



Practical No:-10

Title:- Implementation of GAN on any suitable Dataset.

Theory:-

A Generative Adversarial Network (GAN) is a type of deep learning model proposed by Ian Goodfellow in 2014. It consists of two neural networks the Generator and the Discriminator, which compete with each other in a game-theoretic scenario.

- Generator (G):

The generator's goal is to create fake data that looks as realistic as possible. It takes random noise as input and generates synthetic data (eg:- images).

- Discriminator (D):

The Discriminator's role is to differentiate between real data and fake data. It outputs a probability indicating whether the input is real or fake.

Steps for Implementation:

- 1) Load and preprocess the dataset (eg: MNIST digits)
- 2) Build the Generator network (fully connected or convolutional layers)
- 3) Build the Discriminator network.
- 4) Define the loss functions and optimizers.
- 5) Train both networks.
 - Alternate between training the Discriminator and Generator.
- 6) Visualize generated samples to evaluate performance.

Applications of GAN's :-

- Image generation and enhancement.
- Data augmentation.
- Style transfer
- Image-to-image translation.
- Deepfake creation.



Conclusion:-

GANs are powerful tools in unsupervised learning capable of generating high-quality synthetic data. Through the adversarial training of Generator and Discriminator, the model learns to produce data indistinguishable from real data, making it highly useful in AI applications involving image synthesis and augmentation.