

Deep Research AI Agentic System

This project implements an **AI Agentic System** designed to perform **deep research** by crawling the web using **Tavily**, processing the data using **LangChain**, and orchestrating tasks through **LangGraph**. It is designed with a modular, dual-agent architecture to ensure clarity, separation of responsibilities, and scalability.

Objective

To build a robust, scalable system with the following agents:

- **Research Agent:** Crawls the web and gathers relevant information using the Tavily API.
- **Drafting Agent:** Consumes the collected research and generates a detailed answer using GPT-4 (OpenAI) through LangChain.

System Architecture

User Query

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[Research Agent] → Tavily Search API → Summarized Research Data

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[Drafting Agent] → GPT-4 via LangChain → Final Written Answer

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Output

Both agents are coordinated using LangGraph, ensuring structured execution and reproducibility.

Technology Stack

LangChain LLM integration and data chain creation

LangGraph State management and agent orchestration

Tavily API Web search and advanced result aggregation

OpenAI API Answer generation using GPT-4

Colab Development and testing environment

Implementation Flow

1. **User inputs a research question.**
2. **The Research Agent:**
 - Queries the Tavily API
 - Gathers and formats summaries of web pages
3. **The Drafting Agent:**
 - Takes the research summaries
 - Uses GPT-4 to generate a coherent, structured answer
4. LangGraph orchestrates the two agents in a sequential graph.

Sample Use Case

Query: *"Role of AI in Cricket?"*

Output:

Artificial Intelligence (AI) has the potential to revolutionize cricket in various ways. It can enhance player performance assessment, improve decision-making during matches, and bring efficiency, accuracy, and competitiveness to the game. Innovations such as Hawk-Eye technology, AI-powered player performance analysis, and virtual reality experiences for spectators have already transformed cricket. AI is being harnessed to enhance performance, provide valuable insights, and make informed decisions. By utilizing AI technology, athletes and teams can gain a competitive edge thanks to data-driven analysis and real-time feedback.

AI's integration into cricket is multifaceted and profound. It assists in analyzing performance, recognizing player patterns, analyzing pitch conditions, and devising bowling and batting strategies. AI also plays a pivotal role in monitoring players' health. By scrutinizing movements and identifying potential injury risks, AI ensures that players maintain peak physical condition. Wearable sensors and AI-powered tools track workload, muscle strain, and recovery patterns, empowering medical teams to act proactively and prevent injuries.

AI's role in enhancing broadcasting and fan engagement is also significant. As AI continues to evolve, its influence on cricket will undoubtedly grow. The integration of AI into player performance analysis, health monitoring, and broadcasting is redefining the sport, making it more competitive and engaging for fans. However, it's important to find a balance between leveraging AI for strategic gains and preserving the human element that makes cricket distinctive.

AI's ability to process and analyze vast datasets, understand complex patterns, and predict future outcomes can significantly enhance the cricket team selection process. By providing a more objective, comprehensive, and forward-looking approach, AI can help selectors make informed decisions, ultimately leading to more competitive and successful teams. While AI won't replace the human element in decision-making, it serves as a powerful tool that complements human judgment, offering insights and reducing biases.

In conclusion, the integration of AI in cricket underscores a significant shift towards a more technologically advanced and data-driven approach to the sport. As AI continues to evolve, its applications within cricket are proving invaluable across multiple dimensions. The future promises even greater advancements as AI technologies become more sophisticated, potentially introducing new strategies and insights that could redefine competitive dynamics and fan interaction. Embracing AI is not just about keeping up with technological trends but about pushing the boundaries of what is possible in cricket, making the game more exciting, fair, and engaging for all.