

# Unsupervised Learning of Images:

## VAE, PixelCNN and VQ-VAE

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### **1 Introduction**

Recent advances in generative modelling of images have yielded impressive samples and applications. Maximum likelihood and reconstruction error are two common objectives used to train unsupervised models in the pixel domain, however their usefulness depends on the particular application the features are used in.

## 2 Models

### 2.1 VAE

### 2.2 PixelCNN

### 2.3 VQ-VAE

### 2.4 Summary

## 3 Experiments

For the CIFAR-10 dataset, the model performances are:

Model	NLL Test (Train)
PixelRNN	3.00 (2.93)
PixelCNN	3.14 (3.08)
Gated PixelCNN	3.03 (2.90)
VAE	4.51
VQ-VAE	4.67

## 4 Conclusion