Roadmap to Becoming an AI Agent Expert in 2025 with All Resources

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Roadmap to Becoming an AI Agent Expert in 2025 (Inspired from Analytics Vidhya)

This roadmap will guide you through the necessary steps to become an AI Agent expert by 2025, following a structured learning path that covers key concepts, tools, and techniques. You can follow it week-by-week or dive into areas that interest you the most.

Phase 1: Foundation (Weeks 1-3)

Weeks 1-2: Introduction to Generative AI

1. **Key Concepts:**
    - Understand what Generative AI is and its capabilities (content creation, text, images, music).
    - Learn about key models used in Generative AI:
        - GANs (Generative Adversarial Networks)
        - VAEs (Variational Autoencoders)
        - Gaussian Mixture Models (GMMs)
    - Explore advanced models:
        - Diffusion Models
        - Transformer-based models (e.g., GPT, BERT)

    - State Space Models
- Applications in content creation, healthcare, customer service, etc.

Resources:

- GenAI Pinnacle Program
- Generative AI: A Way of Life

Week 3: Build Your First Agent – No Code

1. **Key Concepts:**
    - Use No-Code tools to build your first AI agent.
    - Platforms: Wordware, Relevance AI, Vertex AI Agent Builder.
    - Types of agents to create: chatbots, lead generation agents, personal assistants.

    Resources:

    - 7 Steps to Build an AI Agent with No Code
    - How to Build an AI Chatbot Without Coding?

Phase 2: Coding Fundamentals & LLMs (Weeks 4-7)

Weeks 4-5: Basic Coding for AI

1. **Key Concepts:**
    - Master Python: variables, loops, data structures, functions.
    - Data processing with **Pandas** and SQL for database management.
    - Use APIs to integrate AI systems with external data sources.
    - Build simple AI-powered web apps using **Flask** or **FastAPI**.

    Resources:

    - Python Tutorial

- Getting Started with RESTful APIs and Fast API

Weeks 6-7: LLM Essentials

1. **Key Concepts:**
   - Learn about **Large Language Models (LLMs)**: GPT, BERT, GPT-4o, Claude.
   - Understand Transformer architecture (self-attention mechanisms).
   - Learn how to train and fine-tune LLMs.
   - Applications of LLMs in NLP tasks: chatbots, summarization, translation.

   Resources:
   - Getting Started with LLMs
   - Understanding Transformers

Phase 3: Advanced Agent Building (Weeks 8-17)

Week 8: Prompt Engineering Essentials

1. **Key Concepts:**
   - Learn prompt engineering: structuring and improving prompts.
   - Techniques: zero-shot, one-shot, few-shot, role-based, chain-of-thought prompting.
   - Advanced techniques: self-consistency for reliable answers.

   Resources:
   - Prompt Engineering Guide

Weeks 9-10: Introduction to LangChain

1. **Key Concepts:**
   - Understand LangChain framework and its components (LLMs, Chains, Parsers, Model I/O).

- Build simple conversational applications using LangChain.

Resources:

- What is LangChain?
- Building LLM-Powered Applications with LangChain

Weeks 11-12: RAG Systems Essentials

1. **Key Concepts:**
   - Learn about **Retrieval-Augmented Generation (RAG)** systems.
   - Implement document loading, chunking, and retrieval using vector databases (ChromaDB, Weaviate).
   - Build end-to-end RAG systems by connecting LLMs with databases for context-aware responses.

   Resources:

   - What is RAG?
   - Building Advanced RAG Applications

Week 13: Introduction to AI Agents

1. **Key Concepts:**
   - Learn about **AI agents**: simple reflex, model-based, goal-based, learning agents.
   - ReAct pattern for decision-making.
   - Build agents that think, reason, and act autonomously.

   Resources:

   - What are AI Agents?

Weeks 14-15: Agentic AI Design Patterns

1. **Key Concepts:**
   - Learn design patterns for building Agentic AI:

- Reflection: self-assessment and behavior improvement.
- Tool Use: integrating external tools like APIs for enhanced performance.
- Multi-agent collaboration for distributed tasks.

Resources:

- Top 4 Agentic AI Design Patterns

Weeks 16-17: Build an AI Agent from Scratch in Python

1. **Key Concepts:**
   - Build an AI agent using **Python** and **LLMs** (e.g., GPT-4o, Llama 3.2).
   - Use external tools (APIs) and integrate them into the agent using **ReAct patterns**.
   - Test and refine your agent to ensure it works autonomously.

   Resources:

   - Building AI Agent Tools Using OpenAI and Python

Phase 4: Advanced Agentic AI Systems (Weeks 18-21)

Weeks 18-19: Build Agentic AI Systems with LangChain, CrewAI, LangGraph, AutoGen

1. **Key Concepts:**
   - Build advanced AI systems using **LangChain**, **CrewAI**, **LangGraph**, **AutoGen**.
   - Integrate multi-agent systems for collaborative tasks.
   - Customize tools, states, nodes, and memory checkpoints in **LangGraph**.

   Resources:

   - How to Build AI Agents with LangGraph

Weeks 20-21: Build Advanced Agentic RAG Systems

1. **Key Concepts:**
    - Create advanced **Agentic RAG systems** by integrating external tools like web search APIs.
    - Use **self-RAG** and **corrective RAG** techniques for continuous improvement.
    - Build self-reflective agents for enhanced performance over time.

    Resources:

    - Corrective RAG
    - Building Agentic RAG with LlamaIndex

Resources

Online Courses and Tutorials:

- AI Agents Course by Hugging Face:

  Hugging Face
- AI Agent Course by Salesforce:

  Salesforce
- Learn AI Agents by Coursera:

  Coursera
- AI Agents in LangGraph by DeepLearning.AI:

  DeepLearning.ai
- AI Agents (Part 17 of 18) | Generative AI for Beginners by Microsoft:

  Microsoft Learn
- Elements of AI:

  Elements of AI

Video Tutorials:

- AI Agents Tutorial For Beginners:

  YouTube

- Building AI Agents in Pure Python - Beginner Course:

  YouTube

- AI AGENTS From Zero to Production in 35 Minutes - FULL TUTORIAL:

  YouTube

Guides and Articles:

- How to Build an AI Agent from Scratch? by Analytics Vidhya:

  Analytics Vidhya

- Steps to Build Your Own AI: A Beginner's Guide by Codewave:

  CodeWave

- Mastering AI Agents: The 10 Best Free Courses, Tutorials & Learning Tools by Medium:

  Medium

Repositories and Frameworks:

- AI Agents for Beginners by Microsoft:

  GitHub

- AllenAct: A Framework for Embodied AI Research:

  arXiv

Learning Platforms:

- Artificial Intelligence Fundamentals by IBM SkillsBuild:

  SkillsBuild

- DeepLearning.AI Courses:

  DeepLearning.ai