A Strategic Framework for XAI-Driven Trading

Autonomous AI Strategy for Next Generation Trading

Brandon, Zaheer, Melissa | STS 420 Final Proposal

The Problem: Data Explosion

90%

Complexity vs. Capacity

90% of all financial data was generated in the last 2 years. The vast majority is unstructured and unreadable by legacy models, leading to structural inequities.

The Three Pillar Framework

Deep RL Engine

Reinforcement Learning agents that optimize execution pathways to minimize market impact and slippage in real time.

GenAI Intel

Advanced NLP agents processing social sentiment, news, and SEC filings in real-time to generate trade signals.

XAI Layer

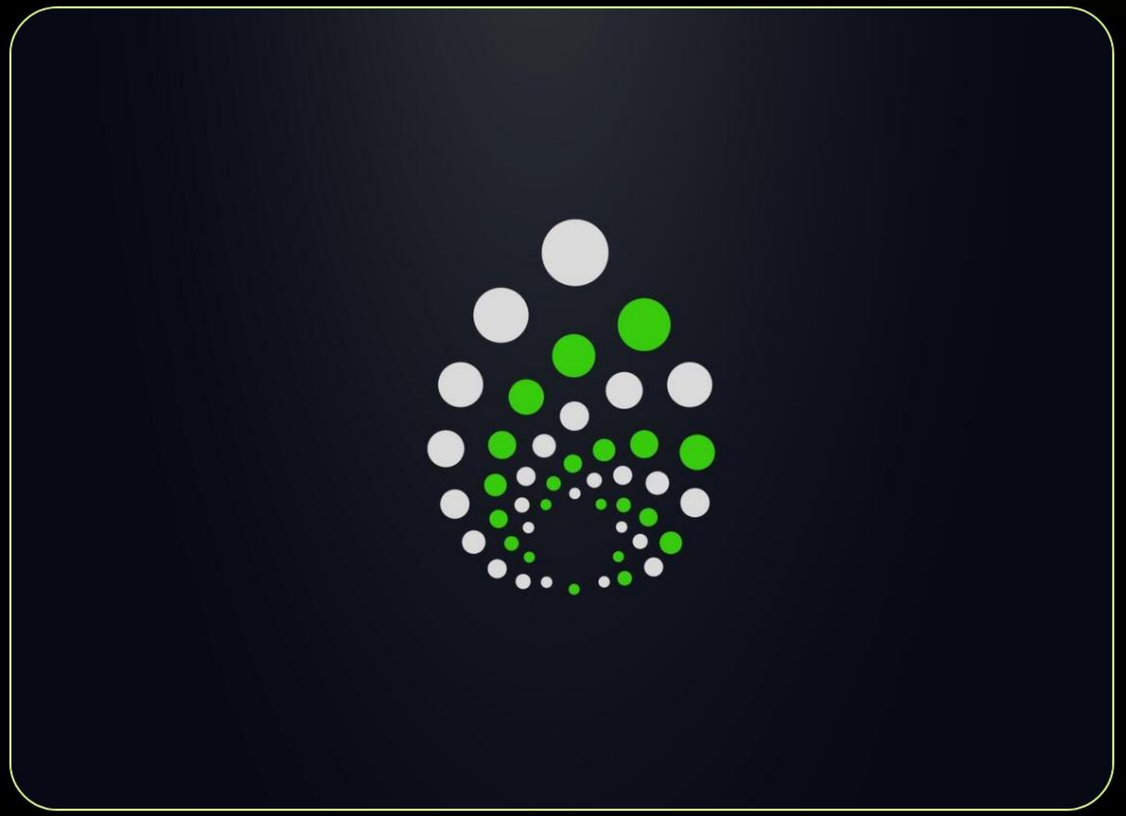
Explainable AI layers that provide a clear, auditable trail for every autonomous decision made by the system.

Processing Market Sentiment

NLP Signal Extraction

The GameStop squeeze showed how social sentiment rapidly influences markets. Our system uses advanced NLP to decode unstructured feeds from news and social platforms.

- → Real-time sentiment scoring
- → Unstructured data ingestion
- → High-speed catalyst detection



Technical Implementation

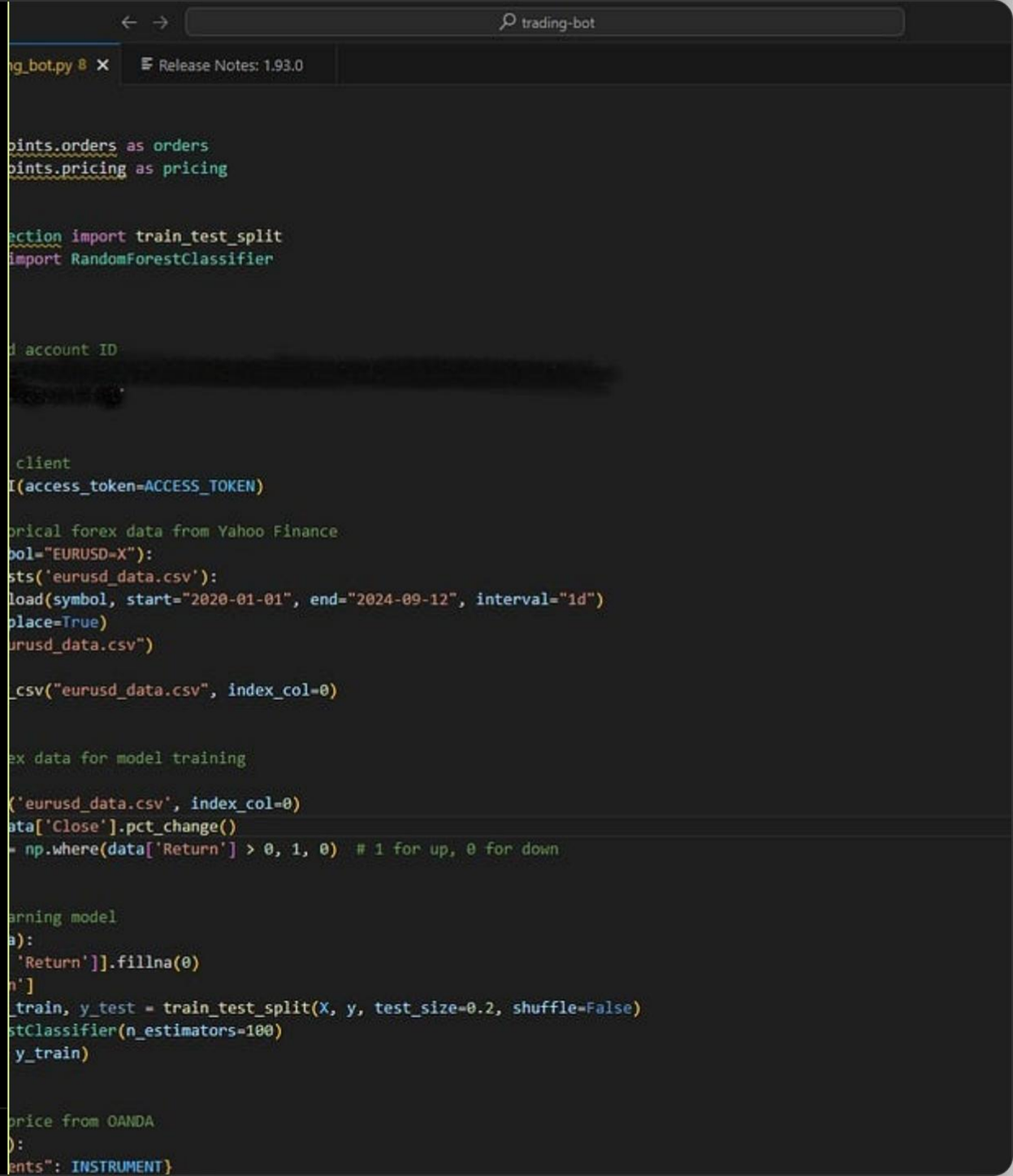
From Conceptual Framework to Functional Prototype

Building the Bot

Functional MVP

We have successfully transitioned from strategy to code. Our Python prototype integrates yfinance and Gemini 2.5 Flash-Lite for high-quota signal generation.

The current iteration handles live price fetching, news synthesis, and generates a structured XAI audit log for regulatory review.



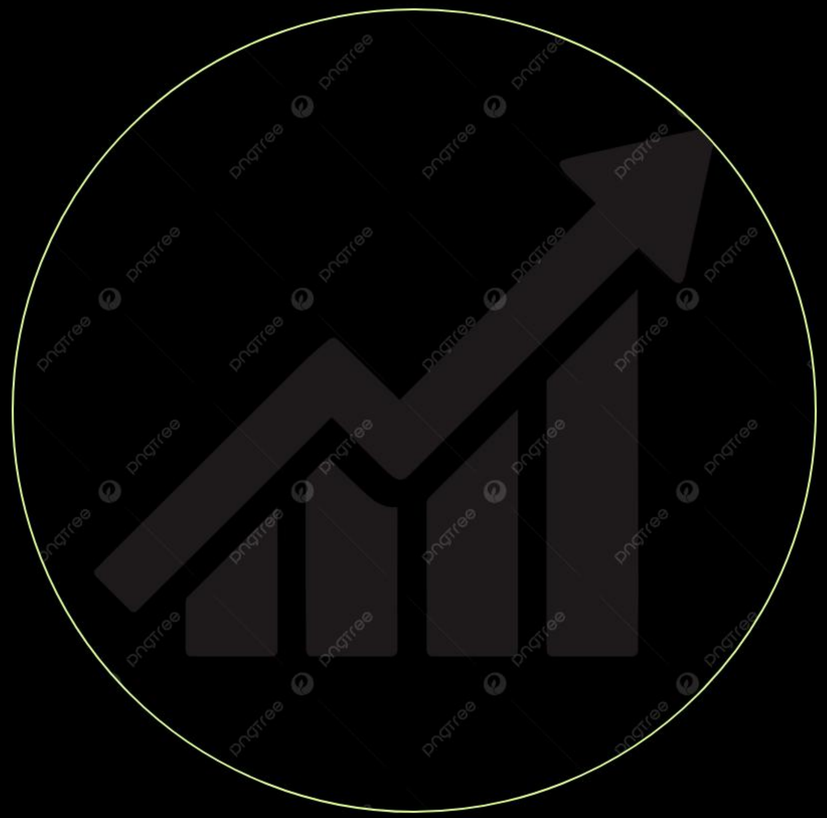
Technical Feasibility

- → **Gemini 2.5 Flash-Lite:** Chosen for its high quota (1,000 requests/day) and low latency.
- → **Python Infrastructure:** Utilizing VS Code and standard libraries for rapid modular development.
- → **Cloud Scalability:** Pre-trained LLMs reduce lead time and capital risk significantly.

Resource Summary

Core Tools: yfinance, pandas, Alpaca Paper-Trading API, Google GenAI. Our modular approach allows for iterative staging without upfront cost.

Case Study: SLV Analysis



Real-Time Audit Log

In our live test on SLV (Silver ETF), the AI generated a HOLD signal at $78.55. The XAI layer explained the decision by weighing historical performance against technical drag.

"The decision balances a 132% yearly gain with significant fee and tax considerations."

XAI Audit Reasoning

Metric	Data Point	Impact Weight	XAI Rationale
Historical ROI	132% Annual	High (+)	Strong momentum justifies maintaining position.
Expense Ratio	0.50%	Moderate (-)	Costs erode net returns over long horizons.
Tax Implication	28% Rate	High (-)	Critical deterrent for short-term rotation.
Market Signal	Mixed	Neutral	Geopolitical uncertainty prevents strong Buy.

Ethical & Regulatory Governance

GDPR Compliance

Ensuring personal data and investing patterns are handled with strict privacy protocols.

AI Act Alignment

Proactive transparency measures to meet the evolving regulatory landscape for financial AI.

Audit Trails

Every autonomous trade creates a log entry, solving the AI "Accountability Gap."

Looking Ahead: Roadmap

Phase 1

Data Pipeline

NLP signal extraction and baseline tests.

Phase 2

RL Engine Live

Paper trade validation and execution optimization.

Phase 3

XAI Integration

Audit layer deployment and regulator reporting.

Phase 4

Market Launch

Live trading and retail access roadmap.

Questions?

A Strategic Framework for XAI-Driven Trading

Brandon, Zaheer, Melissa

STS 420 | Final Integrated Proposal

Image Sources



https://static.vecteezy.com/system/resources/previews/068/083/974/non_2x/leaf-spiral-dot-logo-representing-neural-network-innovation-ai-growth-and-digital-connection-with-green-and-white-color-on-dark-background-abstract-tech-symbol-illustration-vector.jpg

Source: www.vecteezy.com



https://miro.medium.com/v2/resize:fit:1400/1*nkM05fHq2Er1QGrSQNBjSQ.jpeg

Source: medium.com



https://png.pngtree.com/png-clipart/20250530/original/pngtree-minimalist-business-growth-chart-icon-png-image_21092238.png

Source: pngtree.com
