

Agentic AI Workshop

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About me

Abhyuday “Abu” Desai, Ph.D.

- Founder, CEO – Ready Tensor, Inc., an AI/ML start-up
- 20+ years in analytics, data science roles
- Led R&D and consulting teams in the analytics space
- Collaborated with teams at many of the largest corporations in the US and internationally
- Ph.D. from Texas Tech University in Operations Research



Agentic AI Workshop 1: What We'll Learn Today

1. Basic LLM Interactions

Text generation, image creation, audio synthesis

2. Embedding & Similarity

- Generate embeddings for documents
- Calculate cosine similarity
- Find most relevant documents to queries

3. Complete RAG System

- Ingest documents into ChromaDB
- Build semantic search pipeline
- Create RAG-powered chatbot

What we will use - OpenAI Python SDK



OpenAI Python SDK

- Official Python library for OpenAI's APIs
- **Chat Completions** - GPT-4, GPT-3.5 for text generation
- **Embeddings** - Convert text to vectors (text-embedding-3-small)
- **Images** - DALL-E for text-to-image generation
- **Audio** - Text-to-speech and speech-to-text
- **Streaming** - Real-time response generation

What we will use - ChromaDB



ChromaDB

- Open-source vector database for AI applications
- Stores embeddings and enables fast similarity search
- In-memory or **persistent** - Choose based on your needs
- Metadata filtering - Search with both vectors and metadata
- Collections - Organize documents into groups
- Query interface - Simple API for similarity search

Setup for the Coding Exercises

Follow these steps:

1. Clone repo:
 - <https://github.com/readytensor/agentic-ai-workshop-1>
2. Create `.env` file in root of your project
 - Use `.env.example` file as reference
3. Setup your OpenAI API Key.
 - Don't have one? Ask program coordinator for a temporary key to use during workshop
 - This temp key will be deleted after the workshop
4. Create virtual env
5. Install dependencies
6. Open jupyter notebook
7. Navigate to the 3 notebook files in `./notebooks`

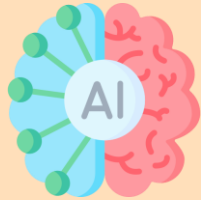
What is Agentic AI?

Agentic AI moves beyond simple input-output to create systems that can **reason, plan, and act independently**.

- AI systems that can **act autonomously to achieve goals**
- Systems that can **use tools, make decisions, and take actions**

LLM Workflows vs Agentic AI

LLM Workflows



- Simple input-output
- No real autonomy
- Static, predictable path

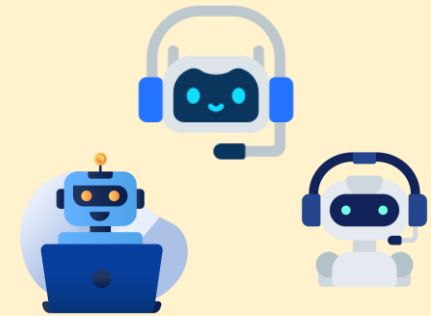
Agentic AI

Single Agent



- Can use tools and APIs
- Makes decisions based on context
- Can take actions to achieve goals

Multi-Agents

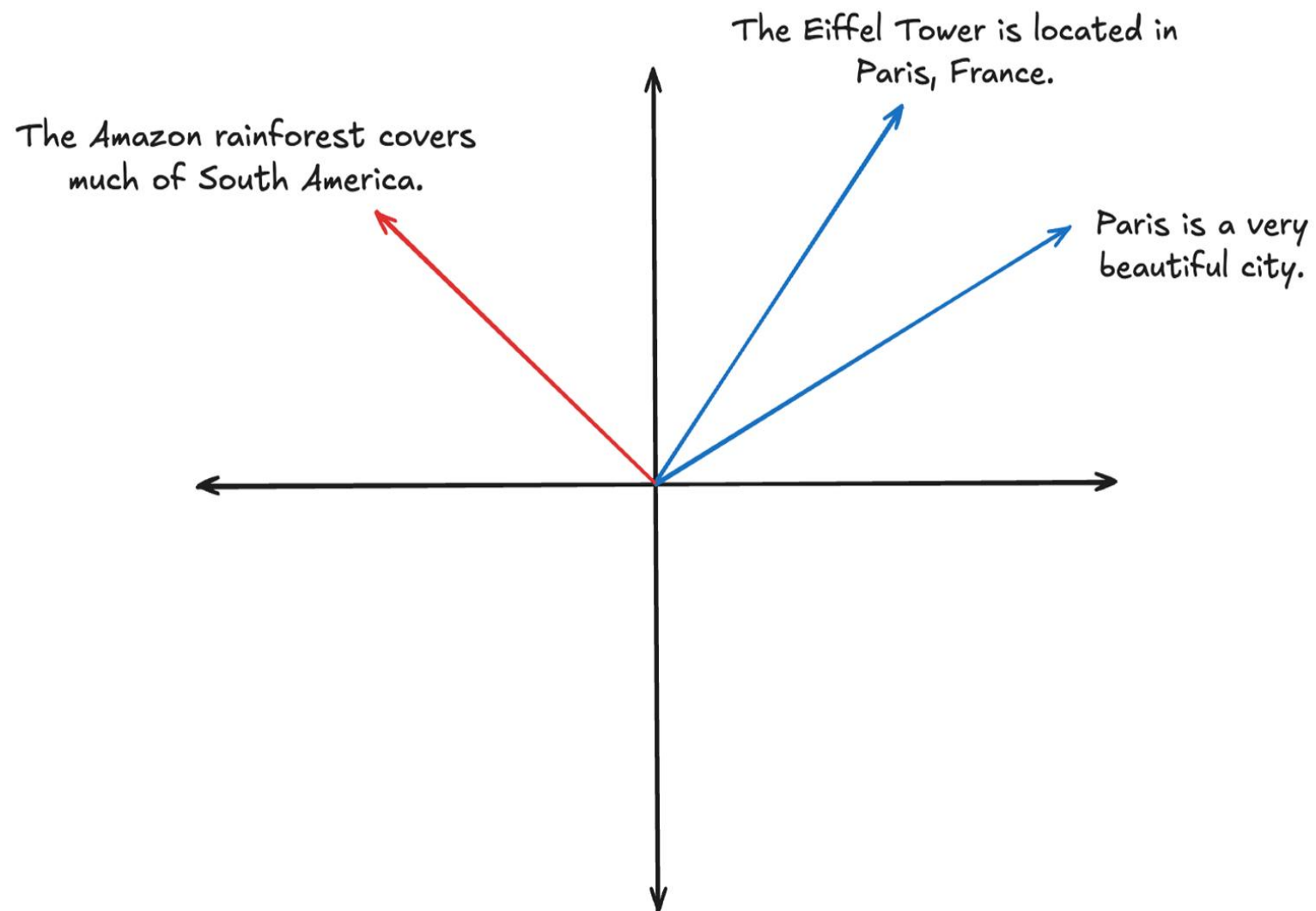


- Multiple specialized agents
- Agents communicate and coordinate
- Complex task decomposition

What are Embeddings?

Numerical representations of text as vectors

- Similar texts have similar embeddings
- High-dimensional (e.g., 1536 dimensions)
- Capture semantic meaning, not just words



Similarity Metrics

Cosine Similarity

- Measures angle between vectors
- Range: -1 to 1
- Higher is better
- Most common

Euclidean Distance

- Straight line distance between 2 vectors
- Range: 0 to infinity
- Lower is better

Cosine Distance

- $1 - \text{Cosine Similarity}$
- Range: 0 to 2
- Lower is better

Retrieval Augmented Generation (RAG)

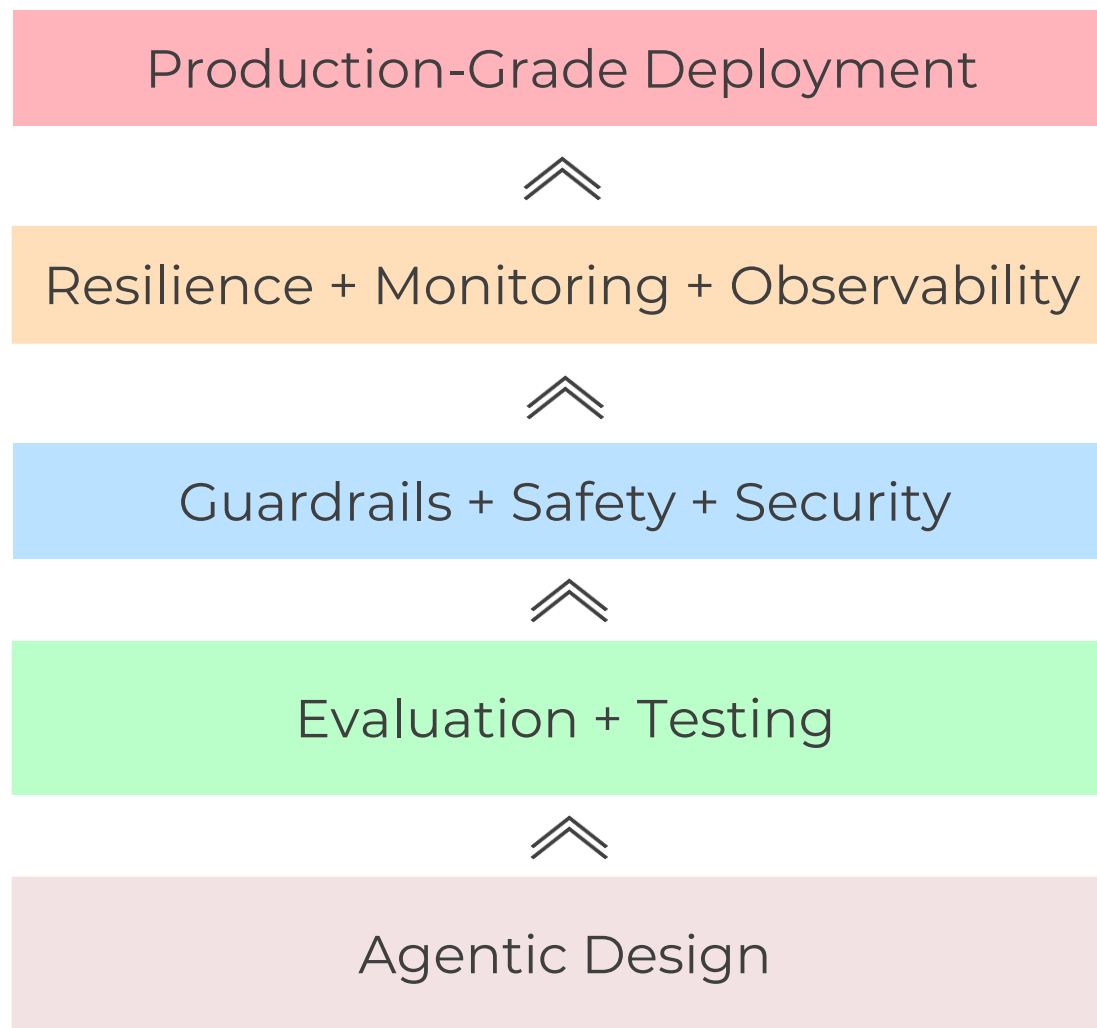
RAG is a technique that combines information retrieval with text generation to provide more accurate and contextual responses.

- Retrieves relevant documents using embeddings
- Uses retrieved context to generate better answers
- Combines search + generation for grounded responses

How it uses embeddings:

- Convert documents to embeddings → store in vector database
- Convert query to embedding → find similar documents
- Use retrieved documents as context for LLM

Agentic Design is Just the Beginning!





Agentic AI Developer Certification

BECOME AN AGENTIC AI DEVELOPER



MODULE 1

Prompt engineering
Reasoning
Tool use
Memory
Vector DBs & RAG



MODULE 2

Multi-agent design
Architectures
Shared memory
MCP
Evaluations



MODULE 3

Guardrails
Safety
APIs / Inference
Monitoring
Observability

Enroll for free: <https://www.readytensor.ai/agentic-ai-cert>



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