Chair of Computational Modeling and Simulation
TUM School of Engineering and Design
Technical University of Munich

Modeling:
Mathematics:
Programming:
Science:

Software Lab:

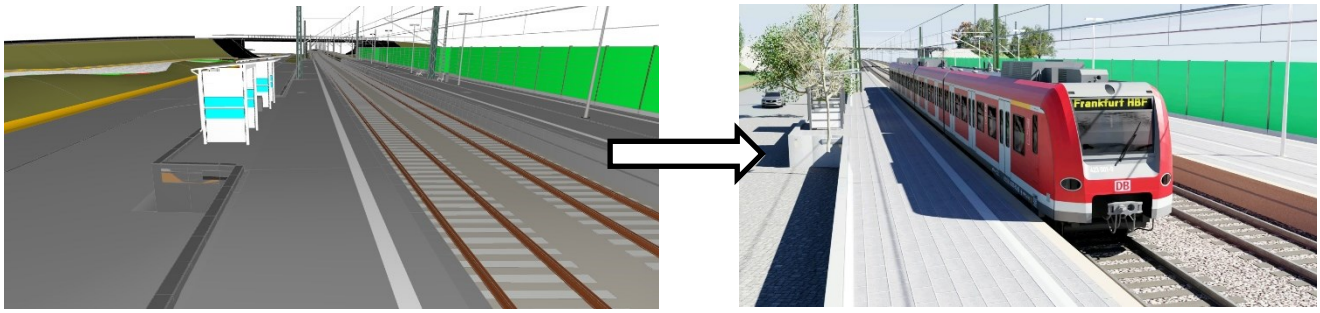
AI-VIS Infra: AI-based visualization of 3D-infrastructure models

Description

Today's tools for 3D modeling of infrastructure facilities provide 3D models that have a high geometric and semantic value for engineering. Due to the often unappealing appearance of the models, they cannot be presented directly to other project participants or to the public. The effort required to create appealing visualizations is relatively high and does not justify the sometimes short half-life of the visualizations. It must be possible to generate visualizations as automatically as possible and without long waiting times. AI-supported methods, comparable to ChatGPT, Stable Diffusion, Dall-E etc., are promising for this purpose.

Particular attention should be paid during development to making the visualizations look realistic. To this end, environmental data must be integrated into the scene, materials/textures must be assigned to the various components, objects such as vehicles, people and vegetation must be placed and selected objects must be animated in the scene (e.g. moving vehicles, moving people, moving escalators or elevators).

The visualizations should be able to be created and changed via prompt inputs (“text-to-image” / “text-to-video”). Ideally, supplementary prompts do not lead to the creation of a completely new scene, but rather to the iterative further development of a rendering.



Example prompt:
“Create a visualization of platform 2 looking towards platform 1. There should be a regional train on the track. The materials should be defined realistically. The sun should be in the east and objects should cast shadows accordingly.”

Task

- Literature Review to identify state-of-the-art methods for AI-based rendering/ visualization/ image generation
- Identify tools for model processing, ai-based rendering, prompting etc.
- Collect data for infrastructure models
- Implement algorithms that perform the described task

Supervisor

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References

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