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Peer Review

Review of: "Enhancing Sample Generation of Diffusion Models using Noise Level Correction"

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This paper presents a new method that enhances sample generation by aligning the estimated noise level with the true distance from the noisy sample to the manifold. A noise level correction network is introduced, leveraging a pre-trained denoising network to estimate the noise level during the denoising process. By integrating task-specific constraints, this method is further extended to various image restoration tasks.

However, the manuscript requires major revision, and the authors should address the following issues:

1. The abstract does not address the shortcomings of existing denoising methods in diffusion models and the problems that this paper aims to solve. Additionally, the experimental section lacks specific experimental data support.
2. The methods in the tables lack corresponding citation information.
3. The introduction mentions various generative networks such as GANs and VAEs, but the experiments only compare with DDIM-related methods. It is recommended that the authors include additional generative models in the comparative experiments to demonstrate the superiority of the proposed method.
4. In the theoretical discussion, the authors assume that "denoising in diffusion models can be interpreted as an approximate projection onto the support of the training set distribution," but do not discuss the significance and limitations of this assumption in practical applications.
5. The paper proposes a method for enhancing sample generation, but does not discuss the practical benefits of this method. For example, how the generation of task-relevant samples could be applied in scenarios such as defect detection and sonar images. It is recommended that

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the authors discuss this in relation to the following articles: “Hierarchical and progressive learning with key point sensitive loss for sonar image classification” and “Erasing-inpainting-based data augmentation using denoising diffusion probabilistic models with limited samples for generalized surface defect inspection.”

Declarations

Potential competing interests: No potential competing interests to declare.