

# Intro to Deep Learning

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# Why is this important?

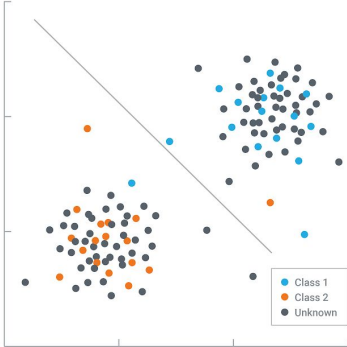
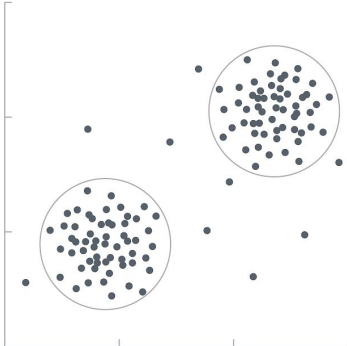
Deep Learning is the state-of-the-art for Computer Vision

Tasks like medical image segmentation, classification, and generating synthetic images all require Deep Learning

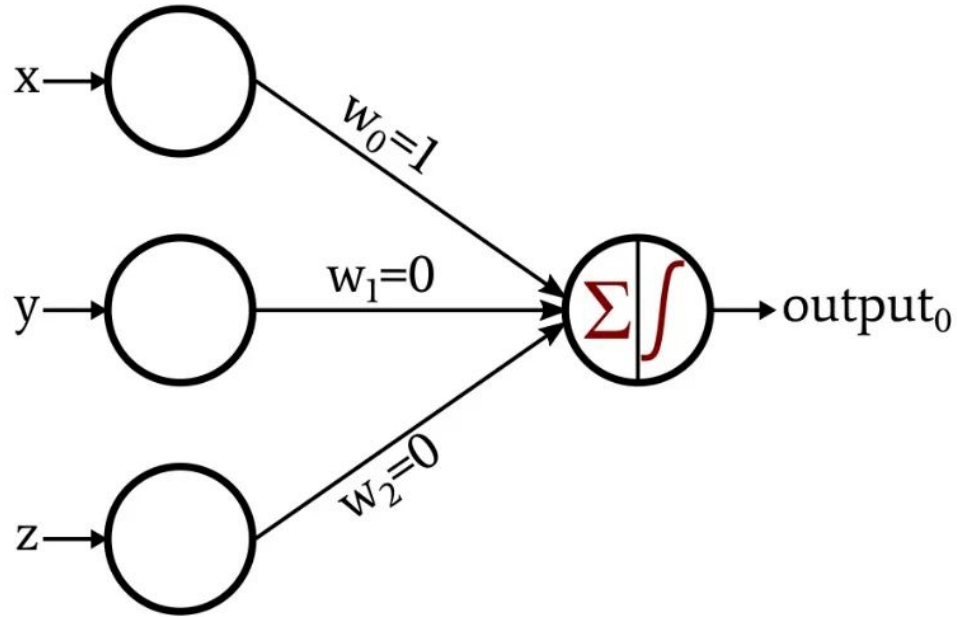
You will use many of the concepts here for your final project

# Fundamentals

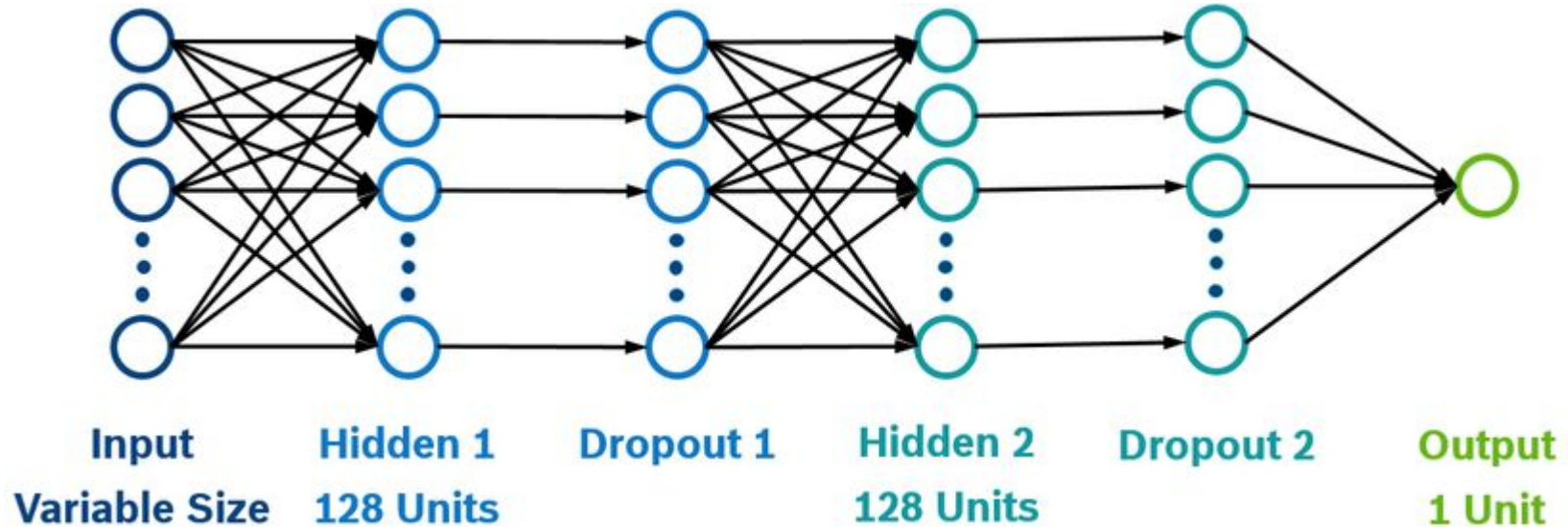
# Types of Learning and Applications

<b>Supervised</b>	<b>Unsupervised</b>
<ul style="list-style-type: none"><li>- Predicting diseases with metabolites and labeled data</li></ul> <p data-bbox="498 500 606 516">SUPERVISED</p>  <p data-bbox="647 819 724 868">● Class 1 ● Class 2 ● Unknown</p>	<ul style="list-style-type: none"><li>- No labeled data</li><li>- Clustering</li></ul> <p data-bbox="1317 505 1445 521">UNSUPERVISED</p> 

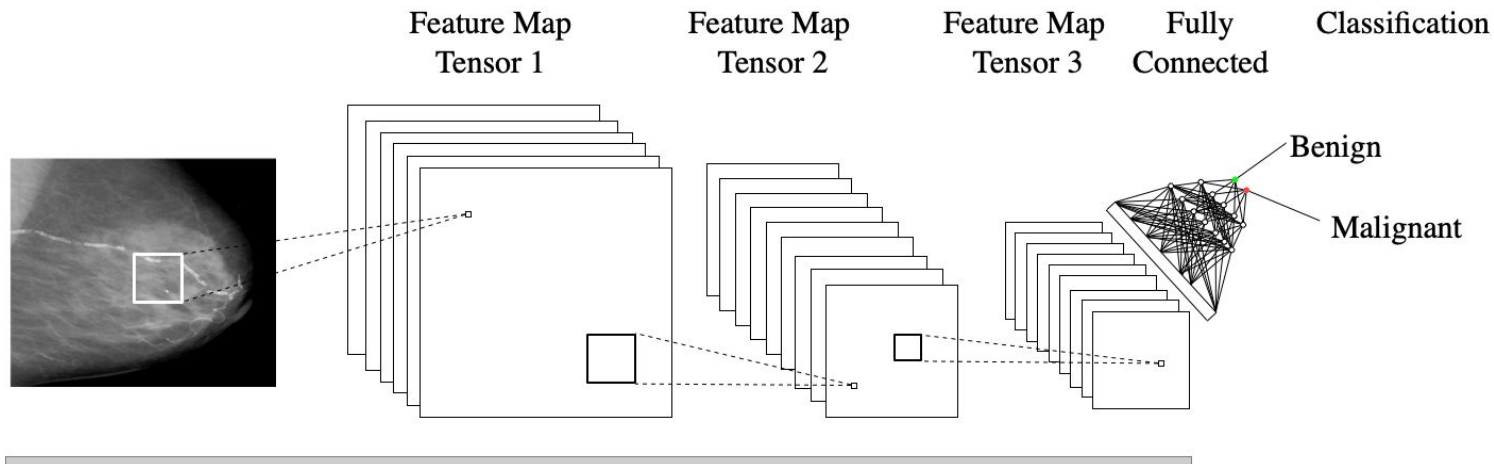
# The Basic Neuron -- The Perceptron



# Basic Deep Learning: Dense Networks



# Convolutions for Preserving Spatial Features

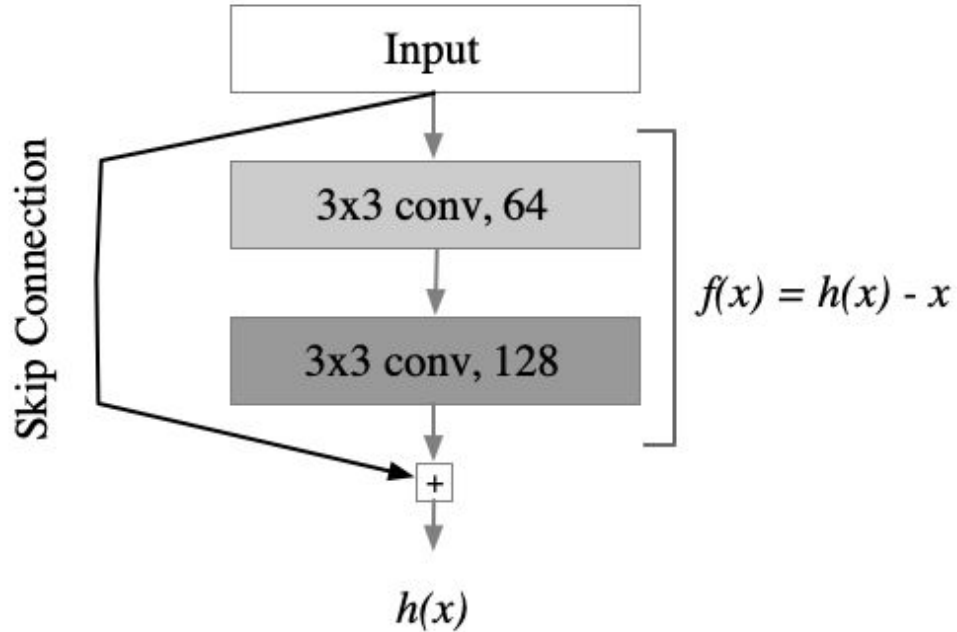


Feature extraction with successive convolutions

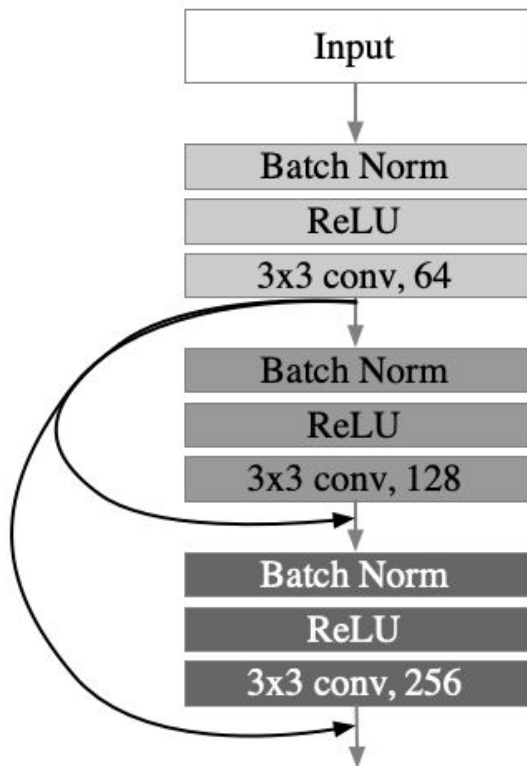
# Skip Connections



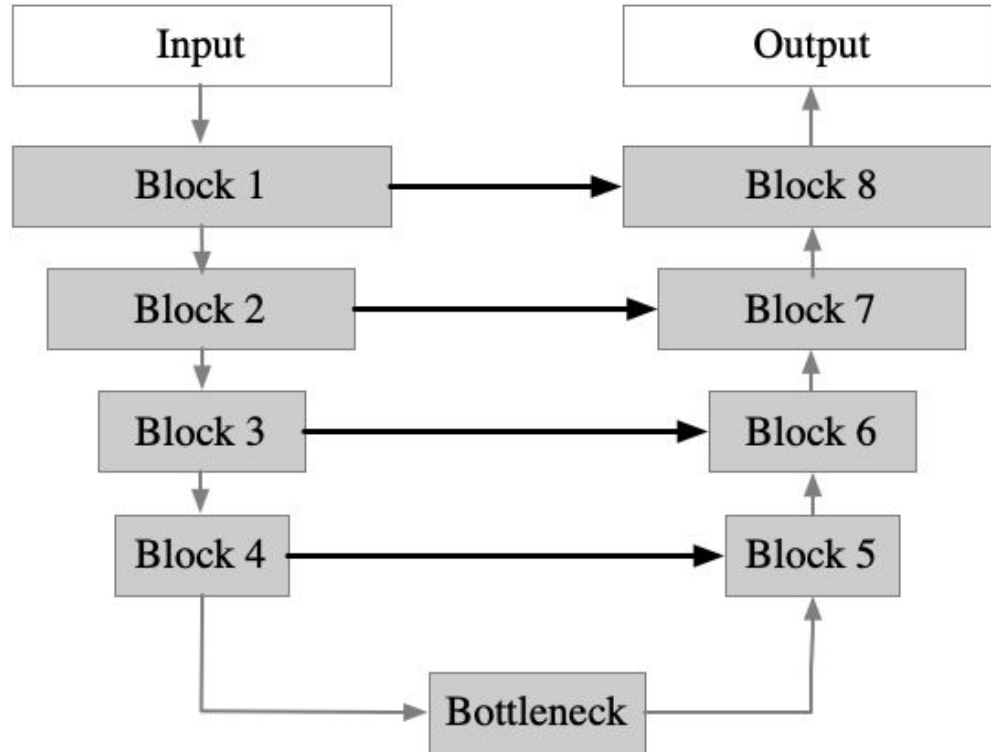
# Skip Connections Preserve Features -- ResNet



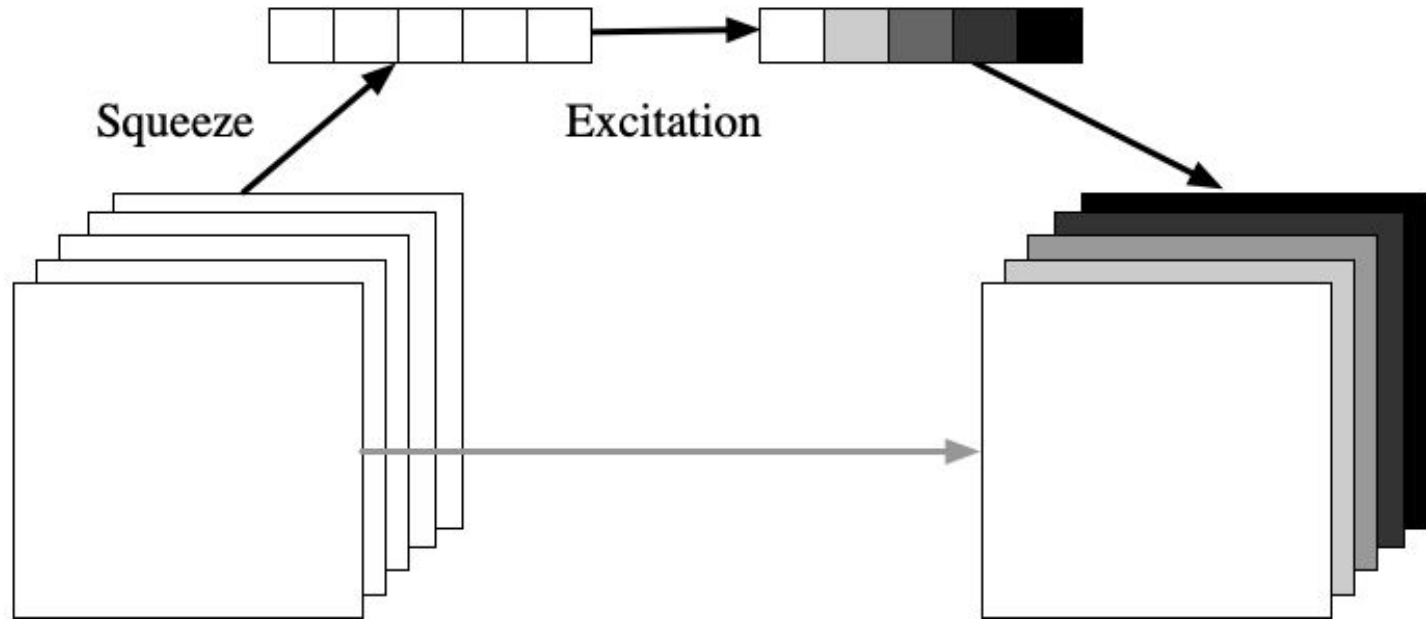
# Skip Connections Preserve Features -- DenseNet



# Skip Connections Preserve Features -- U-Net

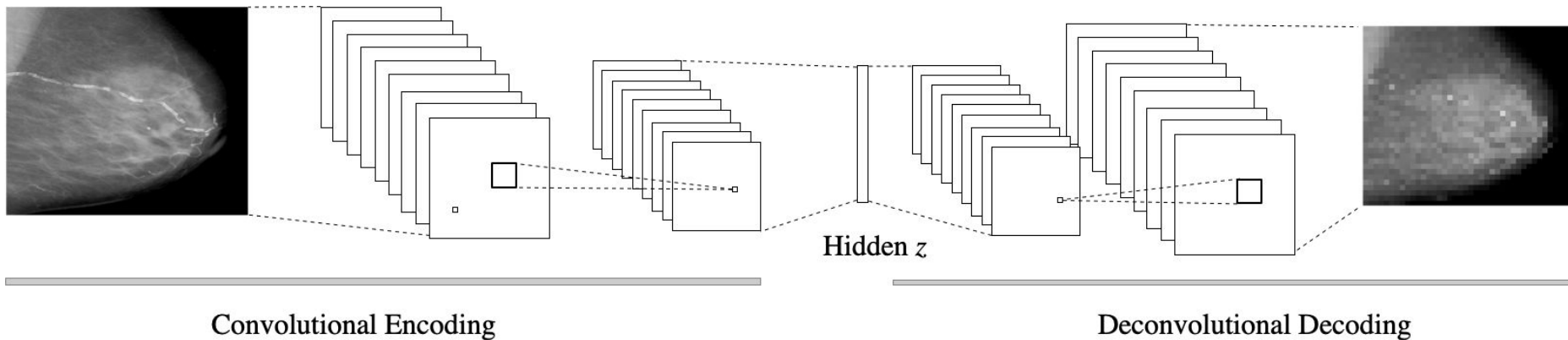


# Skip Connections Preserve Features -- SqueezeNet

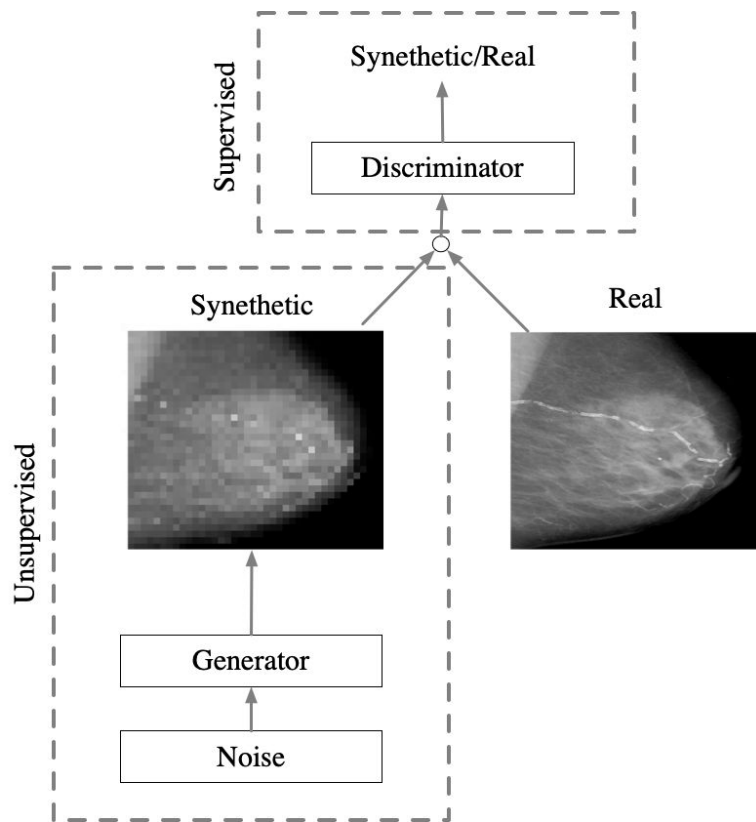


# Generative Networks

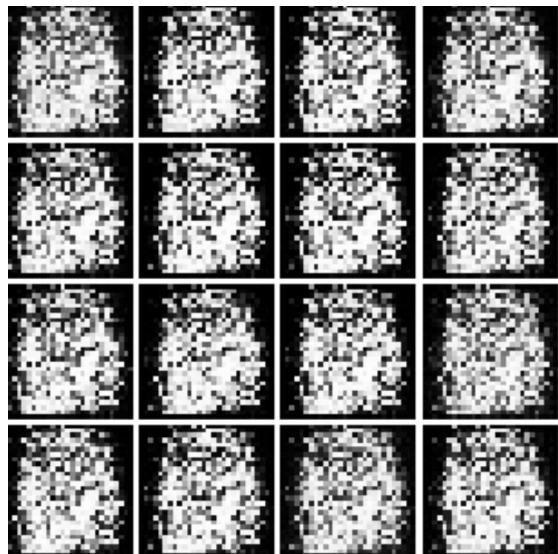
# Autoencoders for Dimensionality Reduction



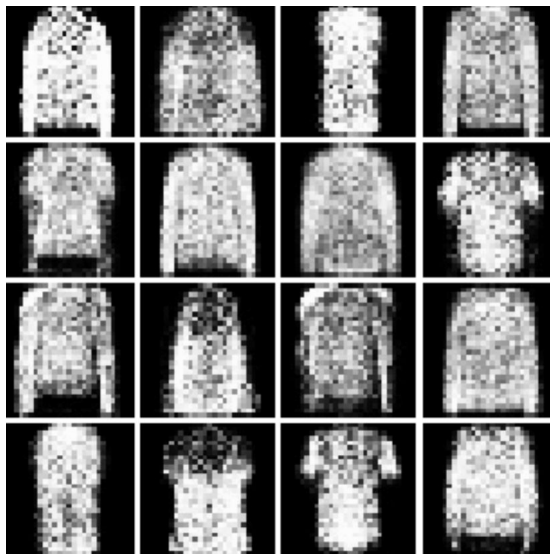
# GANs Generate Synthetic Images



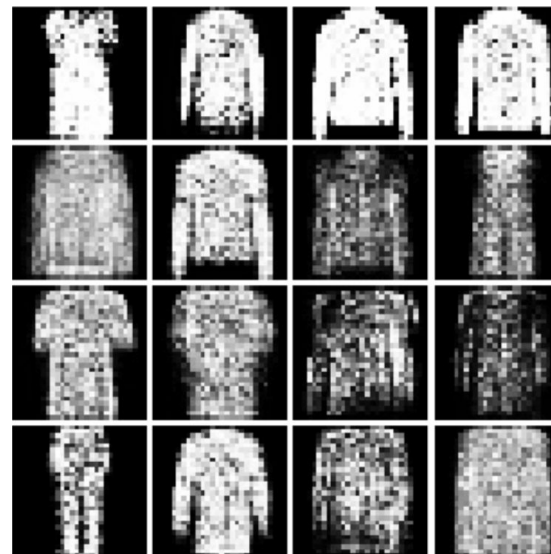
# Generative Networks Synthesize from Noise



Epoch 1



Epoch 2



Epoch 3



# Key Takeaways

# Integrate Deep Learning for Computer Vision

- Know what tasks require which type of models
- Know the difference between Unsupervised and Supervised Learning
- Apply the appropriate base model architecture to your unique tasks