

Abstract:

Artificial neural networks are currently the most widely used and researched models in machine learning with numerous applications in domains such as object recognition, machine translation, robotics or image generation. However, the application of artificial neural networks can often be hindered by the lack of labeled data. The topic of this thesis are techniques designed to lower the amount of labeled data needed to successfully train artificial neural network models. Among these techniques are transfer learning, data augmentation, few-shot learning, semi-supervised learning and models that use large scale unlabeled datasets to learn to solve various tasks in an unsupervised manner. We present results that improve label efficiency in various domains including image classification, image segmentation, object pose estimation and object detection.

Keywords: artificial neural networks, deep learning, transfer learning, data augmentation, few-shot learning, semi-supervised learning