**[CS-8395 Spring 2020]**

**Deep Learning in Medical Image Computing**

**\* Please print and bring it before each class**

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Paper Title: Auto-Encoding Variational Bayes

Please summarize the paper using your own words: (<100 words)

This paper presents a method for unsupervised learning where a neural network autoencoder is user to learn the underlying distribution of the data. This is an example of a generative method, which aims to use machine learning to learn the posterior probability distribution in a Bayesian approach. The main novelty of this paper is that the authors present the idea of a neural network autoencoder. The authors then demonstrate their method on the Frey Face and MNIST datasets and generate samples using the autoencoder that has learned the underlying distribution.

Question 1 for the paper: How well does this approach work with highly unbalanced datasets? For example, if we had a dataset with 99% digit 1’s and 1% digit 9’s, would the autoencoder only output 1’s and capture the variation between 1’s rather than 1’s and 9’s (while a human would see a clear difference between 1’s and 9’s, since we are using unlabeled data, the autoencoder would not).

Question 2 for the paper: How well does the approach work for more complicated datasets such as ImageNet?