

**Assignment #11**

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**Comparison of AI/ML Technologies**

| **Concept** | **Description** | **Key Characteristics** | **Primary Use Cases** | **Relation to Other Concepts** |
| --- | --- | --- | --- | --- |
| **1. LangChain** | Framework for building applications with LLMs | - Chains multiple components together - Manages context/memory - Integrates tools/APIs | - Chatbots - Document analysis - Agent-based systems | Built on top of LLMs, often uses VectorDBs |
| **2. RAG (Retrieval-Augmented Generation)** | Architecture that combines retrieval + generation | - Retrieves relevant info first - Generates answers using retrieved context | - Knowledge-intensive Q&A - Factual content generation | Uses VectorDBs + LLMs together |
| **3. LLMs (Large Language Models)** | Deep learning models for text processing | - Billions of parameters - Pretrained on vast text - Fine-tunable | - Text generation - Translation - Summarization | Foundation for LangChain/RAG |
| **4. FAISS (Facebook AI Similarity Search)** | Library for efficient similarity search | - Optimized for vector comparison - GPU acceleration - Approximate nearest neighbors | - Recommendation systems - Semantic search | Core technology for VectorDBs |
| **5. Vector** | Mathematical representation of data | - High-dimensional arrays - Captures semantic meaning - Dense representations | - All ML applications - Data encoding | Building block for VectorDBs |
| **6. VectorDB** | Database optimized for vector operations | - Stores/retrieves vectors - Supports similarity search - Scalable indexing | - Semantic search - Recommendation engines | Uses FAISS/other indexes, stores Vectors |
| **7. Generative AI** | AI that creates new content | - Outputs novel artifacts - Learns data distribution - Various architectures | - Text/image generation - Content creation | Includes LLMs, GANs, diffusion models |
| **8. GANs (Generative Adversarial Networks)** | Neural network architecture for generation | - Generator + discriminator - Adversarial training - Best for media generation | - Image synthesis - Data augmentation | Subset of Generative AI |