

A Critical Analysis of 'Generative Adversarial Nets'

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In the paper 'Generative Adversarial Nets', which belongs to the family of generative models. Generative Adversarial Nets(GANs) consists of two deep network models. First model is the generator, responsible for generating new samples from some random noise, whilst the discriminator, second model, tries to distinguish samples from the generator from real data. After publishing this paper, GANs have been extensively studied in the last few years, and have been applied to various domains.

Notably, the significant success of GANs achieved in the computer vision field. There were thousands of papers regarding applications of this area, like image processing and computer vision, text-to-image, photograph editing, super resolution and medical anomaly detection, etc.

Despite the revolutionary research, GANs still have two significant challenges which are suffered. Firstly, in the aspect of the train, it is hard to achieve the Nash equilibrium during the training, and the generator collapses which produces limited varieties of samples, which is known as Mode collapse. This could affect performance directly, like image quality, image diversity and stable training. Second aspect to be suffered is evaluation. The evaluation in GANs can be considered as an effort to measure the similarity between the real distribution and the generated distribution. However, the accurate estimation of real distribution is not possible.

With issues stated above, recent GANs researches focus on improving the training for GANs and Application of GANs to the real world. Some research is suggested to improve the training problems[4], and this improvement affects several aspects: generated image diversity, generated image quality and stability of training.

Originally, GANs were proposed for the computer vision area. Although there are many research results applied to some other fields(Music, Natural Language Processing), GANs research in these areas are limited compared to computer vision. I have an interest in application in the music field because of my musical background. It is still a challenging area because of different properties of image and time series data. This difficulty will be solved by future research.

References

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