Midterm Review

Date: *June 17, 2025*

Review Topics

Language Models

- Language distribution

- Bigram Model

- Context-aware models

- Transformer-based context extraction

- Statistically modeling language tasks, e.g., RAG exercise in Assignment 1

Data Distribution

- Data-space

- Data distribution and some dummy examples

- Data manifold: think of dummy examples

- Latent space and its statistical modeling: see an example in Assignment 2

Generative vs Discriminative Learning

- MLE for a general model

- Interpreting supervised and unsupervised learning as MLE learning

- Generative vs discriminative learning

- Naive Bayes: study the simple example in the lecture notes

Autoregressive Models

- Review chain rule and its implications in AR modeling

- How we can understand the chain rule applied by a computational AR model

- Teacher-forcing training and autoregressive generation

ENERGY-BASED MODELS

- Boltzmann formula and Boltzmann machine

- Training via sampling from the model

- Complexity of EBMs

FLOW-BASED MODELS

- Variable exchange and normalizing flow

- Training for flow models

- Design of invertible models as flow-models