

Day 8: Advanced Libraries & AI Integration

1. PyPDF2 Library

PyPDF2 is a Python library for interacting with PDF files. It allows programs to read, extract, and manipulate PDF documents without manually opening them.

Key Concepts:

- **Reading PDFs:** Open and navigate through PDF files programmatically.
- **Extracting Text:** Retrieve text content from pages for analysis, summarization, or processing.
- **Merging Documents:** Combine multiple PDF files into a single document.
- **Splitting PDFs:** Extract specific pages to create new files.
- **Document Metadata:** Access information such as author, title, and creation date.

2. OpenAI API

The OpenAI API provides access to AI models, like GPT, which can generate text, answer questions, or perform tasks based on input prompts.

Key Concepts:

- **Setting Up Client:** Authenticate your application using an API key to securely access OpenAI services.
- **Making Completion Requests:** Send instructions (prompts) to the model to generate text, complete tasks, or answer queries.
- **Understanding Responses:** The API returns structured responses that can be processed and displayed in your application.
- **Rate Limits & Quotas:** Respect API usage limits to avoid errors or throttling.

3. Prompt Engineering

Prompt engineering is the practice of designing input queries to get the best results from AI models.

Key Concepts:

- **Effective Prompts:** Clear, specific, and structured instructions improve output quality.
- **System vs User Messages:**
 - **System Messages:** Provide context or define the behavior of the AI.
 - **User Messages:** The actual instructions or queries for the AI to respond to.
- **Iterative Refinement:** Adjusting prompts based on model responses to achieve more accurate or useful outputs.

4. API Response Handling

Proper handling of API responses ensures your application works reliably and gracefully.

Key Concepts:

- **Parsing Responses:** Extract relevant information from structured outputs returned by the AI.
- **Error Handling:** Detect and manage issues such as invalid requests, timeouts, or exceeded rate limits.
- **Validation:** Ensure the response matches expected formats before using it in your program.

5. Token Management

AI models process text in units called tokens. Understanding them is key to optimizing performance and cost.

Key Concepts:

- **Understanding Tokens:** A token can be a word, part of a word, or punctuation. Both input and output consume tokens.
- **Managing API Costs:** Longer prompts or responses use more tokens, increasing usage costs.
- **Efficient Usage:** Minimize unnecessary text and choose the right model size to balance cost and quality.