Tensor-Train Diffusion Models

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1 Abstract

In this work, we explore the application of fixed, low-rank tensor-train to Denoising Probabilistic Diffusion Models. We show the parametric noise can be modeled using tensor-trains and basis functions. We will also provide details on how the model can be trained using Riemannian Optimization algorithm for fixed-rank tensor-trains. The main objective is to develop a more efficient DDPM with respect to memory and training-time.

2 Background

2.1 Denoising Diffusion Probabilistic Models

2.1.1 Parametric Noise Modeling

2.2 Tensor-Trains

2.2.1 Optimization of Tensor-Train models

3 Model

3.1 Architecture

3.2 Optimization

4 Experiments

4.1 Method

4.2 Results