Implementing similarity measures for CNN training in Tensorflow

Bachelor’s Thesis

Objective:
Training a network for specific tasks requires three ingredients: Training data, a suitable network architecture, e.g., Convolutional Neural Network (CNN), and a loss function that measures the similarity between a reconstructed and a reference image [1]. The aim of this thesis is to familiarize yourself with Tensorflow\(^1\) and implement pixel-based loss functions (\(L_2, L_1\) norm). Afterwards, you extend the framework with patch-based loss functions such as Structural Similarity Index (SSIM) and Normalized Cross Correlation (NCC). Your thesis should also include an evaluation of the different loss functions on a specific task, e.g., image denoising [2].

Qualifications:
- Student of Biomedical Engineering, Information and Computer Engineering, Computer Science, Software Engineering and Management
- Basic knowledge of optimization, machine learning
- Programming skills in Python and C++, optional: CUDA

Contact ICG:
Kerstin Hammernik  
hammernik@icg.tugraz.at

Thomas Pock  
pock@icg.tugraz.at


\(^1\)www.tensorflow.org