Generative AI

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Context

Generative Artificial Intelligence (AI) is part of the broad field of AI focusing on generating content – text, images, videos, program code, audio, various product designs, etc. The key enabling technology of generative AI is Machine Learning (ML) – starting from existing artifacts/data (text, images, videos, and so on) and training models that can then be used to generate output based on the user's prompt and the underlying pre-trained prediction models.

The impact of generative AI is already evident in many industries, as well as in daily work and life – from creating written content, to creating synthetic data that enable experimentation with different What If scenarios, to advancements in customer care, to creating medical images, drug recipes, software design, and many, many more.

Objectives

The major objective of this tutorial is to explain details of generative AI – how it works, what are some necessary requirements, how to apply it, what tools to use, as well as to provide to the attendees some hands-on experience with these tools. In addition, the tutorial intends to introduce and discuss some perks, perils, and implications of generative AI.

Contents

The tutorial starts with a brief introduction to the basic concepts and ideas of large language models, image generation models, video generation models, and the underlying technologies (15-30 min). Then it discusses extensively the advances achieved over the last few years in developing such models and the underlying algorithms and tools for generative AI (about 1 hr 15 min). Special attention is given to the most recent trends in generative AI – prompt engineering, i.e. the process of structuring text that can be interpreted and used by a generative AI model in order to create novel content. A number of existing software tools, applications, systems and development environments are then analyzed in order to illustrate current generative AI technology and to indicate directions for future developments (1 hr 30 min). This part of the tutorial assumes active participation of the attendees, in order to get an effective hands-on experience.

Specifically, the topics covered are:

- generative AI models today
- generative AI tools and services
- architectural aspects of generative AI
- the most widely known algorithms that enable generative AI
- pros and cons of generative AI
- dangers and perils of generative AI
- prompt engineering tips and tricks
- selected examples, languages, approaches, and ongoing projects
    - comparison of generative AI tools and their capabilities

- how to use generative AI in practice to augment everyday work
- stepwise refinement in writing prompts

During the tutorial, the attendees are supposed to work interactively with the tutorial presenter on at least one practical example, using appropriate generative AI tools from the Internet.

Duration of the tutorial

About 3 hours (half day).

Intended audience

IT professionals, startup businesses, developers of Web-based systems, developers of intelligent systems, managers of R&D institutions, students, practitioners, researchers, and other professionals in the broad fields of information technologies and Internet applications.

Prior knowledge required

Only general and vague knowledge of basic concepts in the area of intelligent systems, as well as some basic ideas of AI technologies. All AI concepts necessary for participation in the tutorial will be explained on the spot.

Tutorial presenter

Vladan Devedzic is a Professor of Computer Science and Software Engineering at the University of Belgrade, Faculty of Organizational Sciences, Belgrade, Serbia.

His long-term professional objective is to bring close together ideas from the broad fields of Artificial Intelligence / Intelligent Systems and Software Engineering. His current professional and research interests include artificial intelligence, programming education, software engineering, intelligent software systems and technology-enhanced learning (TEL).

He is the founder and the chair of the GOOD OLD AI research network.

Since 2021, he has been a Corresponding Member of the Serbian Academy of Sciences and Arts (SASA).

For detailed information about his research, project, publications, and work, please refer to his home page.