Sergio Barajas

GAN Literature Review

Generative Adversarial Nets written by Ian J. Goodfellow, Jean Pouget-Abadie, Mehdi Mirza, Bing Xu, David Warde-Farley, Sherjil Ozairy, Aaron Courville and Yoshua Bengio from the University of Montreal. It was the first paper written about using Generative adversarial Networks. It describes the Technical and Mathematical details of the process. It is the first proposal of using a new framework for estimating generative models using to adversarial networks, both being trained simultaneously. The main innovation is obviously the first time training a GAN. The main premise of the use of GANs rely on using a generative model G that captures the data distribution, and a discriminative model D that estimates the probability that a sample came from the training rather than G. In my own words, the Generative model is training to be able to more accurately reproduce data which is indistinguishable from the Data it is training on while the Discriminative model is training to be able to distinguish between the Generative "fake" data and the original authentic training data. In this fashion the GAN plays a sort of two player game which uses minimax to improve accuracy. This has proven to have many applications which include picture fill-in and also super resolution image transformation. the Generative model is training to be able to more accurately reproduce data which is indistinguishable from the Data it is training on while the Discriminative model is training to be able to distinguish between the Generative "fake" data and the original authentic training data. In this fashion the GAN plays a sort of two player game which uses minimax to improve accuracy. This has

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The author claims that prior to their implementation of GANs, the most striking success was with discriminative deep learning. Through their implementation of GAN the authors claim they get past many difficulties present in generative deep learning models and bring new success and more usability to that generative model type. They claim the difficulty of approximating many intractable probabilistic computations that arise in maximum likelihood estimation and related strategies previously made Generative networks unsuccessful. So GANs made Generative deep learning problems more successful.

The author trained adversarial nets on a range of datasets including MNIST, the Toronto Face Database and CIFAR-10. The generator nets used a mixture of rectifier linear activations and sigmoid activations, while the discriminator net used maxout activations. Dropout was applied in training the discriminator net.

The paper concludes by stating many uses and potential for the GAN. The implementation of GANS and their vast potential makes this paper exciting since it was the first paper to be written on the subject. The better understanding of GANs I have attained from reading this paper will be useful while working on the final portion of the final project of the course.

https://arxiv.org/abs/1406.2661