



SYMBIOSIS INSTITUTE OF TECHNOLOGY, NAGPUR

Constituent of Symbiosis International (Deemed University), Pune

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COMPUTER SCIENCE AND ENGINEERING
BATCH 2022-26

AI Research Agent

Course Name: **Flexi Credit Course Generative AI**

Course Code: **705210704**

Semester: **VII**

Section: **C**

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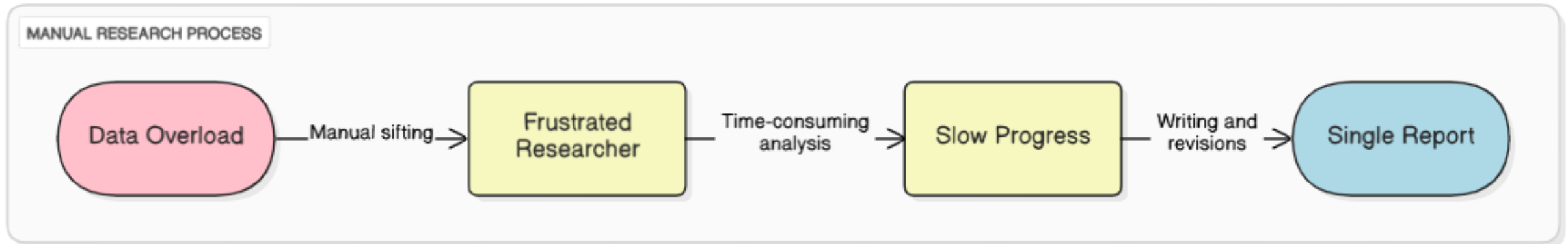
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Problem Statement

Key Point: Traditional research is a major bottleneck in the modern, data-rich world.

- **Information Overload:** It's impossible for a person to manually sift through all available data.
- **Time-Consuming:** The manual process of gathering, analyzing, and writing takes days or weeks.
- **High Cost:** This process is resource-intensive and prone to human bias and error.
- **The Challenge:** How can we get from a simple topic to a deep, comprehensive report in minutes, not days?



Our Solution

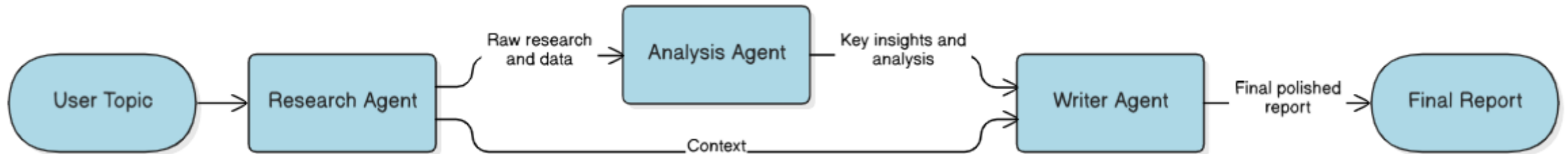
Key Point: A platform that automates the entire research lifecycle by simulating a specialized AI team.

- Acts as a "force multiplier" for any student, analyst, or researcher.
- Provides an end-to-end solution: from a single topic to a full, professional report.
- Built on a multi-agent architecture where specialized AI agents collaborate.
- Delivers in-depth, structured, and data-driven reports on demand.

System Architecture

Key Point: The project's core is a pipeline of three specialized agents, each with a distinct job.

1. **Research Agent:** Gathers raw data, market trends, key statistics, and expert opinions.
2. **Analysis Agent:** Receives the research. Identifies patterns, performs SWOT analysis, and extracts critical, actionable insights.
3. **Writer Agent:** Receives both the research and the analysis. Synthesizes all findings into a polished, professional report with an executive summary and recommendations.



Technology Stack

Key Point: We used modern, powerful tools to build this solution.

- **Python:** The core programming language.
- **Streamlit:** Used to build the fast, interactive, and theme-friendly web application.
- **Google Gemini API:** The generative AI engine that provides the intelligence for all three agents.
- **Plotly:** Used for generating dynamic and interactive data visualizations (market trends, keyword charts).

Methodology

Key Point: The system uses a "Chained-Prompting" method to build context.

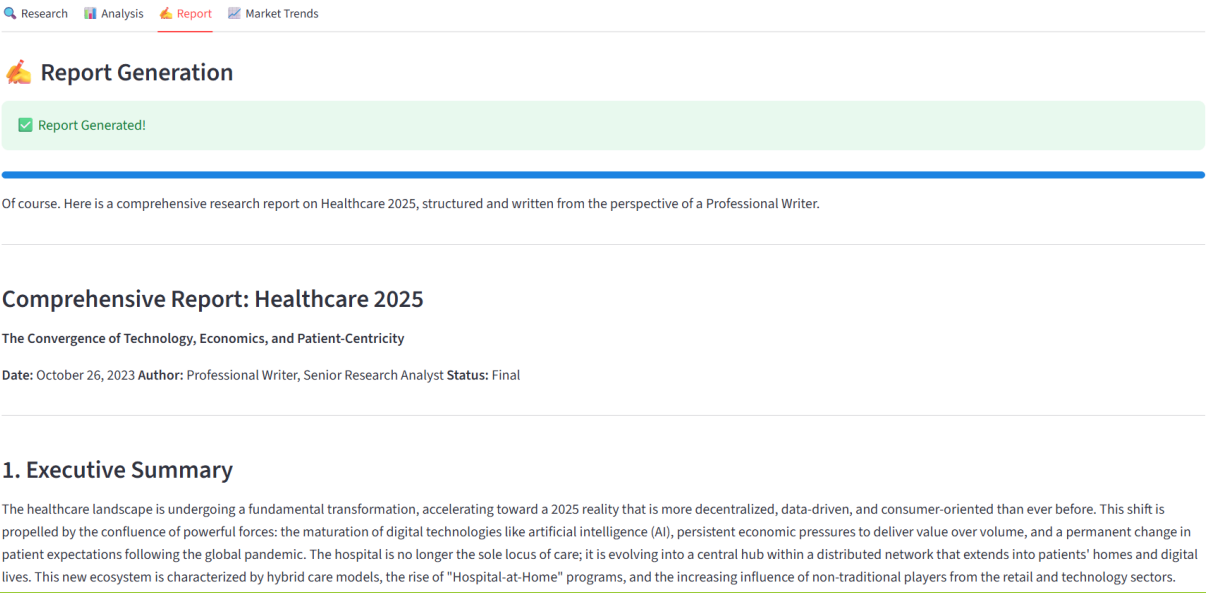
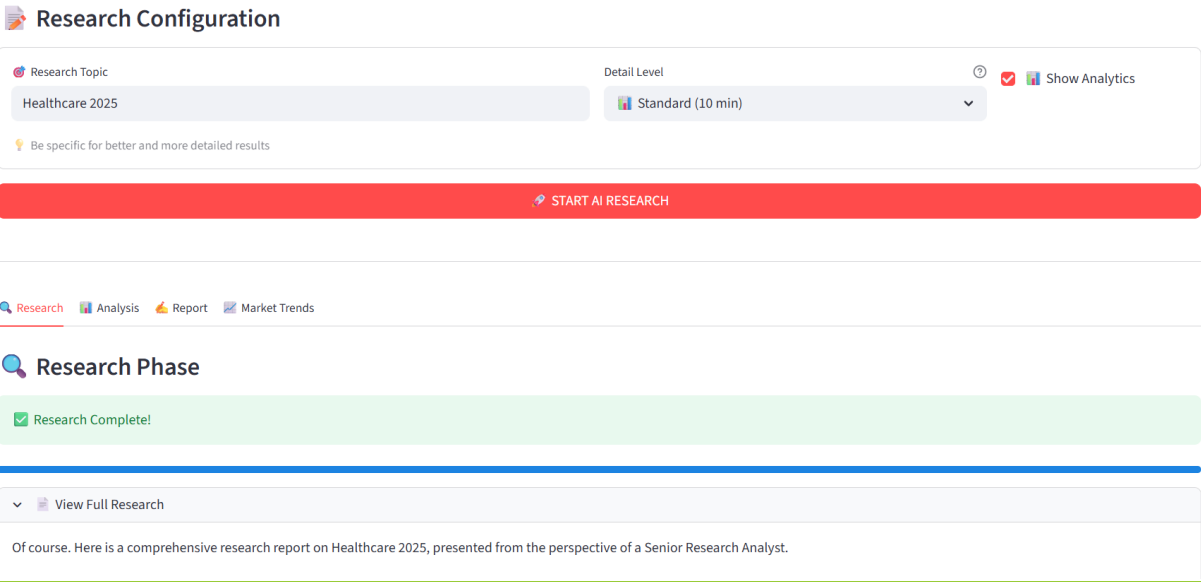
1. User enters a topic (e.g., "Future of Renewable Energy").
2. Phase 1: The **Research Agent** is called. Its output (research_result) is saved.
3. Phase 2: The **Analysis Agent** is called, using the research_result as its context. Its output (analysis_result) is saved.
4. Phase 3: The **Writer Agent** is called, using both the research_result and analysis_result as its full context.

Conclusion: This method is highly effective. It allows each agent to focus on its one specialized task, creating a deeply synthesized final report, not just a simple summary.

Key Features

Key Point: The app provides a clean UI with powerful features.

- **Clean, Tabbed Interface:** Show the main app, highlighting the tabs for "Research," "Analysis," and "Writer."
- **Market Trend Analysis:** Show a screenshot of the "Market Trends" tab with the Plotly charts.
- **Professional Report Generation:** Show a screenshot of the final report in the "Writer" tab.
- **Download Options:** Highlight the "Download" buttons.



Applications

Key Point: This tool is versatile and valuable for many users.

- **Academic & Writing Assistance:** Students and researchers can generate essay drafts and literature reviews.
- **Study Material Generation:** Quickly create custom study guides on complex topics.
- **Idea Brainstorming:** Content creators can find trends, stats, and new angles for articles.
- **Business Analysis:** Analysts can generate preliminary market, competitor, and trend reports.

Future Scope

Key Point: The platform has a clear path for future enhancements.

- **Add Voice I/O:** Integrate speech-to-text and text-to-speech for better accessibility.
- **Support Multiple Languages:** Allow users to research and generate reports in languages other than English.
- **Add Verification Modules:** Integrate plagiarism and fact-checking modules to ensure originality and enhance the trustworthiness of the generated content.

Conclusion

Key Point: The AI Research Agent successfully automates the complex research workflow.

- **Successfully Demonstrated:** The project proves that a multi-agent AI system can effectively handle complex research, analysis, and writing.
- **High-Quality Output:** The chained-prompting method produces high-quality, relevant, and well-structured reports.
- **User-Friendly:** The Streamlit application makes this powerful technology accessible to everyone, regardless of technical skill.
- **Final Thought:** This project bridges the gap between raw data and actionable knowledge, highlighting the value of AI in automating intellectual tasks.

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