

Master Thesis

Start: As soon as possible



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Development of an AI-based Approach for Field Data Augmentation

Background / General Task Description:

In contemporary industries such as autonomous vehicle development, the need for diverse and comprehensive datasets for training and testing Artificial Intelligence (AI) algorithms is paramount. However, traditional data collection methods can be prohibitively expensive and raise concerns regarding data security and privacy. This project proposes a novel approach to address these challenges by employing AI to generate high-quality field images, thereby eliminating the need for extensive data collection efforts while ensuring data privacy and security. The primary objective of this master thesis is to develop and evaluate an AI-driven field image generation and data augmentation system that can efficiently generate diverse, realistic, and high-quality images for training models, specifically targeting applications in autonomous vehicle development.

Possible Work Packages:

- **Literature Review and Theoretical Framework:** Examine the theoretical foundations of AI-based image generation techniques, including Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and other relevant methodologies.
- **Design and Implementation of an AI-driven Image Generation System:** Implement the proposed system using appropriate programming languages (e.g., Python) and AI libraries (e.g., TensorFlow, PyTorch).
- **Evaluation of Generated Images:** Utilize quantitative metrics and qualitative evaluations to measure the performance of the image generation system.
- **Comparison with Similar Conventional Methods:** Evaluate factors such as cost-effectiveness, data diversity, and privacy implications to determine the advantages and limitations of each approach.

Your Profile:

- Candidates should have a strong academic background in computer science, machine learning, or a related field, with experience in ML, computer vision, and data generation techniques.
- Experience in working with programming languages such as Python is essential, along with experience in using AI frameworks and libraries such as TensorFlow, PyTorch, or similar tools for machine learning and image processing tasks.
- Candidates should demonstrate a research-oriented mindset and the ability to critically evaluate existing methodologies and propose novel solutions.
- Effective time management and organization skills to handle literature review, quantitative analysis techniques and report writing.
- Readiness to adapt the research direction based on emerging findings and challenges.

Has the topic sparked your interest? If so, we look forward to receiving your application including your CV.