Deep Learning Engineer Assignment: Intelligent Document Processing Agent

Objective

The goal of this assignment is to design and implement an AI-powered agent that can efficiently process and analyze a collection of research papers in PDF format. The agent should be capable of extracting structured information from these documents and answering complex user queries based on their content.

Requirements

The assignment consists of three key tasks:

1. Document Processing and Information Extraction

- Develop a pipeline that ingests multiple PDF documents (academic papers).
- Extract meaningful text and structure (titles, abstracts, sections, tables, and references).
- Ensure high accuracy in content extraction, preserving equations, figures, and tables where possible.

2. Intelligent Querying Mechanism

- Implement an NLP-powered interface that allows users to query extracted content.
- The agent should support:
    - Direct content lookup (e.g., "What is the conclusion of Paper X?")
    - Comparison across papers (e.g., "Compare the results of Paper A and Paper B.")
    - Summarization of key insights (e.g., "Summarize the methodology of Paper C.")
    - Extraction of specific evaluation results (e.g., "What are the accuracy and F1-score reported in Paper D?")

3. Deployment and Usability

- The agent should be accessible via a simple CLI or Notebook.
- The system should handle multiple PDF uploads and process them in parallel.

Implementation Guidelines

- Use a combination of OCR (if needed) and NLP techniques for text extraction.
- You can use any LLM for the implementation.
- You can use a RAG system if you think it is required.
- Optimize performance to ensure quick responses to user queries.
- For the core agent implementation, do not use LangChain, LangGraph or similar libraries. Instead, write it using your own Python code.

Deliverables

- A brief report (README or a separate document) explaining:
    - The architecture and approach used.
    - The steps taken for information extraction and query processing.
    - Challenges faced and solutions implemented.
    - Instructions for setting up and running the agent.
- (Optional) A short video demo showcasing the agent in action.

Evaluation Criteria

- **Accuracy of extracted information** (correct structure and content parsing).
- **Capacity to handle complex queries** (ability to correctly interpret and respond to advanced questions such as comparisons, summarizations, and evaluation result extractions).
- **Accuracy of responses** (relevance and correctness of information provided by the agent).
- **Scalability and efficiency** (handling multiple papers and large documents).
- **Code quality and documentation** (clean, modular, and well-explained codebase).

Good luck! We look forward to seeing your solution.