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**Programming for Artificial Intelligence**

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## Task 11

### Describe the difference between:

#### 1. LangChain

- A **Python framework** that helps **build applications** using **LLMs** (like OpenAI models).
- Especially good for connecting LLMs to **external data** (your files, websites, databases).
- **Example:** If you want a chatbot that answers based on your company's documents, LangChain manages that easily.

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

- A **technique** that **retrieves** real data from external sources (like documents, websites) and **feeds it into the LLM** to make responses **more accurate**.
- Instead of the LLM "guessing," it **looks up facts** first, then **generates** a better answer.
- "**Look up + Answer**" instead of just "Answer."

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

- AI models trained on **huge amounts of text** to **understand** and **generate** human-like language.
- They're like super-powerful autocomplete engines that can **write, summarize, chat**, etc.
- **Examples:** GPT-4, Claude, Gemini.

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

- A **library** for **fast searching** through **vectors**.
- Mainly used to **quickly find similar stuff** — like finding the most relevant paragraphs to a question.
- Super important for **RAG systems**.

#### 5. Vector

- A **list of numbers** (like [0.3, 0.9, 0.2, 0.8...]).
- In AI, vectors **represent meaning** — like a sentence or an image — in a **mathematical form**.
- Vectors let computers **measure similarity** between texts, images, etc.

## 6. VectorDB (Vector Database)

- A **special database** made to **store and search vectors** quickly.
- Examples: FAISS, Pinecone, Chroma, Milvus.
- Important for RAG and AI search engines because it **finds similar meanings** instead of just matching words.

## 7. Generative AI

- AI that can **create new stuff**: text, images, music, code, etc.
- Powered mostly by **LLMs, diffusion models**, and **GANs**.
- Example: ChatGPT writing a story, DALL-E making a picture, or an AI composing a song.

## 8. GANs (Generative Adversarial Networks)

- A special type of AI where **two models fight each other**:
    - **Generator**: tries to make fake data (like a fake photo).
    - **Discriminator**: tries to catch if it's fake.
  - They **train together**, getting better and better until the fake stuff looks **real**.
  - Mostly used for **realistic images, deepfakes, art creation**.
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