

Generative AI with Lang chain

Module 1: Introduction to Generative AI

- What is Generative AI?
- Evolution from GPT-2 to GPT-4
- Common use cases (text generation, chatbots, agents, tools)
- Overview of LLM providers (OpenAI, Anthropic, Cohere, Mistral)

Module 2: Introduction to LangChain

- What is LangChain?
- LangChain architecture & components
- Installation & setup (Python)
- LangChain vs other LLM frameworks (LlamaIndex, Haystack)

Module 3: LangChain Components Deep Dive

- LLMs: Connecting to OpenAI, HuggingFace, etc.
- Prompts: PromptTemplates, few-shot prompts, chaining
- Chains: SimpleSequentialChain, LLMChain, Custom chains
- Memory: BufferMemory, ConversationMemory, EntityMemory
- Agents: Tools, Toolkits, Agent types (ZeroShotAgent, Conversational)

Module 4: Prompt Engineering for LangChain

- Writing effective prompts
- Prompt Templates & variables
- Context window management
- Few-shot prompting with LangChain
- Dynamic prompting

Module 5: Retrieval-Augmented Generation (RAG)

- What is RAG?
- Vector stores overview: FAISS, ChromaDB, Pinecone
- Embeddings: OpenAI, HuggingFace
- Document loaders: PDFs, HTML, YouTube, APIs
- Text splitting strategies

Module 6: Building QA Systems

- Indexing documents
- Retrievers and retriever chains
- Implementing basic RAG pipelines
- Conversational RAG
- Evaluation of RAG performance (precision, hallucination)

Module 7: Building Real-World Applications

Chatbots & Assistants

- Building a conversational agent with memory
- Integrating LangChain with Streamlit/Gradio
- Multi-turn dialogue with context
- Role-based assistants

LangChain Agents & Tools

- Building custom tools
- Using SerpAPI, Wikipedia, Calculator tools
- LangChain Agent types
- Tool calling with OpenAI function calling
- Routing chains & decision logic

Module 8: LangChain with External Systems

LangChain + Databases & APIs

- Integrating SQL/NoSQL databases (Postgres, MongoDB)
- Natural language to SQL queries
- Calling REST APIs with agents
- LangChain Expression Language (LCEL)

LangChain + Web and Cloud

- Deploying LangChain apps to cloud (Render, Vercel)
- LangChain + FastAPI/Flask
- LangServe for API deployment
- LangChainHub usage
- Caching and rate-limiting

Module 9: Advanced LangChain & Productionizing

Evaluation & Monitoring

- LangSmith overview
- Tracing LangChain runs
- Logging inputs/outputs/errors
- Evaluating prompts and chains
- A/B testing

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