**Assignment\_9**

1. What are the main tasks that autoencoders are used for?

**Ans: An autoencoder is an unsupervised learning technique for neural networks that learns efficient data representations (encoding) by training the network to ignore signal “noise.” Autoencoders can be used for image denoising, image compression, and, in some cases, even generation of image data.**

1. Suppose you want to train a classifier, and you have plenty of unlabeled training data but only a few thousand labeled instances. How can autoencoders help? How would you proceed?

**Ans: Use Genetic Algorithms. Add more Hidden Layers to the Network. Use Higher initial Weight Values.**

1. If an autoencoder perfectly reconstructs the inputs, is it necessarily a good autoencoder? How can you evaluate the performance of an autoencoder?
2. What are undercomplete and overcomplete autoencoders? What is the main risk of an excessively undercomplete autoencoder? What about the main risk of an overcomplete autoencoder?
3. How do you tie weights in a stacked autoencoder? What is the point of doing so?

**Ans: An autoencoder with tied weights has decoder weights that are the transpose of the encoder weights; this is a form of parameter sharing, which reduces the number of parameters of the model**.

1. What is a generative model? Can you name a type of generative autoencoder?

**Ans: Generative modeling is** **the use of artificial intelligence (AI), statistics and probability in applications to produce a representation or abstraction of observed phenomena or target variables that can be calculated from observations**.

1. What is a GAN? Can you name a few tasks where GANs can shine?

**Ans: At a high level, GANs are neural networks that learn how to generate realistic samples of the data on which they were trained on. For example, given photos of handwritten digits, GANs learn how to generate realistic photos of more handwritten digits.**

**Generative adversarial networks (GANs) are algorithmic architectures that use two neural networks, pitting one against the other (thus the “adversarial”) in order to generate new, synthetic instances of data that can pass for real data. They are used widely in image generation, video generation and voice generation.**

1. What are the main difficulties when training GANs?

**Ans: In recent times, GANs has achieved outstanding performance in producing natural images. However, there exist major challenges in training of GANs, i.e., mode collapse, non-convergence and instability, due to inappropriate design of network architecture, use of objective function and selection of optimization algorithm**.