**Study Planner Assistant with RAG**

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**Abstract**

The *Study Planner Assistant with Retrieval-Augmented Generation (RAG)* is an intelligent system designed to help students plan, organize, and optimize their study schedules. Unlike traditional planners that rely on manual entries, this system leverages retrieval-based methods with generative AI to provide accurate, context-aware, and adaptive study plans. The assistant retrieves relevant academic resources, processes them, and generates a personalized schedule that matches each student’s unique needs. This project demonstrates the role of RAG in education and highlights its potential to transform digital learning support.

**Chapter 1: Introduction**

Managing academic schedules has always been a challenge for students. With increasing course loads, multiple exams, and extracurricular activities, students often struggle with prioritizing tasks. Traditional planners provide static schedules that do not adapt to changes such as postponed exams, missed deadlines, or sudden workload increases.

The Study Planner Assistant aims to solve this problem by creating a system that is **dynamic, intelligent, and personalized**. By using RAG, the system retrieves relevant information from textbooks, notes, and previous exam papers, and then generates a context-aware schedule. The assistant also adapts the plan as deadlines or priorities change, ensuring flexibility and efficiency.

**Chapter 2: Problem Statement**

Students face the following issues in current study planning methods:

1. Inability to adapt to last-minute academic changes.
2. Lack of integration with study resources.
3. Over-reliance on manual planning tools.
4. High stress due to inefficient time management.

To overcome these limitations, an AI-based intelligent planner is required that combines **data retrieval** with **contextual generation** to ensure accuracy and personalization.

**Chapter 3: Objectives**

The primary objectives of the project are:

* To build a smart planner that helps students manage their schedules efficiently.
* To use Retrieval-Augmented Generation for generating reliable and context-based responses.
* To minimize manual effort by automating scheduling tasks.
* To integrate adaptive features such as progress tracking and personalized suggestions.
* To develop a scalable solution that can be applied to both students and professionals.

**Chapter 4: Literature Review**

Existing tools such as Google Calendar, Notion, and Microsoft To-Do provide generic task management but fail to offer **personalized study assistance**. AI-based chatbots provide interactivity but often generate vague, non-contextual responses.

Research on RAG (Lewis et al., 2020) has shown its effectiveness in knowledge-intensive tasks. By combining document retrieval with generative models, RAG ensures that responses are grounded in facts while retaining the flexibility of natural language generation. This makes RAG a suitable approach for building an adaptive study assistant.

**Chapter 5: System Architecture**

The proposed system is divided into the following modules:

1. **User Interface (UI):** Students interact with the assistant through a simple web or app interface.
2. **Retriever Module:** Fetches relevant academic content from notes, textbooks, and databases.
3. **Generator Module:** Uses a Large Language Model to create schedules and study suggestions.
4. **Planner Engine:** Designs adaptive daily/weekly plans, sets priorities, and tracks progress.
5. **Database:** Stores syllabus, resources, and student profiles.

The architecture ensures smooth integration of **retrieval and generation**, enabling accurate and adaptive outputs.

**Chapter 6: Methodology**

The methodology includes:

1. **Data Collection:** Gathering syllabus, lecture notes, textbooks, and exam timetables.
2. **Preprocessing:** Converting resources into embeddings and storing them in a vector database.
3. **Retriever (R):** Fetching the most relevant information for a given query.
4. **Generator (G):** Producing intelligent, context-aware responses based on the retrieved content.
5. **Planner Module:** Allocating study hours, scheduling revisions, and suggesting breaks.
6. **Integration:** Combining all modules to form a single seamless system.

**Chapter 7: Implementation Details**

* **Frontend:** HTML, CSS, JavaScript, or React for a modern UI.
* **Backend:** Python with Flask/Django for server logic.
* **Database:**
  + Vector DB (FAISS/Pinecone) for retrieval.
  + SQL/NoSQL DB (MySQL/MongoDB) for user data.
* **Model:** RAG with a pre-trained LLM such as GPT or LLaMA.
* **Deployment:** Cloud servers (AWS/GCP/Azure) for scalability.
* **Security:** Authentication and encryption for user data.

**Chapter 8: Use Cases**

1. **Exam Preparation:** Personalized study schedules for exams.
2. **Competitive Exams:** Structured plans for GRE, GATE, UPSC, etc.
3. **Daily Study Routine:** Adaptive allocation of subjects and revision slots.
4. **Collaborative Planning:** Group projects and shared schedules.

**Chapter 9: Advantages & Applications**

* Personalized and adaptive study plans.
* Integration of reliable knowledge sources.
* Stress reduction by automating planning tasks.
* Scalability to corporate training and professional learning.

**Chapter 10: Limitations**

* Dependent on quality of resources provided.
* Requires high computational power for large datasets.
* Needs regular updates to stay aligned with curricula.

**Chapter 11: Future Scope**

* Voice-enabled interaction for accessibility.
* Integration with e-learning platforms like Coursera or Udemy.
* Gamification for motivation (streaks, rewards).
* Multi-language support for wider adoption.
* AI-driven analytics to track weak areas.

**Chapter 12: Conclusion**

The Study Planner Assistant with RAG provides a practical and innovative solution for academic challenges. It combines retrieval and generation to produce personalized, reliable, and dynamic study plans. The project demonstrates how AI can revolutionize education by making study planning **smarter, adaptive, and stress-free**.