset categories, tokenize text data, and store in **MongoDB**.
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Exploratory Data Analysis (EDA)

- Visualize price trends, user behavior patterns, and portfolio risk exposure.
 - Analyze sentiment per asset and sector over time.
 - Detect sparsity and volatility in user portfolios and asset classes.
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Recommendation & Forecasting Models

- **Risk-Based Portfolio Recommender:**
Build personalized allocations using Modern Portfolio Theory or ML-based risk profiling.
 - **Sentiment-Aware Recommender:**
Combine BERT-based sentiment with historical return correlations to drive suggestions.
 - **Goal Forecasting:**
Use time series models (e.g., ARIMA, LSTM) to project goal feasibility based on user savings and market outlook.
 - **Anomaly Detection:**
Identify sudden price drops/spikes using Isolation Forest, Z-score analysis, or Bayesian changepoints.
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Cold-Start & Behavioral Strategies

- Use metadata embeddings and trending-by-sector models to recommend assets to new users.
 - Classify users into financial personas (e.g., “Crypto Enthusiasts”, “Safe Investors”) using behavioral clustering.
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Evaluation & A/B Testing

- Offline metrics: **Sharpe Ratio**, **Precision@K**, **NDCG**, **Coverage**, **Novelty**.
 - Simulate synthetic portfolio outcomes and compare algorithm variants in A/B tests.
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Interactive Dashboard

Build with **Streamlit** or **Dash**:

- Portfolio breakdown and trend visualization
 - Sentiment tracker by asset, industry, or market
 - Anomaly alert monitor and watchlist triggers
 - Goal planner for projected milestones and required savings
 - User behavior explorer (e.g., asset switching patterns)
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Model Serving & Scheduling

- Deploy recommender and sentiment models via **FastAPI** or **Flask**.
- Use **Airflow** or **Prefect** to automate daily retraining and data refresh.
- Containerize all components using **Docker** for easy deployment.

Advanced Features

AI-Powered Voice Assistant

- Integrate a conversational agent using **LangChain + OpenAI API** (or Whisper for voice-to-text).
- Users can ask:
 - “What’s the sentiment on Nvidia today?”
 - “Show me low-risk ETFs for long-term investment.”
 - “How close am I to my vacation savings goal?”

Real-Time Event & Sentiment Monitoring

- Ingest live data streams with **Kafka** to trigger portfolio alerts, breaking news updates, or sentiment spikes.

Explainable Recommendations

- Use **SHAP** or **LIME** to explain recommendations:
 - “Recommended due to positive earnings, high sentiment, and portfolio diversification.”

Conversational Search Interface

- Let users search the market using natural language:
 - “Find tech stocks under \$50 with strong growth.”
 - “Recommend altcoins with high social buzz this week.”

Multilingual & Accessibility Support

- Localize interface in major languages (e.g., Hindi, Spanish, French).
- Include audio captions and screen reader compatibility.

Tech Stack

Frontend

- **Next.js** (React-based UI with Tailwind, Chart.js / Recharts for visualization)

Backend

- **Python 3.9+, FastAPI, MongoDB, Docker, Airflow**

Data & ML

- **Pandas, NumPy, scikit-learn, Transformers (FinBERT/BERT), LangChain**

Streaming & Realtime

- **Kafka, WebSockets, Alpaca API, CoinGecko, NewsAPI**

Visualization & Dashboard

- **Streamlit, Dash, Recharts / D3.js**