Automatic Termination of a Score-Based Generative Modelling

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Abstract

We present an automatic stopping scheme of score-based generative modeling (SGM), or denoising diffusion probabilistic modelling. SGN is a novel class of generative models exhibiting state-of-the -art quality in image or audio synthesis. SGN consists of a forward diffusion process which adds noise to the target distribution to obtain an easy-to-sample reference density and a backward/time-reversal denoising process which is approximated by a statistical model (e.g. neural networks). In spite of its high cost of training a diffusion model, it requires about a thousand times larger time compared to that of GAN to generate samples. Franzese, et al. (2022) report that there exists an optimal value for the diffusion time, a hyper-parameter of SGM. In order to overcome the trade-off of the diffusion time and quality as well as the high cost of training and generation of samples we propose an early stopping scheme of score-based generative modelling. We confirm the effectiveness of our algorithm by numerical experiments.