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**Lab 11 Task**

In this lab task, The terms are described as Follows

**1. LangChain**

LangChain is a powerful open-source framework that helps developers build applications using large language models (LLMs). Instead of calling a model like GPT-4 directly, LangChain allows you to connect the model with tools, memory, databases, and documents.

**Example**: Suppose you're building a chatbot that can search your files and answer questions. LangChain can help you connect the LLM to your files, retrieve the right data, and generate a smart response.

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

RAG is a technique used to improve how LLMs answer questions. Instead of relying only on what the model "knows," RAG fetches relevant information from an external database or documents before generating the final response.

**Example**: If you ask an LLM about recent news, a RAG system will first retrieve relevant news articles and then let the model generate an accurate answer based on them.

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

LLMs are AI models trained on a large amount of text data to understand and generate human-like language. Examples include OpenAI’s GPT-4, Google’s Gemini, and Meta’s LLaMA.

**Example**: ChatGPT is based on an LLM. You ask a question, and it replies in fluent, often intelligent language.

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

FAISS is an open-source tool developed by Facebook to efficiently search and compare high-dimensional vectors. It’s mainly used for fast similarity search in large datasets.

**Example**: If you want to find all documents similar to a given paragraph, FAISS can quickly return the most relevant ones based on vector similarity.

**5. Vector**

In the context of AI, a vector is just a list of numbers that represents text, images, or other data in a mathematical form that the computer can understand. It is a way to convert human language into a format that AI can process.

**Example**: The sentence “I love AI” might be converted into a vector like [0.1, 0.8, 0.4, ...] to capture its meaning.

**6. VectorDB (Vector Database)**

A VectorDB is a special kind of database designed to store and search these vectors efficiently. It is used in AI systems to store embeddings of text, images, etc., and quickly find similar items.

**Example**: Pinecone, Weaviate, and Chroma are popular vector databases used in applications like semantic search, RAG, and recommendation systems.

**7. Generative AI**

Generative AI refers to AI systems that can create new content such as text, images, music, code, or even videos. These systems learn from existing data and then generate something new based on that learning.

**Example**: ChatGPT writes essays, DALL·E generates images from text, and GitHub Copilot writes code — all of them are Generative AI tools.

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

GANs are a specific type of generative AI model made of two parts: a generator and a discriminator. The generator tries to create realistic data (like fake images), and the discriminator tries to detect whether the data is real or fake. Both compete with each other, improving over time.

**Example**: GANs are used to generate realistic human faces that don’t actually exist, or to enhance low-resolution images into HD.