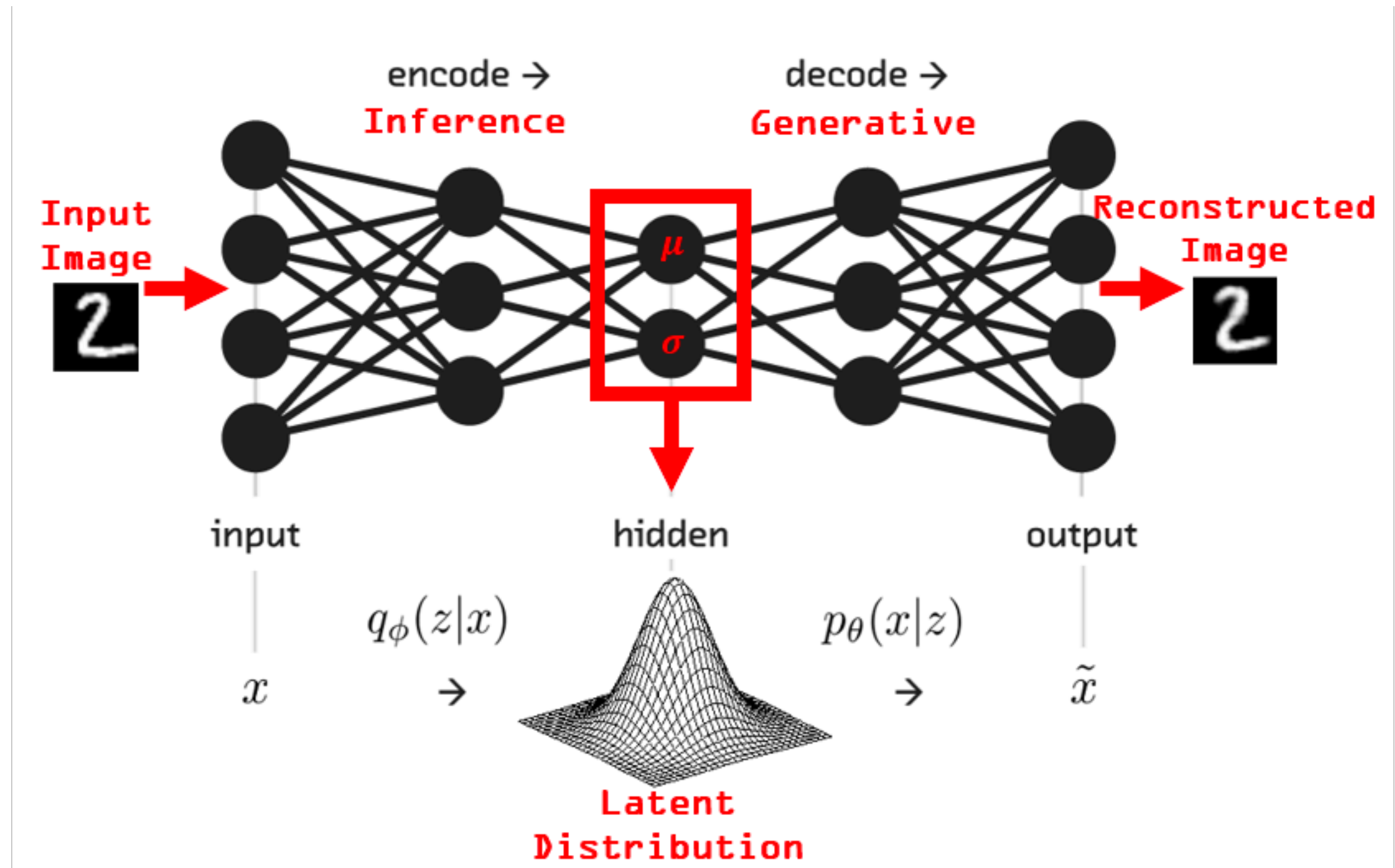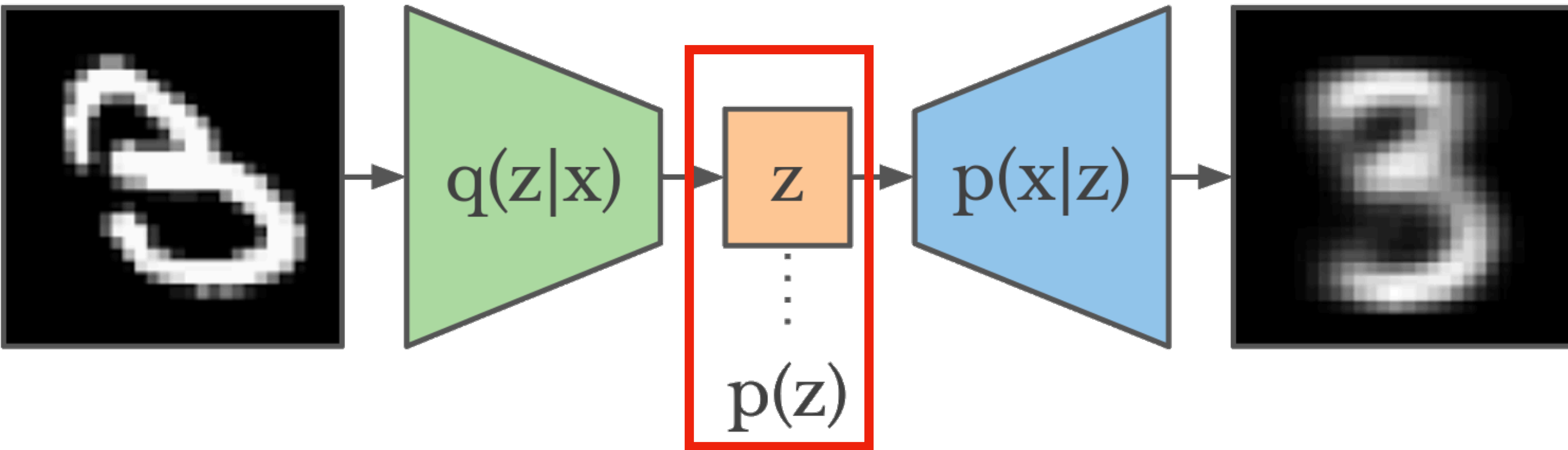# VAE

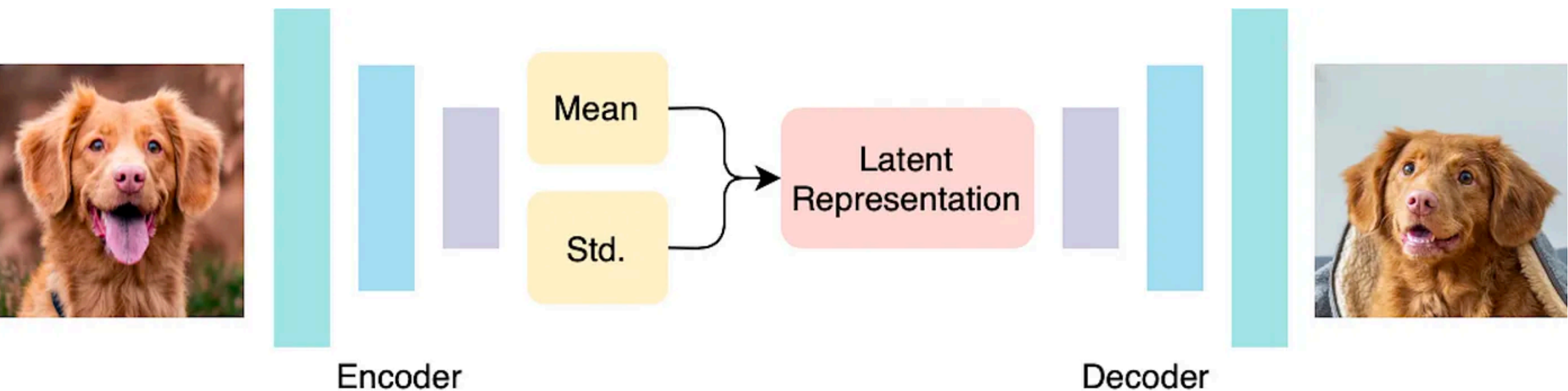- Variational Autoencoder is a great way to model objects

VAE

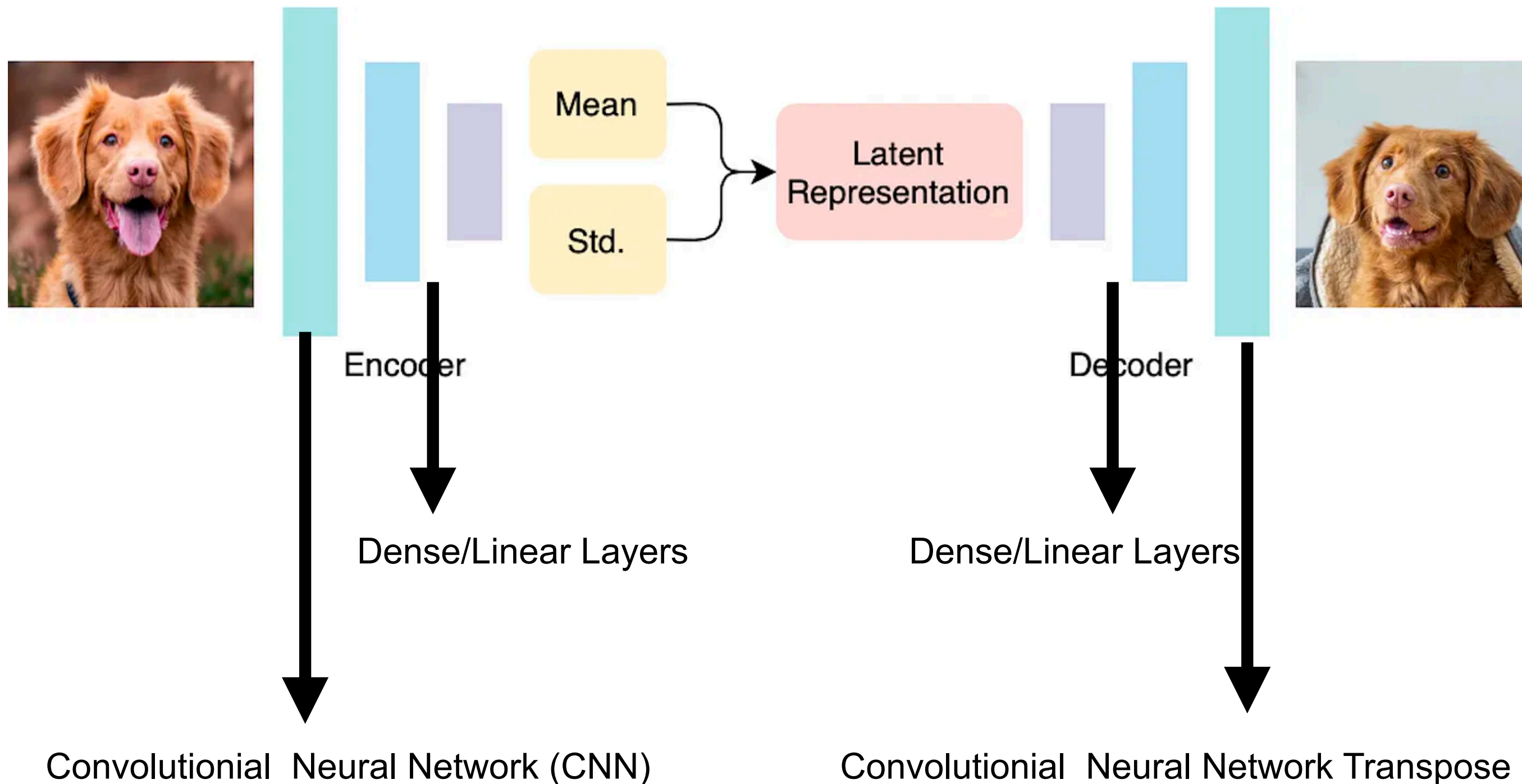- Variational Autoencoder is a great way to model objects
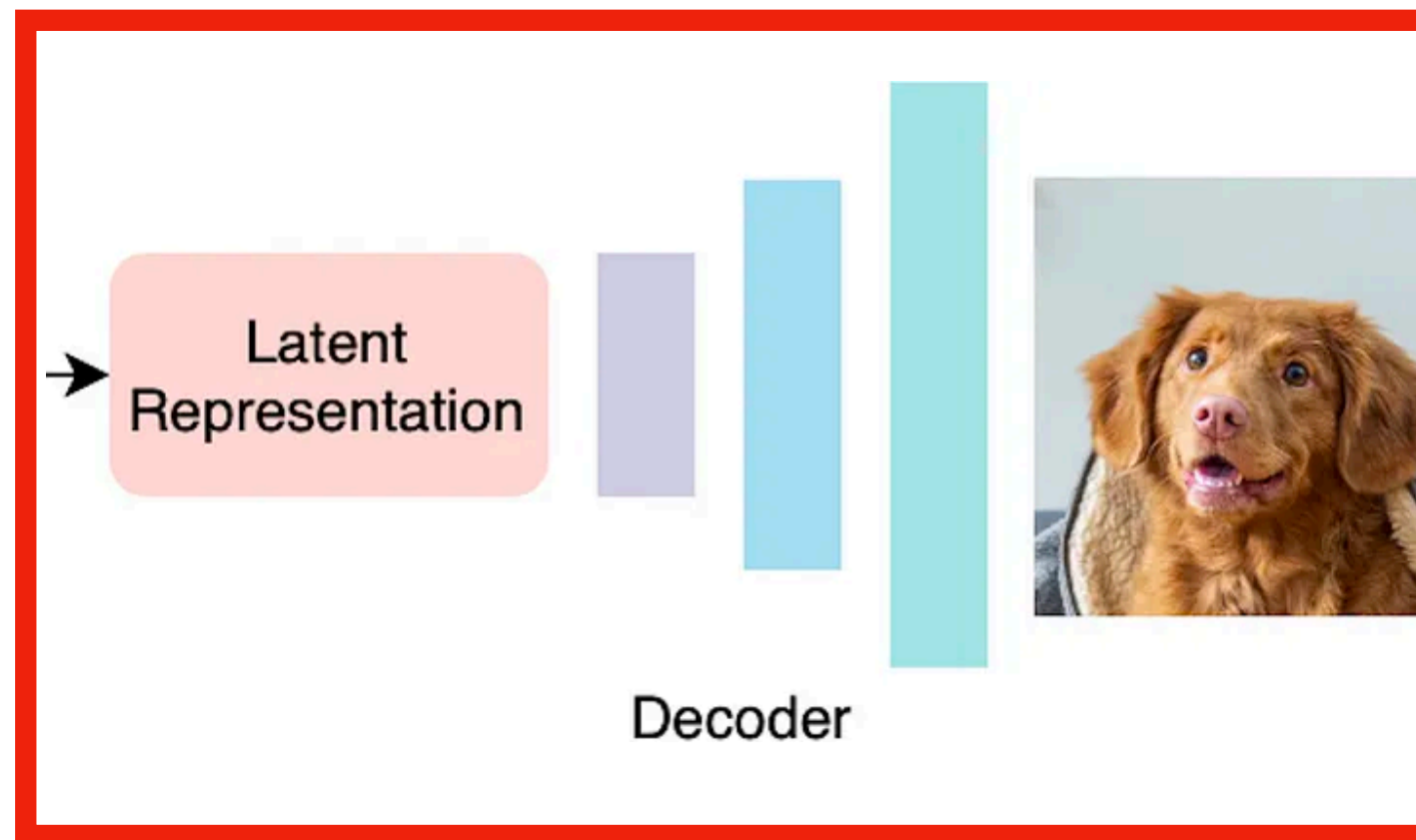

Randomly sample a normal distribution in this space

MNIST VAE encoder

- We will use a CNN to encode the data and process it

Encoder — Mean / Std. → Latent Representation — Decoder

Dense/Linear Layers

Dense/Linear Layers

Convolutionial Neural Network (CNN)

Convolutionial Neural Network Transpose

Exploring the latent space?

Latent Representation → Decoder → (dog image)
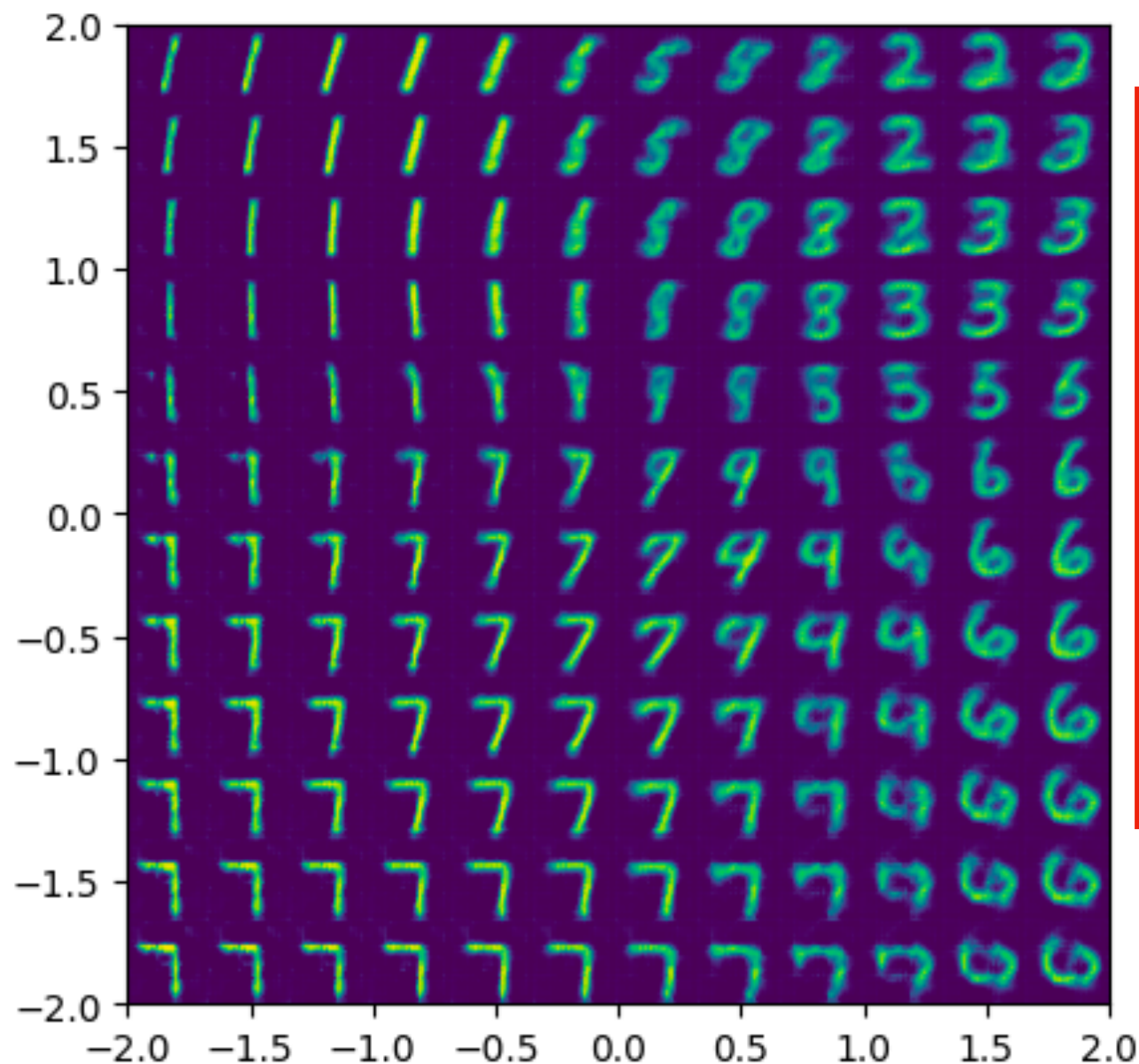
Generator

- We can sample the latent space as a generator

Conditional VAE

Latent Representation

Decoder

Generator

Variables that we would like to condition on
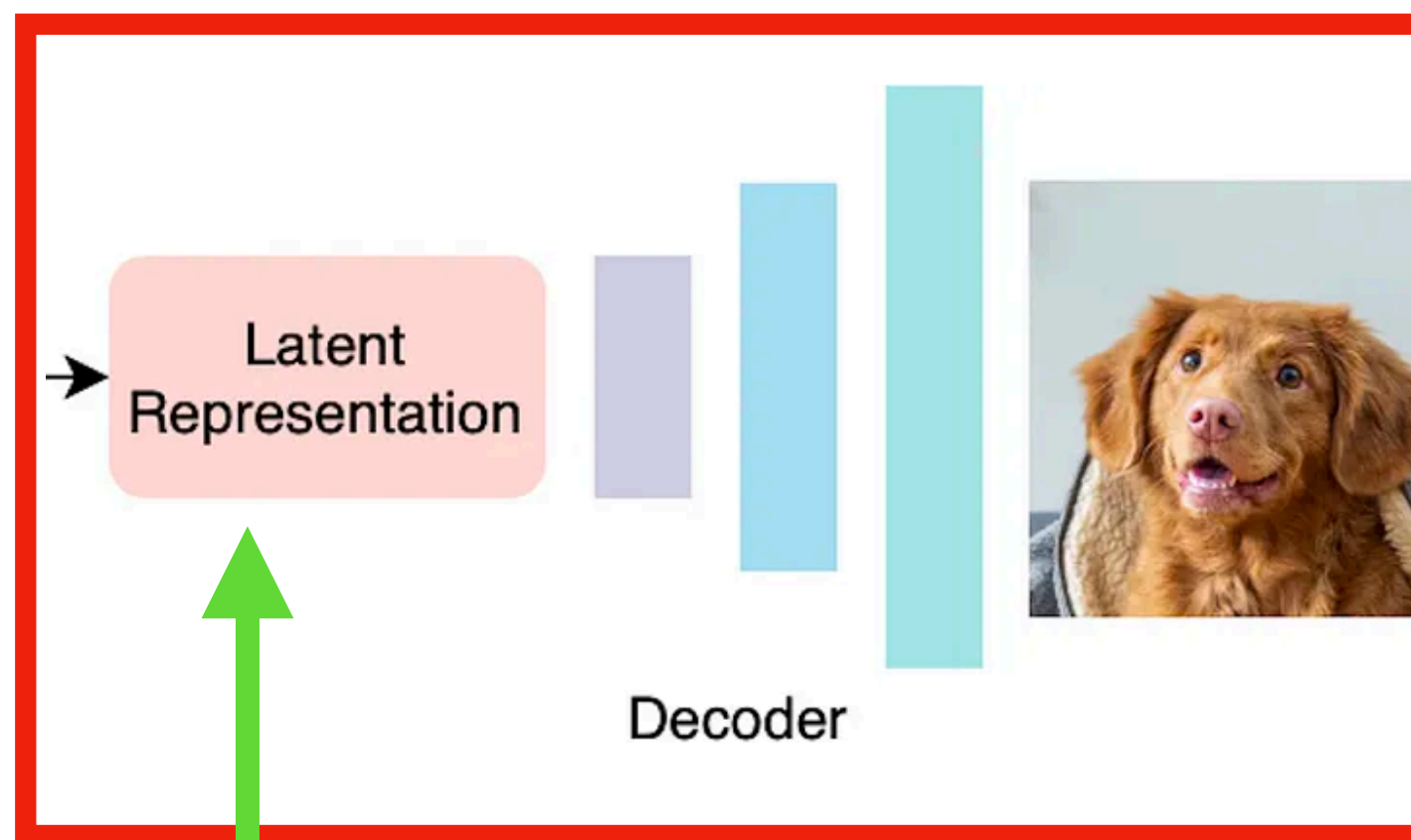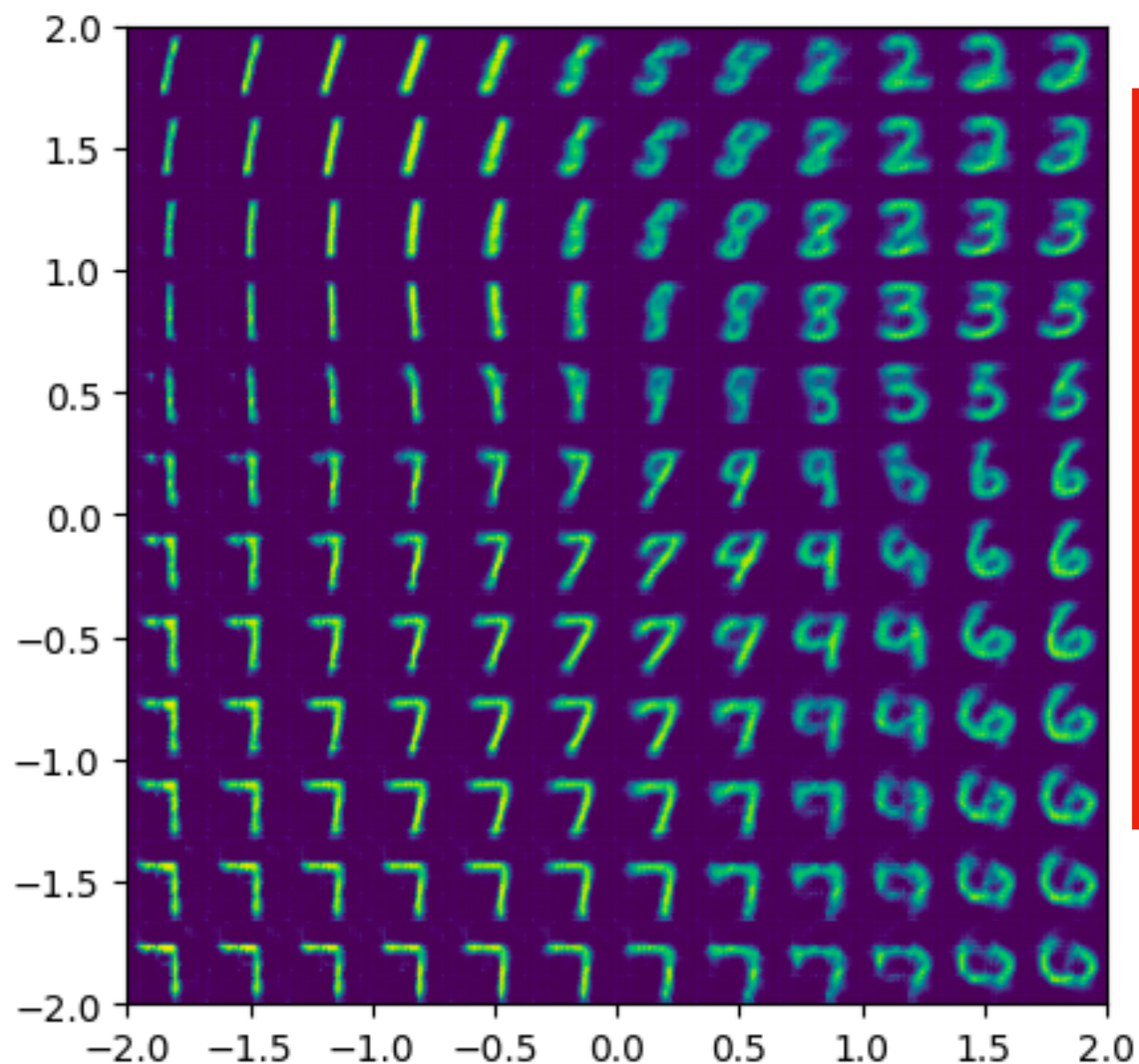
- Force known inputs into the VAE

- That way our latent space has explicit knowledge of what is going on

Image Sources

proton therapy machine

link: https://www.itnonline.com/content/mass-general-cancer-center-researchers-share-insights-evolution-proton-radiotherapy

attribution: Massachusetts General Hospital

VAE diagram

link: https://towardsdatascience.com/how-to-generate-images-using-autoencoders-acfbc6c3555e

attribution: Sergios Karagiannakos

VAE diagram images 1

link: https://stats.stackexchange.com/questions/420974/backpropagation-on-variational-autoencoders

attribution: Edv Beq (https://stats.stackexchange.com/users/87106/edv-beq), Backpropagation on Variational Autoencoders, URL (version: 2019-08-13): https://stats.stackexchange.com/q/420974

VAE diagram images 2, with dog

link: https://towardsdatascience.com/building-a-convolutional-vae-in-pytorch-a0f54c947f71

attribution: Tim Cheng