School of Computer Science & Engineering
California State University, San Bernardino Proposal
for CSE 6950 (Graduate Independent Study)

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Project Title: "Financial News Insight Retrieval Tool Using Large Language Models (LLM)"

Abstract:

The News Research Tool for Easy Information Retrieval is an AI-powered application designed to provide fast and comprehensive analysis of financial and stock market news. Using advanced Natural Language Processing (NLP) and Large Language Models (LLMs), the tool allows users to input article URLs or ask domain-specific questions to extract key insights efficiently. It automatically reads financial news, identifies trends, summarizes critical information, and delivers relevant answers in real time. By eliminating the need for manual data extraction and interpretation, this tool enhances research efficiency, making it an invaluable resource for investors, analysts, and financial professionals seeking timely and accurate market intelligence.

Objectives of the Project

1. **Automate Financial News Extraction & Processing** – Efficiently extract and process news articles to generate relevant insights using web scraping and text loading techniques.
2. **Enable Accurate & Fast Information Retrieval** – Use **LLM embeddings** to enable semantic search and provide real-time, context-aware answers to financial queries.
3. **Enhance Decision-Making & Research Efficiency** – Help financial professionals make informed decisions by summarizing news and identifying key trends, reducing manual effort in research.

Significance:

1. **Fast & Automated Analysis** – Quickly processes financial and stock market news, eliminating the need for manual reading and interpretation.
2. **Real-Time Insights & Trend Detection** – Identifies key market trends, sentiment, and financial movements, ensuring timely and accurate information.
3. **Enhanced Decision-Making** – Provides data-driven insights to help investors, analysts, and financial professionals make informed decisions.
4. **Domain-Specific Question Answering** – Allows users to input article URLs or ask finance-related queries to extract relevant insights efficiently.

5. **Reduces Information Overload** – Filters and summarizes critical financial news, presenting only the most relevant details for better research efficiency.

Methodology

Data Collection & Preprocessing

- Users provide article URLs or upload financial news text files.
- The UnstructuredURLLoader or TextLoader extracts raw text from the provided sources.
- Text preprocessing is performed using NLTK/SpaCy, including stopword removal, tokenization, and text cleaning to ensure high-quality input data.

Text Chunking & Embedding Generation

- The extracted news content is divided into smaller semantic chunks using RecursiveCharacterTextSplitter to improve retrieval efficiency.
- Each chunk is converted into vector embeddings using OpenAIEmbeddings to enable semantic search.

. Vector Storage & Retrieval

- The generated embeddings are stored in a FAISS (Facebook AI Similarity Search) vector database, which allows fast retrieval of relevant text segments.
- When a user submits a query, the retrieval system searches for the most relevant chunks based on semantic similarity.

Question Processing & Response Generation

- The retrieved text chunks are passed to a Large Language Model (LLM) using LangChain's RetrievalQAWithSourcesChain.
- The LLM generates concise answers, summaries, or insights based on the retrieved content.
- Sentiment analysis and trend detection may also be applied to further enhance the response.

User Interaction & Visualization

- The results, including summarized insights, sentiment analysis, and relevant answers, are displayed on the Streamlit-based UI.
- Users can interact with the system by submitting new queries, viewing trends, and analyzing insights in real time.

Conclusion:

The News Research Tool for Easy Information Retrieval leverages AI, NLP, and LLMs to automate the analysis of financial news, providing timely, accurate insights without manual effort. By integrating FAISS for fast retrieval, OpenAI embeddings for semantic search, and Streamlit for user interaction, the tool enhances research efficiency and decision-making. It empowers investors and analysts with deeper market intelligence, making it a valuable resource in today's fast-paced financial environment.