TUTORIAL

Generative Intelligence and Software Development Lifecycles

Description

This **half-day tutorial** revises the concepts and applications of Generative Intelligence Systems, Agentic Frameworks, and Multi-Agent Systems in Software Development Lifecycles. The use of these technologies is already underway and their rapid evolution promises to unlock unprecedented possibilities such as accelerated prototyping, personalized innovation, and collaborative ecosystems. Researchers, solution architects, and software developers are augmented by GenAI-powered tools to brainstorm on new ideas, elaborate on specific concepts, and develop MVP to support their business proposals. The central questions for our discussion include:

- ❖ What is Generative AI, and how is it different from traditional AI?
- ❖ What are the real-world benefits and limitations of using GenAI in SDLC?
- ❖ What does it mean for an AI to be agentic or autonomous?
- ❖ What are the broader implications around the rise of this technology for the industry, the workforce, and society as a whole?

The objective of this **tutorial** include:

- ❖ Provide attendees with an understanding about Generative Intelligence, Agentic AI, Multi-Agent Systems, and 'automated thinking'.
- ❖ Investigate current perceptions about Generative Intelligence, Multi-Agent Systems, and automated research and development.
- ❖ Explore how GenAI-Multi-Agent Systems have the potential to redefine the essence of collaborative creative process, with the focus on automated research process but extensible to other areas of creative thinking.

Target audience:

Researchers, students, and practitioners with strong technical background and some understanding about AI, Machine Learning, Deep Learning, and programming. The tutorial includes practical demonstrations during this session and exercises that attendants can implement during their own time after the session.

Proposed Structure

Session 1: Foundations of Generative AI (30 mins)

Introduces the concept of Generative Intelligence Systems (GenAI) and its transformative role in industry and society through the lenses of Software Development Lifecycles. We will introduce foundational ideas about GenAI, how it impacts automation of reasoning, and outline practical applications for solution development.

Session 2: Large Generative Models (30 mins)

An in-depth look at the workings of Large Generative Models. Focus on Transformer Architecture, how Generative Models operate, what Generative Models can do, how to submit and configure requests to Generative Models.

Break 15 minutes

Session 3: Prompt Engineering (30 mins)

Learn about Prompt Engineering and how to apply these techniques to the design, structure, and refinement of prompts to optimize results. We discuss the art and science behind effective prompts to interact with Large Generative Models.

Session 4: Generative AI Pipelines (30 minutes)

Learn the impact of AI Pipelines on GenAI-powered solutions and how to design complex AI pipelines that integrate multiple AI services, APIs, and models to create intelligent, adaptive systems.

Break 15 minutes

Session 5: Agentic AI Systems (30 minutes)

Introduction to agent-based systems, concepts of autonomy, reactivity, proactiveness, and social ability. Role of agents in software automation and decision-making. Learn about intelligent agent architectures including BDI (Belief-Desire-Intention) models. Explore simple decision-making and state management.

Session 6: Multi-Agent Systems Architectures (30 minutes)

Introduction to MAS architectures to compose systems of interacting agents, the impact of communication protocols, collaboration models, and conflict resolution strategies. Explore decentralized and dynamic agent networks where agents discover and connect with each other automatically to exchange services and capabilities. Learn about AI systems that collaborate with users or other AI entities in real time to augment creativity, problem-solving, and system development.

Closing: Can GenAI automate the process of creating a Technology Startup? (15 minutes)

Discussion about utilization of GenAI and Agentic AI for the full automation of SDLC covering applications about ideation, market analysis, solution modeling, requirement elicitation, all the way through automation of solution creation, prototyping, and marketing. How far can we get?

Exercises

This tutorial is supported by demonstrations that will be executed presentations. Attendants will be able to execute the exercises after the tutorial by following the instructions at:

http://generativeintelligencelab.ai/exercises.html

About the Instructor

Dr. Fernando Koch is a Research Professor at Florida Atlantic University, where he leads the Generative Intelligence Lab. He is a global leader in Artificial Intelligence and Generative AI with over 30 years of experience spanning academic research, enterprise innovation, and solution architecture. Dr. Koch holds a Ph.D. in Computer Science from Utrecht University and has held leadership roles at IBM Research, Samsung Research, and Openwave, as well as academic appointments at the University of Melbourne and Korea University. His work bridges academia and industry, with a proven track record of driving and scaling AI initiatives across Fortune 100 companies, startups, and research institutions. Dr. Koch is a technical advisor to entrepreneurs and innovation leaders, known for building high-performing development teams and delivering AI solutions in complex enterprise environments. He has co-edited 6 books, authored over 90 scientific publications, and filed more than 100 patent applications (http://www.fernandokoch.me)