NAVIGATING MODE COLLAPSE IN GAN

A PROJECT REPORT

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ABSTRACT

Generative Adversarial Networks (GANs) have yielded impressive results in various tasks and applications in recent years. However, the mode collapse issue remains a significant challenge in GANs. In this project, a novel training pipeline is proposed to tackle the mode collapse problem of GANs. Unlike existing methods, the proposed approach generalizes the discriminator as a feature embedding and maximizes the entropy of distributions in the embedding space learned by the discriminator. We introduce two regularization terms, Deep Local Linear Embedding and Deep Isometric feature Mapping, to encourage the discriminator to learn the structural information embedded in the data.

This facilitates the embedding space learned by the discriminator to be well-formed. We design a non-parametric entropy estimator to effectively maximize the entropy of embedding vectors based on the well-learned embedding space, which acts as an approximation of maximizing the entropy of the generated distribution.

The pipeline significantly reduces the mode collapse without compromising the quality of generated samples when improving the discriminator and maximizing the distance between the most similar samples in the embedding space. These extensive experimental results demonstrate the effectiveness of the approach, which surpasses the GAN baseline and outperforms the recent state-of-the-art models.