Abstract

Deep learning has found its way into various industrial sectors such as automotive, healthcare, home appliances and security. As an innovative product, Diehl Controls plans on to propose a safety system in kitchen which uses deep learning concepts to detect multiple use cases. One of them is fire detection. This thesis aims at developing a Convolutional Neural Netowrk (CNNs) to classify images into fire/non-fire.

Availability of data is one of the crucial factors in developing a robust deep learning model. As the task-specific may not be available in each and every scenario, including this, the thesis also proposes a novel algorithm to synthesize images which can be used for other applications as well. The algorithm makes use of Generative Adversarial Networks (GANs) to synthesize data. With very limited real data for training, it is demonstrated that how utilizing synthetic data can improve the CNN's performance as compared to when it is trained only with the real data. Additionally, a lightweight CNN architecture is proposed for the binary classification. As the final product is an edge device with the CNN model embedded in it, it is critical to have a model that consumes less memory.

Keywords: Deep learning, Convolutional Neural Networks (CNNs), Binary classification, Generative Adversarial Networks (GANs), Tensorflow.