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Specifications Document: AUTOtrade

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Contents

I Project Definition

AUTOtrade is a sophisticated stock trading system designed to revolutionize the financial trading experience. By integrating time series analysis, large language models (LLMs), and intelligent agents, the system enables informed and automated trading decisions. A central agent, known as the "trader," utilizes real-time insights from diverse data sources to execute buy and sell actions within a predefined budget. This innovative approach addresses key challenges in modern trading, including information overload, time constraints, and behavioral biases.

II Context

The financial markets landscape has undergone a radical transformation compared to the previous century. This evolution is characterized by three fundamental changes:

1 The Emergence of High-Frequency Trading:

Transactions are now executed in milliseconds, creating an environment where execution speed becomes a crucial competitive advantage. This evolution has fundamentally altered market dynamics, rendering traditional trading approaches obsolete.

2 The Democratization of Market Data:

Access to market data has significantly broadened, allowing more participants to engage in financial markets. This democratization has increased the complexity of market interactions and the need for sophisticated analysis tools.

3 The Impact of Social Media:

The instant dissemination of news via social platforms has created a new paradigm where information flows and influences markets in real time, necessitating rapid analysis and response capabilities.

III Identified Challenges

1 Information Overload:

The challenge of information overload manifests in several critical aspects:

- Heterogeneous Data Volume.

  The system must process data from multiple sources:

  - Traditional financial news via the AlphaVantage API
  - RSS feeds from various financial information sources
  - Social sentiment data from Reddit and other platforms
  - Time series of asset prices and volumes

- Integration Complexity.

  Integrating these diverse sources requires:

  - Normalizing data formats
  - Managing different temporal scales
  - Real-time data validation and cleaning

- Need for Automation

  Manual analysis becomes impossible due to:

  - The growing volume of data to process
  - The speed required for analysis
  - The complexity of correlations to identify

2 Time Constraints

Time constraints impose strict requirements on the system:

- Market Reactivity

  The system must handle:

  - Market reactions in milliseconds
  - Instantaneous price variations
  - Short-lived arbitrage opportunities

- Real-Time Processing

  Necessity to:

  - Analyze data streams continuously
  - Maintain consistent performance
  - Optimize latency times

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IV Project Objectives

1 Multi-Source Analysis

The system aims to efficiently integrate and analyze:

- Sentiment Data
  - The AlphaVantage API for real-time news
  - The FinBERT model for financial text analysis
  - VADER for social sentiment analysis
  - RSS feeds for general media coverage
- Technical Data
  - Price time series
  - Calculated technical indicators
  - Transaction volumes
  - Identified market patterns

2 Artificial Intelligence

AI development focuses on:

- Predictive Models
  - Univariate and multivariate LSTM for time series analysis
  - Univariate MLP for price predictions
- Optimization
  - Continuous model calibration
  - Adaptation to market conditions
  - Real-time validation of predictions

3 Decision Automation

Decision automation relies on:

- Decision Engine
  - Three clear options: Buy, Sell, Hold
  - Configurable trading rules
  - Integrated risk management
- Transparency
  - Complete traceability of decisions
  - Documentation of influencing factors
  - Clear performance metrics

V Team Responsibilities

Fatima Zahra Oubella: News Fetching and Sentiment Analysis

Fatima Zahra is responsible for integrating data from financial news sources using APIs like AlphaVantage and performing sentiment analysis using advanced natural language processing tools such as FinBERT. Her role ensures real-time insights are derived from news articles, enhancing the system's responsiveness to market events.

Nassira Nguadi: Reddit Fetching and Sentiment Analysis

Nassira focuses on gathering sentiment data from Reddit and other social media platforms. Using tools like VADER, she analyzes discussions and trends to capture market sentiment. Her work plays a critical role in identifying shifts influenced by social media.

Youness Aabibi: Time Series Analysis and Stock Prediction

Youness specializes in building predictive models for stock price forecasting. Leveraging deep learning architectures like LSTM and MLP, he provides accurate time series analysis, enabling the system to anticipate market movements and generate actionable recommendations.

Firdawsi Amine: AutoTrader and Website Development

Firdawsi oversees the development of the AutoTrader system, ensuring seamless decision automation for buy, sell, or hold actions. He is also responsible for designing and coding the web interface, providing users with an intuitive platform to interact with the system.

Shared Tasks: Documentation, Planning, and Architecture Development

All team members collaborate on project documentation, ensuring clarity and coherence in deliverables. Planning and system architecture development are also joint efforts, ensuring the project's success through collective insights and shared expertise.