

**Programming for AI**

**Task 11**

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**1. LangChain**

* LangChain is a tool that helps developers connect LLMs (like ChatGPT) with other things like documents, tools, or databases.

It makes it easier to build **AI apps** that can talk, search, remember, and take action.

* You don't need to build everything from scratch LangChain gives you the parts to make an AI assistant that can think and act.

**Example:**

If we want to make an AI chatbot that reads PDFs and answers questions from them, LangChain can help us to do that.

**RAG (Retrieval-Augmented Generation)**

* RAG is a smart technique where an AI doesn't just rely on what it was trained on.

Instead, it first searches for useful info (retrieval), then uses it to generate an answer (generation).

**Example:**

If we ask the AI about a topic in our notes, RAG will search notes first and then answer based on that not just from memory.

**LLMs (Large Language Models)**

* LLMs are AI models that understand and generate human language. They are trained on a lot of text and can answer questions, write essays, translate, and more.

**Example:**

ChatGPT is an LLM. It can talk with you like a human.

1. **FAISS** 
   * FAISS is a tool that helps you find similar things very fast like finding similar texts or images.

It works with vectors (numbers that represent text).

**Example:**

If you want to find hadiths similar to a given one, FAISS can do that quickly by comparing their vector values.

1. **Vector** 
   * A vector is a list of numbers that represents something like a word, sentence, or image in a way the computer understands.

**Example:**

The sentence “he is kind” becomes a vector like [0.5, 0.9, -0.3, …] inside the computer.

1. **VectorDB (Vector Database)** 
   * A special type of database that stores **vectors** and helps to **find similar ones** quickly.

**Example:**

If you save 1000 hadiths as vectors in a VectorDB, you can easily ask: “Which hadith is closest to this topic?”

1. **Generative AI** 
   * It’s AI that can **create new things** like text, images, music, code, etc.

**Example:**

ChatGPT writing an essay or DALL·E creating an image from text is generative AI

1. **GANs (Generative Adversarial Networks)** 
   * GANs are a **type of AI** where two models **compete** with each other — one tries to create fake data (like images), and the other tries to catch it.

This back-and-forth helps generate **very realistic images or videos**.

**Example:**

AI-generated fake faces or fake art often come from GANs.