Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)

SUBJECT: Computer vision-based civil infrastructure monitoring using physics-based graphics models

SUPERVISOR:

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DESCRIPTION:

Inspection of a civil infrastructure is costly due to involvement of human resources, thus efforts are made to automate this process with the aid of computer vision-based systems employing artificial neural networks (ANNs) [1, 2]. However, training of the ANNs requires data sets containing large amount of properly labelled data such as images showing damaged structural elements. Collecting of the data prepared in such a way requires tremendous effort. This problem can be overcome with data generated with the aid of physics-based graphics models (PBGM) [3, 4]. Such synthetic but realistic data allows for training the ANNs and can be generated semi-automatically. Application and assessment of reliability of this methodology in the inspection of the civil infrastructure is not only interesting research object but also can make ANNs-based civil infrastructure inspection closer to be used in real engineering applications.

The purpose of this PhD thesis will be development of a physics based graphics models (PBGM) to generate a synthetic dataset for inspections of civil infrastructure, in which surface damage textures are applied to the photo-realistic model of the structure based on finite element analysis results. The proposed models will be generated with aid of programming languages such as MATLAB or Python.

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