

Conference Paper Critique

This paper should be submitted to AICS, the Irish Conference on Artificial Intelligence and Cognitive Science, for its novel contributions to machine learning. The paper is worthy of submission as it provides a broad, unbiased investigation into the merits of many of the most prominent deep generative models, with a particular focus on their uses in semi-supervised learning, while also providing a reference guide for semi-supervised learning using deep generative models that is accessible to machine learning practitioners of all levels of expertise.

Deep generative modeling is an area of much active research, with new literature published regularly. The papers produced about deep generative models generally tend to be from research groups which are developing new models or trying to improve existing methods. In this regard, the majority of literature presents the author's work versus other models whose shortcomings reflect positively on the contributions of the paper in question. The number of models chosen for comparison is usually quite low, and it is possible that the only models included are ones which compare favorably with the narrative that the author is trying to tell. This is particularly the case in terms of semi-supervised results. The author usually displays a table of results and claims that the model it is advocating is 'competitive' with other contemporary techniques, with methods for obtaining the results often vague.

This work aims to reduce all bias in the comparison of models. All models for examination are selected in advance. The author of this work did not advocate any particular model in advance, and all comment in the paper is based solely on the experimental results obtained. As fair a comparison as possible across models is sought through consistent network architectures across all models. The same classifier is used for all models in the semi-supervised classification experiments, something that is not always observed in literature.

The majority of literature in this area is aimed exclusively at those with a deep understanding of the models. Most papers focus on a particular model, performing a thorough analysis of the model in question, and comparing this model with a small number of other models according to a number of often complex metrics. These papers often lack a simple explanation of the model's operation and implementation, in favor of detailed equations and mathematical proofs. The results sections of these papers usually dedicate a very small portion to semi-supervised performance, if at all. In general, literature about deep generative models is not informative to a simple user who wishes to apply them in semi-supervised scenarios, where it is potentially very useful.

This paper provides a useful point of reference for any machine learning practitioners seeking to optimize supervised learning performance in a scenario plausible for implementing semi-supervised learning, i.e. where labeled data is expensive or impractical to obtain, while unlabeled data is relatively abundant. In addition, this paper provides a broad scope of the deep generative modeling field with simple explanations of various models, while also stating clearly which are the most promising models in terms of semi-supervised learning.