

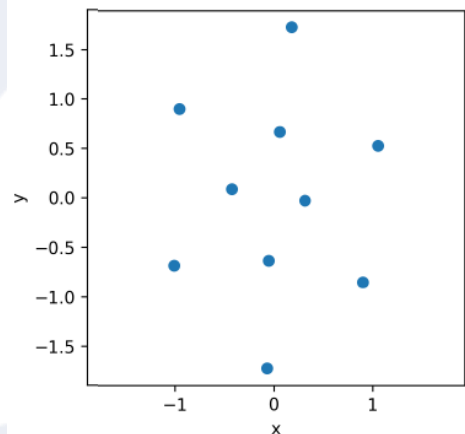
Deterministic Sampling Using Neural Networks

Sampling from a probability distribution is a ubiquitous task in stochastic information processing. Samples are used in many applications like particle filters or Monte-Carlo integration. In the simplest case they are drawn randomly from a distribution. Deterministic samples on the other hand are optimally placed to represent a distribution, yielding Quasi-Monte-Carlo methods. These have been shown to have better convergence properties than using random samples.

At ISAS different methods to draw deterministic samples have been developed. They are all based on minimizing a distance measure between the original distribution and the samples. Solving this optimization problem is often too slow for real-time applications.

The goal of this thesis is to investigate how neural networks can be used to speed up deterministic sampling. The thesis will roughly consist of the following tasks:

- Literature research on deterministic sampling and neural networks.
- Selection of one or more neural network architectures or approaches
- Implementation and evaluation of the selected methods



Requirements:

This topic is suited for students with a background in computer science, mathematics, electrical engineering, or other engineering majors. High motivation, reliability, and a methodical and independent approach to work are expected. Prior knowledge in neural networks and point set processing are advantageous.

Emphasis:

Theoretical Study

Software Implementation

Hardware Implementation

We offer:

- Excellent support and advice
- High-end infrastructure
- Contacts to industry and research partners

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