# Artificial Art:

## **How does it work?** -

* GANS!

## **Description/Definition:**

* GAN Stands for Generative Adversarial Networks. They are “Generative” Models that can create new data from your training data through the usage of **two neural networks**

## **Quick Details:**

* Unsupervised Learning
  + Input data is untagged/unclassified!
* Uses a CO-OP Zero-Sum game framework
  + One party’s gain is precisely balanced by another party’s loss

## **Nitty Gritty:**

### Two NNW (Neural Networks):

#### Generator

* + - Convolutional Neural Net
    - What is my goal?
      * Manufacture output that can be easily mistaken for real data.

#### Discriminator

* + - Deconvolutional Neural Net
    - What is my goal?
      * Identify which outputs it receives have been artificially created.

### Training Information

* + Based on a feedback loop between the two networks, as the discriminator describes an object to the generator, the generator will attempt to manufacture what the discriminator desires and check it with him, if it classifies/fools the discriminator, then success, if not, the generator will keep trying to improve the quality of the output, which in turn trains the discriminator more and more of how to flag data that has been artificially created.

### Sugar Coat & Final Thoughts:

* + **Desired output is needed to be fed into the GAN model.**
  + Gather an initial training dataset that follows **as close to the parameters of the desired output as possible**. The data is then randomized and thrown into the generator until the model develops basic understanding and **is able to produce its own output.**
  + Now we feed the “GENERATED” images into the discriminator along with parameters that **follow our original desired output**.
  + **Discriminator** will filter through the data presented and **will return a binary probability to represent the authenticity of each image**. These values are then manually checked for success and **repeated until the desired outcome is reached.**
  + **Min-Max**
    - Generator is **maximizing** the probability of having its outputs declared as real versus fake.
    - D is trying to **minimize** that probability ^

## **Sources:**

* + [Source 1](https://www.techtarget.com/searchenterpriseai/definition/generative-adversarial-network-GAN#:~:text=A%20generative%20adversarial%20network%20(GAN,sum%20game%20framework%20to%20learn.) (TechTarget article that really goes over everything in its entirety
  + [Source 2](https://heartbeat.comet.ml/artificial-art-how-gans-are-making-machines-creative-b99105627198) (Heartbeat article that has a really good analogy of how GAN networks function)
  + [Source 3](https://developers.google.com/machine-learning/gan#:~:text=Generative%20adversarial%20networks%20(GANs)%20are,belong%20to%20any%20real%20person.) (Google Dev)
  + [IBM Technology "What are GANs"](https://www.youtube.com/watch?v=TpMIssRdhco) (Video, pretty good)