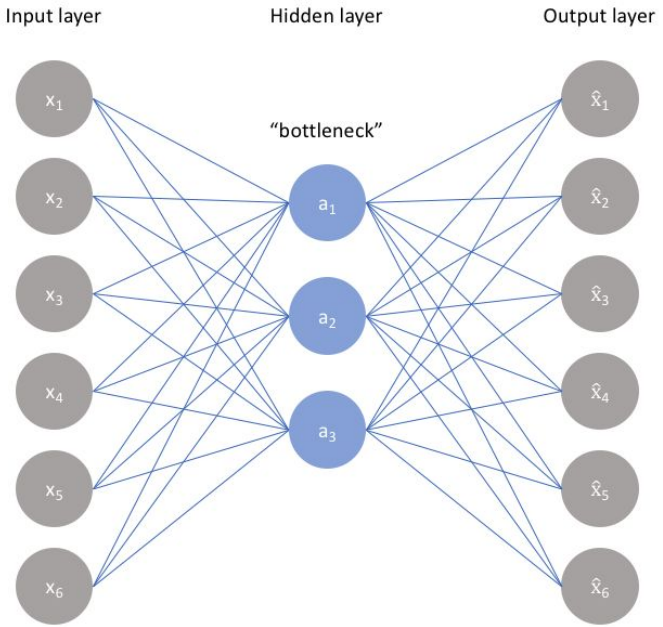
# GANs

https://github.com/timestocome/DeepLearning-Talks

# AutoEncoders

- Compression, noise removal
- Z space, Latent Space, Bottleneck

- data need not be labeled
- still used internally in complex GANS
- … and other neural networds



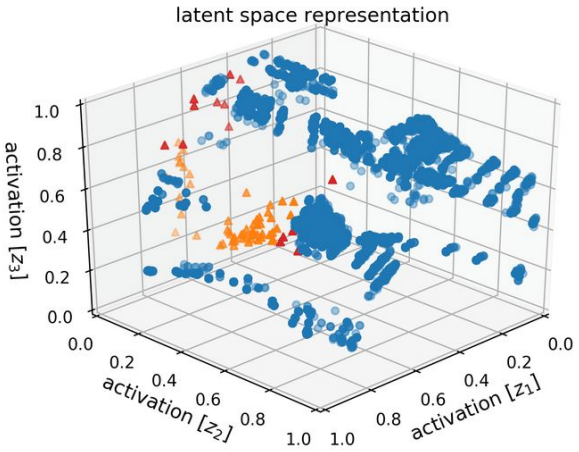
# Latent Space, Z space

Not continuous

Can be mapped onto data but

poorly grouped, can't create similar

data



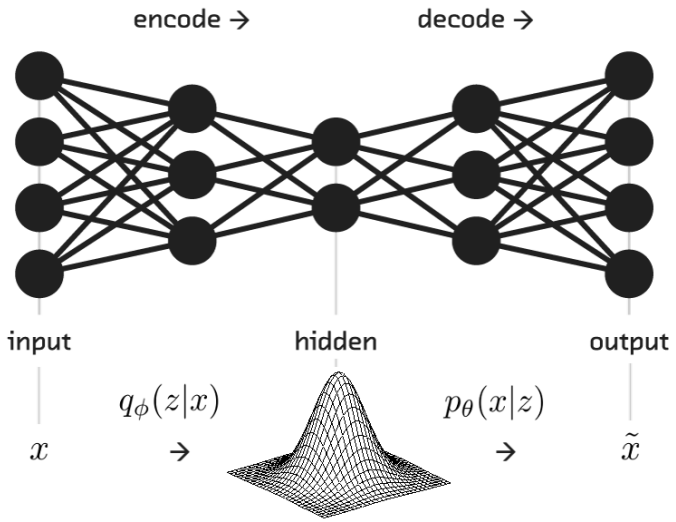
# Variational Auto Encoders

- Continuous Z Space, learns distribution
- Binary Cross Entropy + KL Divergence
- Similar data grouped together
- Can create similar data

How VanGogh is it?

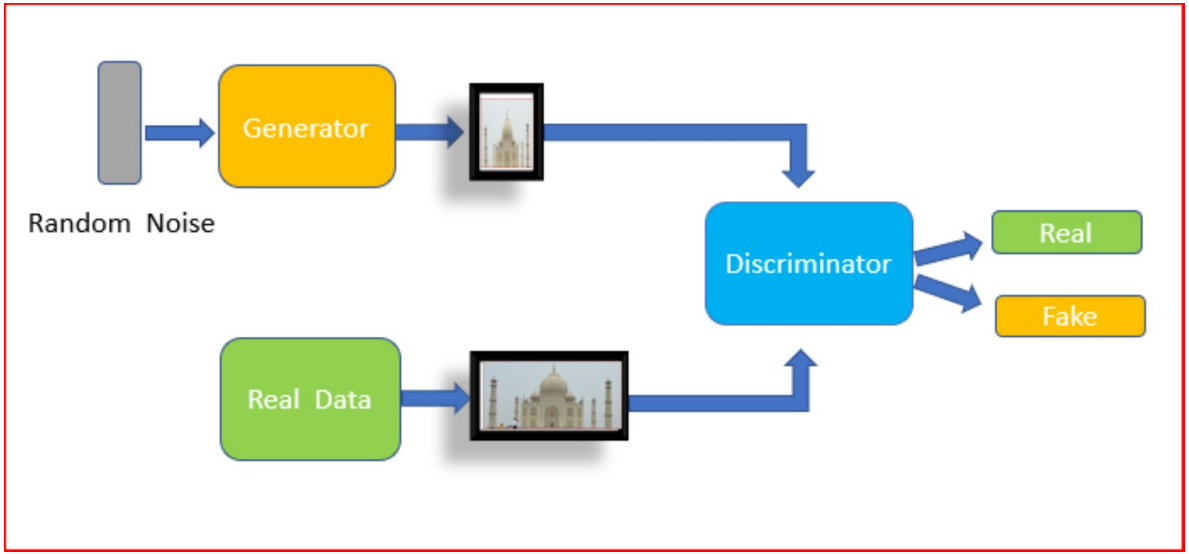
How is this measured?

$$D(p||q) = \sum_{x \in X} p(x) \log \frac{p(x)}{q(x)}.$$



# GANs

- Discriminator ( Critic ) determines error
- Generator can be used to create new data ( medical imaging )



# Training GANs

for each batch:

take a random real example, and generated fake and classify them

compute error and update Discriminator

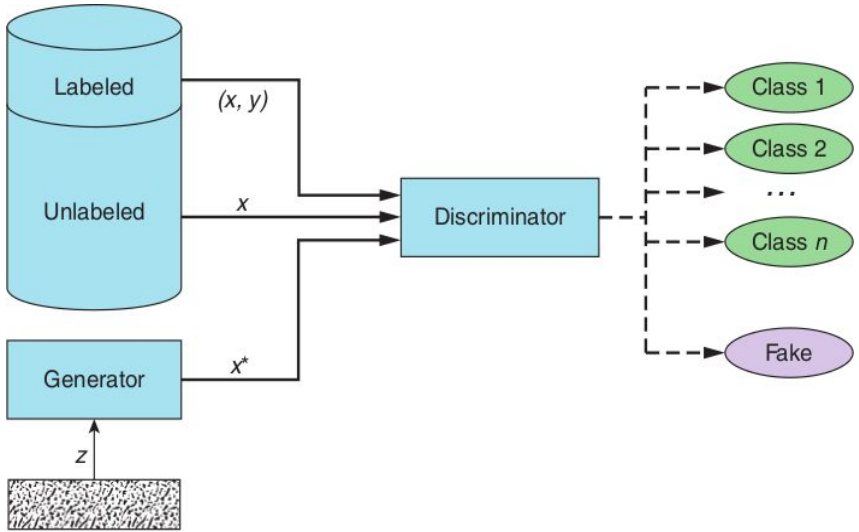
take random noise and create fake example for Discriminator to classify

compute error and update Generator

# Semi Supervised GAN

Can be used with partially labeled data ( Kannada/MNIST )

( different distribution btwn train/test/val data, used only 4k labeled images of 40k, 81% accuracy)



# Things to remember

Changing the cost function has led to big breakthroughs in ML (GANS, RL)

Compound cost functions are difficult to train (mode collapse - mae)

None of the above can be a useful class ( image recognition )

Networks can be designed to label data, or augment data

# Code

Semi Supervised GAN Kannada code
https://github.com/timestocome/DeepLearning-Talks/tree/master/GAN%20Talk

- RL GANs —- World Models https://worldmodels.github.io/
- Really Awesome GAN resources
  https://github.com/nightrome/really-awesome-gan
- Keras GANs https://github.com/eriklindernoren/Keras-GAN
- Numpy GAN https://github.com/shinseung428/gan_numpy

# Resources

Paper

- Generative Adversarial Nets

  https://papers.nips.cc/paper/5423-generative-adversarial-nets.pdf

Books

- Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play (O'Reilly)
- GANs in Action ( Manning)

# Misc

Papers with Code: https://paperswithcode.com