Question 1. What are the main messages you learned from this chapter?

- MedGAN was introduced as a neural network model that generate high-dimensional, multi-label discrete variables that represent the events in EHRs. In the dimension-wise probability task, MedGAN performs best when both actual and fake data exhibit the same level of quality.
- Molecule Generation: In one application of VAE, a discrete SMILES string representation of moleculea are transformed into a continuous embedding vector representation and be used to synthesize other molecules.
- MolGAN: The MolGAN creates new molecules that mimic the input molecules by taking molecule graph data as input. MolGAN does not improve the uniqueness property of molecule generations as well as GraphVAE.

Question 2. What related resources (book, paper, blog, link) do you recommend your classmates to checkout?

[ML and AI link]https://www.aman.ai

Question 3. Which part do you want to improve in this chapter?

I do not have any comment regarding the chapter.

Question 4. What is the main difference between GAN and VAE?

- GAN is used to generate new data not through data pertubation method but from training a set of 2 neural networks: a generator and a discriminator. A generator is used to produce more realistic examples while the discriminator is used to have a better distinguishing power. The discriminator uses the cross entropy loss while the generator uses the minmax problem of maximizing the V as a function of the discriminator's payoff while minimizing the max of V.
- VAE is another popular generative model for creating realistic data samples. VAE extends AE by adding a regularization term - $$D_{KL}$$ - the divergence of the inference network $$q(z|x)$$ distribution and generative network distribution $$p(x|z)$$ on the representation space / embedding space z.
- Both GAN and VAE use the Autoencoder approach. GAN uses the Encoder as its Generator and the Decoder as its Discriminator. VAE uses the Encoder as its inference network and ues the Decoder as its generative network. The main differences are the loss function of the Autoencoder network. GAN applies the loss functions to its encoder and decoder similarly to a zero sum game while VAE applies the loss function as a regularized loss function with respect to the Kullback-Leibler divergence $$D_{KL}$$.