



INTERNSHIP

Deep Learning and Image Classification

Problem Description

As part of the further development of enhanced optical classification algorithm approaches using CNN and RNN shall be exploited using deep learning approaches.

Therefore several projects are ready to start in 2018, with the final target to build an operative prototype (technology demonstrator). Within the scope of these projects the trainee has the possibility to engage in a wide field of activities. Important to RAD is that the trainee is willing to learn how to work in a project environment where he/she can develop ideas and following them individually until realization. Projects can start in May 2018 or in accordance with mutual agreement.

Project A: Image Analysis

Target is to find relevant image characteristics for enlarge potential content for deep learning libraries. Based on an existing pool of videos made with different optical sensors (TVC, FLIR), the features of the video images shall be analysed to find relevant characteristics for this specific type of video. Based on this conclusion a filter algorithm shall be developed to adapt video content/ images to these characteristics. This shall be the starting point to develop and populate classification library with content, which shall build the base for deep learning for future projects.

(Scope: 2-3 months)

Project B: Classification Library

Target is to develop the frame work of a library system which can be used to manage the content for deep learning approaches. Using the framework of "Caffe" deep learning framework developed by Berkley Vision & learning Centre a concept for a library system based on a server infrastructure shall be developed, which suites the purpose of RAD's applications. In this project it is necessary to involve all potential stakeholders as this library shall be the base for all deep learning activities within Rheinmetall for multiple applications.

(Scope: 2 months)

Project C: Deep-Learning Centre implementation

Target is to evaluate/develop software with HMI which is able to handle/manage the deep learning library. User friendliness is key to the success of this project, tools shall be easy to use and shall have the flexibility to be extended for future needs. It shall be able handle the deep learning process for CNN and RNN, by defining samples which are than mapped in the library. Further the learning process shall be monitored and managed using the tool.

(Scope: 1 month)

Project D: Embedding Neural Networks

Target is to build an envelope in which trained CNN and RNN can run and receive the input from the surrounding sensors. This project involves HW evaluation and SW interface definition and integration. At the end of the project the prototype shall be ready for integration into a real system of RAD.

(Scope: 2 months)

Project E: Co-Classifer Integration

Target is to integrate the prototype in the real Sensor Unit and show it performance in a field trial.

(Scope: 1 month)

Your Profile

- Bachelor/Master student in computer science, electrical/mechanical engineering, physics
- Experience in either C++, Java, or Python programming
- Good knowledge of Matlab/Simulink and Linux
- Knowledge of neural networks, Matlab Neural Network Toolbox, deep learning with “CAFFE”, and digital image processing is a plus
- Independent, structured, and solution-oriented

Contact

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