

Homework Assignment 2

Due Date: 6pm on Tuesday March 7th

1. Reading summary (6 points)

Please summarize the reading material in your own words. This exercise will help you comprehend the main

objectives in the reading besides the technical details. Your summary should consist of three parts:

1. One-sentence summary
2. One-paragraph summary
3. Half-page summary

2. Questions (4 points)

Please select **one** question to answer in each of the following four question sets. (A total of four questions.)

2.1 Chapter 1

- What is a generative modeling problem?
- What are the three difficulties in generative modeling? How does VAE deal with each of them?
- What property must the distribution have in latent variable models described in 1.1?

2.2 Chapter 2.1-2.3

- What are the differences between the sparse auto-encoder and the VAE?
- How does VAE define latent variable and why?
- What does the reparameterization trick do in VAE?
- Explain the meaning of the objective function in VAE training.

2.3 Chapter 2.4-Chapter 3

- How would the hyper parameter in affect the learned VAE model?
- What's the main difference between CVAE and VAE?

2.4 Overall

- What are the pros and cons of VAE?
- How can we extract feature embedding of using a learned VAE model? What's the main difference between VAE embedding and other feature embedding using non-variational methods?