

The Superior University, Lahore

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| Course Title: | PAI LAB | | |
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Task – 11

TASK -11:

**1. LangChain**

**Think of it like a helpful manager for AI apps.**  
LangChain is a framework that helps developers connect large language models (LLMs) with **real-world tools**, like **databases, documents, and search engines**. On its own, an AI might just generate text, but LangChain helps it take actions, remember past chats, look things up, and more.

LangChain is like giving a smart assistant not just a brain (LLM), but also a phone, a notebook, and internet access—so it can do more than just talk.

**2. RAG (Retrieval-Augmented Generation)**

**Let’s say your AI doesn’t remember everything—it can “go read” before answering.**  
RAG combines **searching** and **text generation**. Before answering a question, the AI first **retrieves relevant documents or facts** from a knowledge base (like Wikipedia or a company database), then uses that to **generate a more accurate answer**

It’s like when someone asks you a question, and instead of guessing, you Google it first and then explain it in your own words.

**3. LLMs (Large Language Models)**

**These are the "brains" behind AI tools like ChatGPT.**  
LLMs are trained on huge amounts of text so they can understand and generate human-like language. They don’t “know” things like a human does but are really good at predicting what text should come next.

It’s like a super-smart autocomplete, but one that can write essays, chat with you, or summarize books.

**4. FAISS (Facebook AI Similarity Search)**

**A tool to find "what’s most similar" to something.**  
FAISS is a **library** developed by Facebook to help you quickly search through **millions of items** (like documents or images) to find the ones that are most similar to a given query—based on **vectors**.

Imagine you walk into a massive library and ask, “Give me books most like this one.” FAISS finds them instantly using math.

**5. Vector**

**A smart way to represent meaning as numbers.**  
In AI, text (or images) are turned into **vectors**, which are just lists of numbers. These numbers capture the **meaning or context** of the data, so the AI can compare things mathematically.

If every sentence were a coordinate on a map, vectors are what help you place them. Sentences with similar meanings are “close together” on this map.

**6. VectorDB (Vector Database)**

**A special kind of database that stores and finds vectors.**  
Unlike regular databases (which store rows and columns), a **VectorDB** stores **vectors** and is designed to **quickly search** for similar ones. It’s often used in RAG systems to find relevant info before answering.

Think of it like a music app that doesn’t just search by title, but by “vibe”—it finds songs that *feel* like the one you’re listening to.

**7. Generative AI**

**AI that *creates* things.**  
This refers to AI that can generate content—like text, images, code, music, and even video. Tools like ChatGPT, DALL·E, or GitHub Copilot are all forms of generative AI.

🎨 *Analogy*: It’s like giving a robot a blank canvas and asking it to draw, write, or sing something brand new.

**8. GANs (Generative Adversarial Networks)**

**A clever “two-AI” system where one creates and the other critiques.**  
GANs have two parts: a **generator** (that tries to make something realistic, like a fake photo), and a **discriminator** (that tries to spot if it’s fake). Over time, they get better by competing, and the generator learns to create very convincing results.

Imagine a forger trying to create fake art and an expert trying to catch the fakes. They push each other to get better—and eventually, the fakes look real.