BUSINESS INTELLIGENCE AND DATA ANALYTICS

University of Petra

Institute of Analytics Recognized Programme

University of Petra

307307
Part 4 – LLM Applications - RAG and Agentic AI

Introduction to Retrieval Oriented Applications (RAG) and Agentic AI

BUSINESS INTELLIGENCE AND DATA ANALYTICS
– WE PREDICT THE FUTURE –

Institute of Analytics
Recognized Programme

University of Petra

Introduction to Retrieval Oriented Applications (RAG)

BUSINESS INTELLIGENCE AND DATA ANALYTICS
– WE PREDICT THE FUTURE –

Institute of Analytics
Recognized Programme

University of Petra

Introduction to Agentic AI

What is Agentic AI?

- Agentic AI refers to AI systems designed to act autonomously to achieve goals.
- Unlike simple models that respond to prompts, agentic systems plan, reason, take actions, and iterate.
- Examples: AutoGPT, BabyAGI, OpenAI Agents.

Key Characteristics of Agentic AI

- Goal-Oriented: Operates toward a defined objective.
- Autonomy: Executes multiple steps without constant user input.
- Memory: Maintains state or knowledge over time.
- Tool Use: Interfaces with external APIs, databases, and environments.

Components of an Agentic AI System

1. Planner: Breaks down goals into actionable steps.
2. Executor: Runs code, queries tools, or calls functions.
3. Memory Store: Retains past actions and decisions.
4. Environment Interface: Integrates with real-world systems (e.g., browsers, databases).

Agent Frameworks and Tools

- LangChain: Compositional chains, memory, and tool integration.
- OpenAI Functions & Assistants API: Define callable functions.
- AutoGPT: Open-source autonomous task agent.
- ReAct: Combines reasoning and acting.

Common Use Cases

- Research Automation (AutoGPT browsing the web).
- Task Delegation (automated personal assistants).
- Multi-step Code Generation.
- Complex Data Pipelines (search, fetch, summarize).
- Business Process Automation (e.g., generating and sending reports).

Code Demo - OpenAI Function Calling Example (Part 1)

```
functions = [
  {
    "name": "get_weather",
    "description": "Get weather info",
    "parameters": {
        "type": "object",
        "properties": {
            "city": {"type": "string"}
        },
        "required": ["city"]
    }
  }
]
```

Code Demo - OpenAI Function Calling Example (Part 2)

```
import openai

  openai.api_key = "your_api_key_here"

  response = openai.ChatCompletion.create(
   model="gpt-4-0613",
   messages=[
     {"role": "user", "content": "What's the weather in Paris?"}
   ],
   functions=functions,
   function_call="auto"
)
•
  print(response.choices[0].message)
```

Challenges and Limitations

- Safety and Control: Autonomous behavior needs oversight.
- Cost and Latency: Long-running or iterative agents consume resources.
- Hallucination: Agents may confidently perform incorrect actions.
- Evaluation: Hard to measure effectiveness of multi-step tasks.

Best Practices

- Define clear boundaries and scopes.
- Monitor outputs and log all actions.
- Combine with human-in-the-loop review.
- Start small and incrementally increase autonomy.

Summary

- Agentic AI represents a shift from passive models to active, goal-driven systems.
- Applications span research, coding, business automation.
- Requires careful design, monitoring, and ethical use.
- Tools like LangChain and OpenAI's functions simplify development.