Module 3.

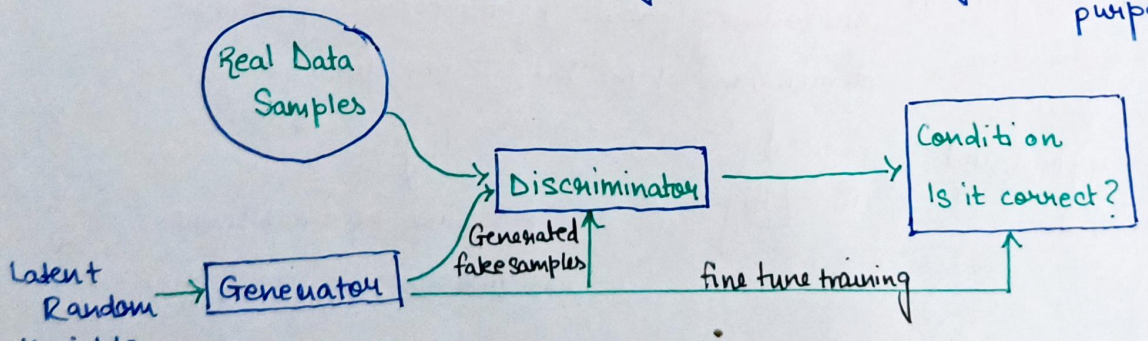
★ GAN {Generative Adversial Network}

- GANs are a powerful class of neural networks that are used for unsupervised learning.
- Developed by Ian J. Goodfellow in 2014.
- GANs are basically made up of a system of two competing neural network models which compete with each other and are able to analyze, capture and copy the variations within a dataset.
- The GANs are formulated as a minimax game, where the discriminator is trying to minimize its reward $V(D,G)$ and the generator is trying to maximize its loss.

~> **Generative** ~> To learn a generative model, which describes how data is generated in terms of a prob. model.

~> **Adversial** ~> The training of a model is done in an adversarial setting.

~> **Networks** ~> Use deep learning networks as AI algorithms for training purposes.



→ Generator

- Generator generates fake samples of data and tries to fool the Discriminator.
- The Discriminator, on the other hand, tries to distinguish between the real and fake samples.
- They both run in competition with each other in the training phase.
- They get better and better in their respective jobs after each repetition.
- The generator is trained while the discriminator is idle, and vicevensa.
- Only forward propagation and no backpropagation is done.

---

* Convolutional Neural Network (CNN),

• Architecture,

Convolutional layer → Pooling → Flatten → Dense

- Convolutional layer
  - used to learn spatial patterns and features from the input data.
    - filter is applied and slid over the image.
- Pooling
  - used for downsampling the feature maps and reducing spatial dimensions of the data.
    - Max / Avg.
- Flatten
  - used to convert multidimensional feature maps produced by the convo. layers into one-dimensional vector.
    - preserves all the elements while removing the spatial structure.
- Dense
  - fully connected layer
    - final decision making layer.
      - last stage.
