Abstract

As society continues to accumulate more and more data, demand for machine learning algorithms that can learn from data with limited human intervention only increases. Semi-supervised learning (SSL) methods, which extend supervised learning algorithms by enabling them to use unlabeled data, play an important role in addressing this challenge. In this thesis, a framework unifying the traditional assumptions and approaches to SSL is defined. A synthesis of SSL literature then places a range of contemporary approaches into this common framework.

Our focus is on methods which use generative adversarial networks (GANs) to perform SSL. We analyse in detail one particular GAN-based SSL approach. This is shown to be closely related to two preceding approaches. Through synthetic experiments we provide an intuitive understanding and motivate the formulation of our focus approach. We then theoretically analyse potential alternative formulations of its loss function. This analysis motivates a number of research questions that centre on possible improvements to, and experiments to better understand the focus model. While we find support for our hypotheses, our conclusion more broadly is that the focus method is not especially robust.