Group 3 Project Summary: Intelligent Finance Agent for Stock Analysis and Recommendation

This project presents a modular AI-driven finance agent designed to provide actionable stock market insights and recommendations based on a combination of historical price data, market trend analysis, and real-time financial news. The agent leverages multiple components working together to deliver comprehensive research, analysis, and final buy/not-buy recommendations that can be deployed as a chatbot or integrated into larger financial advisory tools.

Key Components and Workflow

1. Research Planning (PlannerAgent)
   The agent begins by outlining a structured plan for analyzing a stock, including collecting one year of historical price and volume data, computing key market trends, and generating an evaluation summary. This step sets the foundation for methodical and reusable research logic.

2. Data Acquisition (DataAgent)
   Historical daily price data is fetched directly from Yahoo Finance's public API, focusing on recent 1-year trading activity. The data is cleaned and validated, particularly extracting the closing price to assess recent market behavior.

3. Market Trend Analysis (AnalysisAgent)
   Using the acquired data, the agent calculates daily returns to deduce average price change and volatility, thereby detecting whether the stock is trending upwards or downwards. This quantitative summary balances recent market dynamics.

4. Keyword Extraction for News (Helper Function)
   To enhance decision-making, relevant keywords tied to the stock's ticker, industry, and sector are dynamically extracted from Yahoo Finance metadata. These keywords enable focused searches for news articles related to the stock.

5. News Retrieval and Summarization (NewsAgent)
   The agent fetches financial news headlines from multiple freely available RSS feeds (including Yahoo Finance, CNBC, and Reuters). Headlines are filtered by the keyword list to ensure topical relevance. The resulting brief news summary helps incorporate market sentiment and developments.

6. Final Recommendation Generation (SummaryAgent)
   Utilizing a state-of-the-art natural language generation model (Google's Flan-T5), the agent synthesizes data trends and recent news to produce a clear "buy" or "not buy" recommendation. The output is concise, interpretable, and grounded only in available quantitative and textual data.

7. Knowledge Embedding and Memory (MemoryAgent)
   Summaries and insights are stored using sentence embeddings and efficient similarity search (FAISS index) to maintain contextual memory. This allows future queries and expansions on past recommendations, supporting persistent and contextual financial advisory.

8. Quality Evaluation (EvaluatorAgent)
   The clarity and usefulness of each recommendation are assessed by an expert-tuned language

model, providing feedback on whether the output is actionable or needs refinement. This meta-review step ensures higher reliability in deployment scenarios.

Technologies Used

- Python ecosystem: yfinance, pandas, numpy for data handling.

- Natural Language Processing: Transformers (Flan-T5), Sentence Transformers embeddings.

- Information Retrieval: RSS feed parsing through feedparser.

- Similarity Search: FAISS for memory encoding and retrieval.

Use Cases and Impact

- Provides retail traders and financial analysts with automated, data-driven stock evaluations.

- Combines fundamental price trends with qualitative news sentiment analysis for well-rounded perspectives.

- Enables integration into conversational AI platforms or standalone analytics dashboards.

- Supports extension with further financial indicators, corporate event data, or user personalization.

Conclusion

This project demonstrates an effective architecture for building intelligent finance agents combining quantitative finance, NLP, and knowledge memory. It leverages accessible free data sources and advanced AI models to democratize financial research and decision-making assistance through automated, real-time insights.