

**PAI LAB**

**Task # 11**

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**Subject:**

PAI

# **1. LangChain**

**LangChain** is a Python framework that helps developers build applications powered by **Large Language Models (LLMs)**.  
It provides tools to:

* Chain together different components (like prompts, memory, and models)
* Use LLMs to interact with external data sources (files, databases, APIs)
* Build complex workflows (e.g., document Q&A, summarization, chatbots)

*Think of LangChain as a toolbox for using LLMs in real-world apps.*

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

**RAG** is a method where the LLM retrieves **relevant information from a database or documents** before answering.  
It combines:

* **Retrieval** (searching for facts)
* **Generation** (LLM writing a response)

Example: Instead of just guessing, the LLM first fetches data from documents using a search system, then answers.

*It makes answers more accurate by grounding them in real facts.*

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

LLMs are **AI models trained on massive text data** to understand and generate human-like language.  
Examples include:

* ChatGPT (by OpenAI)
* LLaMA (by Meta)
* Claude (by Anthropic)

They can write code, answer questions, summarize, translate, and more.

*LLMs are the brain behind chatbots and AI writing tools.*

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

**FAISS** is a **library developed by Facebook AI** that helps you search for similar vectors quickly.

Use case:

* When you convert text into vector form, FAISS helps you find the most similar ones efficiently.

*It’s like Google Search but for numbers (vectors).*

# **5. Vector**

A **vector** is a list of numbers that represents the **meaning of text** in numerical form.

Example:

* “Hotel” → [0.12, -0.88, 0.45, …]

LLMs and AI use vectors to compare words, sentences, or documents.

*Vectors help machines “understand” text by converting it into numbers.*

# **6. VectorDB (Vector Database)**

A **VectorDB** is a database that stores **vectors instead of regular text or numbers.**  
It allows you to:

* Store vector embeddings of documents
* Perform similarity search (find documents similar to a query)

Examples: **Pinecone, Weaviate, Chroma, FAISS**

*Used in RAG systems to search documents with LLMs.*

# 7. Generative AI

**Generative AI** refers to AI systems that can **create new content**—text, images, music, video, and more.

Examples:

* ChatGPT (text)
* DALL·E (images)
* GitHub Copilot (code)

*It generates original data instead of just analyzing existing data.*

# 8. GANs (Generative Adversarial Networks)

**GANs** are a type of generative AI model made of two parts:

* **Generator:** creates fake data
* **Discriminator:** tries to detect if the data is real or fake

They “compete” with each other to improve generation quality.

*Used for creating realistic images, deepfakes, and artwork.*