Design and Optimization of Electromagnetic Shielding Using AI-Based Techniques

Návrh a optimalizace elektromagnetického stínění pomocí technik umělé inteligence

Supevisor: prof. Mgr. Milan Adámek, Ph.D.

Consultant: Ing. Stanislav Kovář, Ph.D.

Department (FAI): Department of Security Engineering

Study program: Security Technologies, Systems and Management

Abstract:

In the era of rapidly advancing Artificial Intelligence (AI) technologies, the responsible development and deployment of AI systems is essential to ensure their ethical and fair use. This thesis topic aims to contribute to the field of Responsible AI in Computer Vision using Generative AI by exploring key research paths. The research will cover the development of methods and techniques to detect and mitigate biases in image recognition systems to promote fairness across diverse races/ethnicities. Within this context, it is necessary to investigate and explore the ethical implications of monitoring systems that use AI and their impact on privacy and civil rights. The student will be responsible to propose strategies for responsible deployment too. Since all the above mentioned computations consume a huge amount of energy, the survey on the environmental consequences of AI in sustainability, such as the carbon footprint of large-scale models training, and the development of strategies for optimization of energy consumption in both training and inference will be provided. Another stage of the topic will be related to the examination of robustness and security of computer vision and generative AI models against adversarial attacks, aiming to develop techniques to make AI systems more resilient and secure in real-world scenarios will be taken into the consideration. The topic area also includes the analysis of interpretability, explainability, and metrics of computer vision and generative AI models to promote transparency and trust, allowing users to understand outputs and processes of AI-based systems. Such an analysis will be followed by the exploration of governance frameworks and regulatory policies that are needed to ensure the responsible development of AI, considering international collaboration and standards.

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Study Program Board´s Standpoint:

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