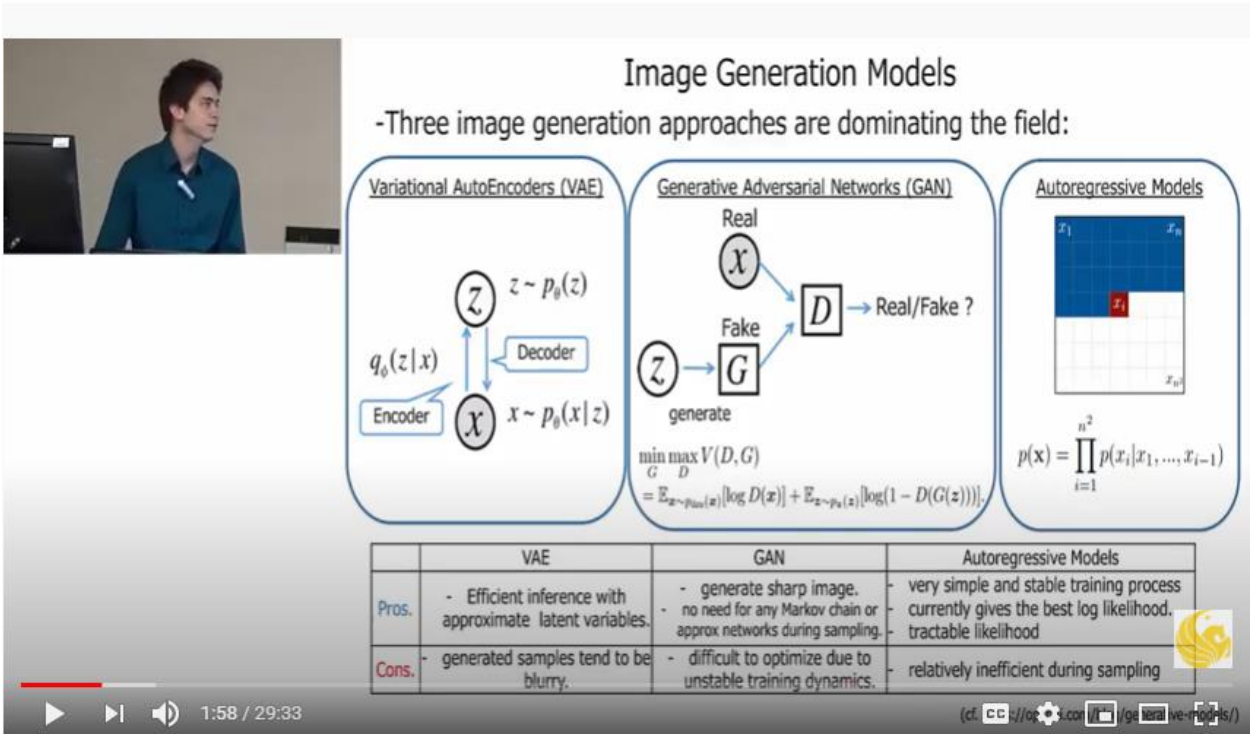

Variational Autoencoders (VAEs):

1.What is VAEs?
variational autoencoders (**VAEs**) are autoencoders that tackle the problem of the latent space irregularity by making the encoder return a distribution over the latent space instead of a single point and by adding in the loss function a regularisation term over that returned distribution in order to ensure a better

2. How does a VAE work?

In neural net language, a variational autoencoder consists of an encoder, a decoder, and a loss function. The encoder compresses data into a latent space (z). ... The encoder **is** a neural network. Its input **is** a datapoint x, its output **is** a hidden representation z, and it has weights and biases θ.

Link:
1.https://ermongroup.github.io/cs228-notes/extras/vae/
2.https://ermongroup.github.io/cs228-notes/learning/latent/

Generative adversarial networks:

1. What is a GAN model?

Generative Adversarial Network (**GAN**) ... 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.

2. How Generative Modeling works?

```
- it helps to genarte new data from INPUT X with LABEL Y. By using the join
probability of (X,Y)
```

3. Where we use that?

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- we use that in different fields. Like image compression, image classification,
image reconstruction etc.
```

Link:

1. https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans/

4. Generative Adversarial Networks use Adversarial loss to train there models. Hard to optimize.

   Adversarial loss - It is a binary classifier that differentiates between ground truth data and generated data predicted by the generative network.

Autoregressive Models:

1.Autoregressive Models are cnn nd rnn models

How does an Auto regression Model work?

An **autoregressive model (AR)** is when a value from a time series is compared to previous values from that same time series and a regression model is used to fit the data. The model is used to describe certain time-varying processes in nature, economics, etc. It specifies that

the variable depends linearly on its own previous values and on a stochastic term (random term):

$$x_t = b_0 + b_1 x_{t-1} + \varepsilon_t$$

where:

x_t = value of time series at time t
b0 = intercept at the vertical axis (y-axis)
b1 = slope coefficient
x_{t-1} = value of time series at time $t - 1$
ε_t = error term (or residual term or disturbance term)
t = time; t = 1, 2, 3…T

The **order of an AR model** is the number of immediately preceding values in the series that are used to predict the value at the present time. So, the preceding model is a first-order autoregression, written as **AR(1).**

The model is a second-order AR, written as AR(2), if the value at time t is predicted from the values at times t−1 and t−2. More generally, a kth-order AR, written as AR(k), is a multiple linear regression in which the value of the series at any time t is a (linear) function of the values at times t−1,t−2,…,t−k