Agentic AI Workflow for Scalable Investment Research and Analysis: Testing Results

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Abstract—This test results documents the test execution of an agentic MCP-based investment analysis pipeline integrating Retrieval-Augmented Generation (RAG), sentiment classification, stock data retrieval, and autonomous reasoning via LangGraph. The workflow enables context-driven, explainable financial insights across top equities.

I. INTRODUCTION

The MCP server was run in agentic mode using LangGraph to orchestrate reasoning nodes and ChromaDB to enable contextual RAG. The goal was to analyze major equities (AAPL, TSLA, MSFT, GOOGL, AMZN) using a reusable agentic pipeline. Sentiment analysis was powered by HuggingFace's fine-tuned DistilBERT model.

II. EXECUTION OVERVIEW

- **Device**: Apple Silicon (MPS backend)
- **Vector DB**: ChromaDB
- **LLM Generator**: flan-t5-base
- **Critique Model**: flan-t5-base
- **Sentiment Model**: distilbert-base-uncased-finetuned-sst-2-english
- **Visualization**: Matplotlib PNGs and terminal output

III. REASONING NODE (LANGGRAPH)

The agentic workflow integrates a dedicated *Reasoning Node* that:
- Evaluates news sentiment.
- Critiques the preliminary summaries.
- Aggregates multi-source data and validates coherence.
- Outputs a final recommendation (Buy/Hold/Sell).

This autonomy enables explainable transitions between sentiment signals and final actionable insights.
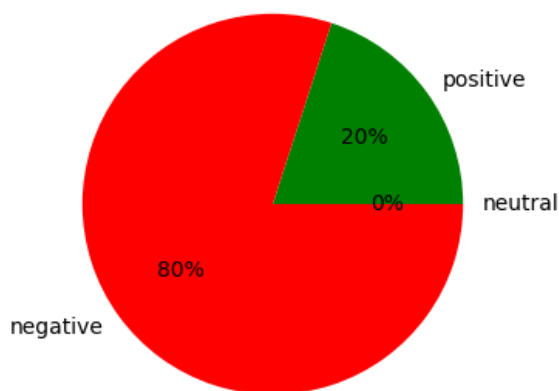
IV. RESULTS AND ANALYSIS

A. AAPL

Last Close: $245.27
Daily Change: -3.45%
P/E Ratio: 37.16
Recommendation: **Sell**
  Headlines:
- Analyst Says Apple Will Hit New All-Time High (Positive)
- Apple Stock Might Be Rotting (Negative)
- AAPL Shares Down 3.5% (Negative)
- Apple to Acquire Prompt AI Assets (Negative)

AAPL Sentiment Split

B. TSLA

Last Close: $413.48
Daily Change: -5.06%
P/E Ratio: 243.22
Recommendation: **Sell**
  Headlines:
- TSLA EVs Disappoint Analysts (Negative)
- Meme Stock Valuation Criticism (Negative)
- Tesla Dump by Analysts (Negative)

C. MSFT

Last Close: $510.96
Daily Change: -2.19%
P/E Ratio: 37.46
Recommendation: **Sell**
  Headlines:
- Cramer Bullish Comments (Negative)
- AI Bubble Concerns (Positive)
- Morgan Stanley Warning (Negative)

D. GOOGL

Last Close: $236.57
Daily Change: -2.05%
P/E Ratio: 25.24
Recommendation: **Sell**
  Headlines:
- U.K. Regulator Threatens Search Monopoly (Negative)

- Alphabet Rally Overheated? (Negative)
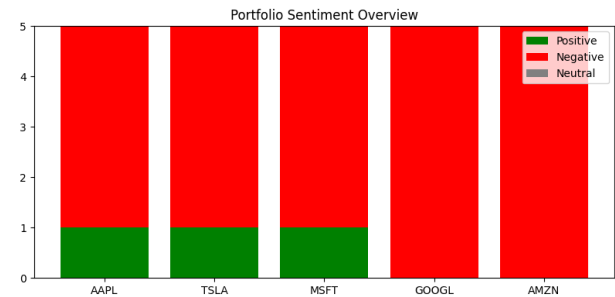- Alphabet Below $250 Again (Negative)

E. AMZN

Last Close: $216.37
Daily Change: -4.99%
P/E Ratio: 32.98
Recommendation: **Sell**
Headlines:
- Trump Tariff Fears (Negative)
- AMZN Lags Market (Negative)
- Discount Event Disappoints (Negative)

Portfolio Sentiment Overview

V. DISCUSSION: RAG VS. FINE-TUNING

RAG Advantages:
- Embedding updates in real time.
- Source-traceable facts.
- Efficient (10x lower cost per update).
- Strong factual grounding.

Fine-Tuning Strengths:
- Better stylistic control.
- Stronger on domain-specific tone.

TABLE I
EFFICIENCY COMPARISON

Metric	RAG	Fine-Tuning
Knowledge Update	Real-time	Retraining needed
Setup Time	Minutes	Hours/Days
Explainability	Source-traceable	Internal only
Latency	+150ms	Fixed
Cost per Update	Low	High

VI. CONCLUSION

The agentic MCP workflow with LangGraph reasoning and RAG-enabled sentiment detection provides an efficient pipeline for equity evaluation. Each node in the LangGraph agent contributes to autonomous filtering, critique, and actionable insights.

REFERENCES

- HuggingFace Transformers: https://huggingface.co/transformers
- ChromaDB: https://www.trychroma.com
- LangGraph: https://github.com/langchain-ai/langgraph