Keras Sequential Model

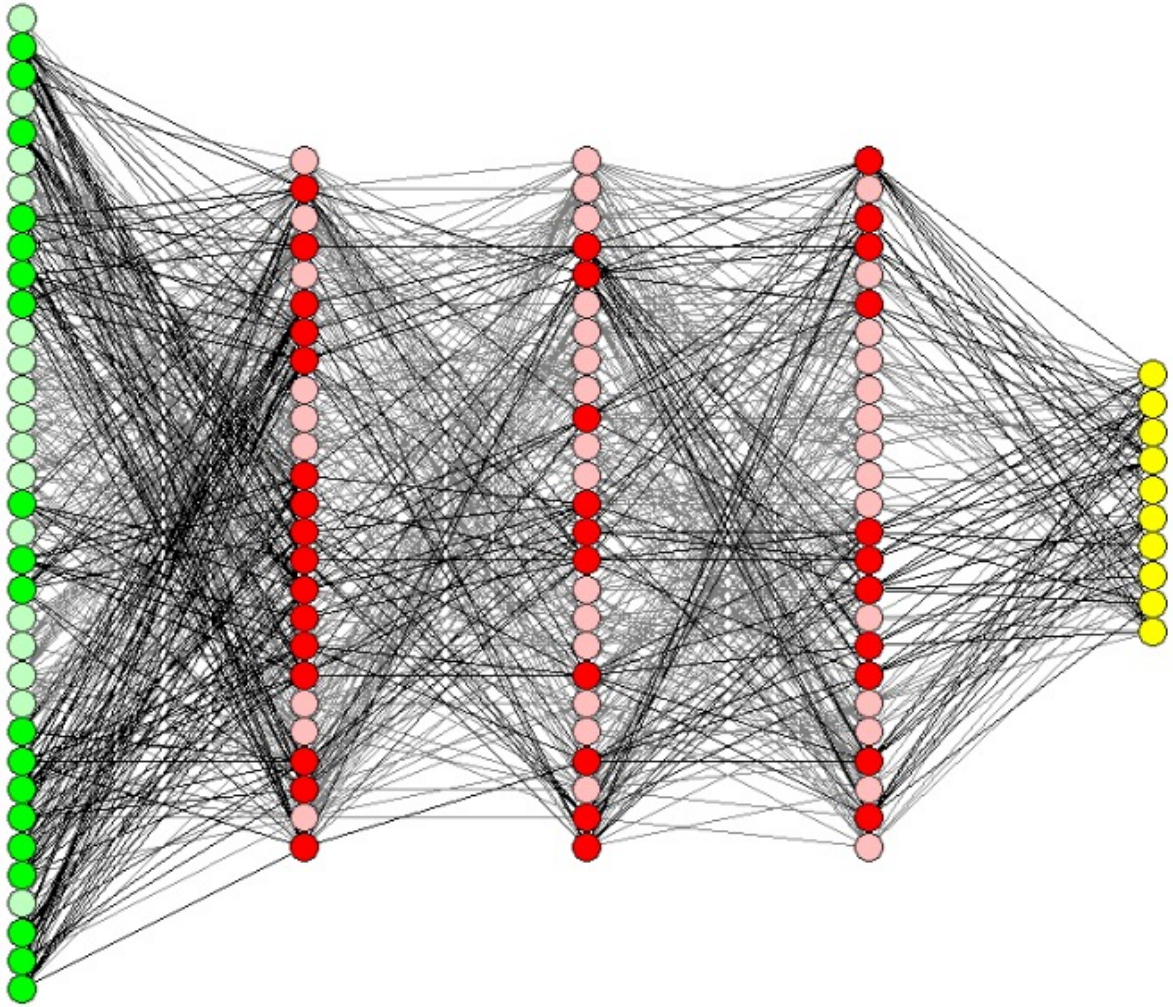
COSC 410: Applied Machine Learning

Spring 2022

Prof. Apthorpe

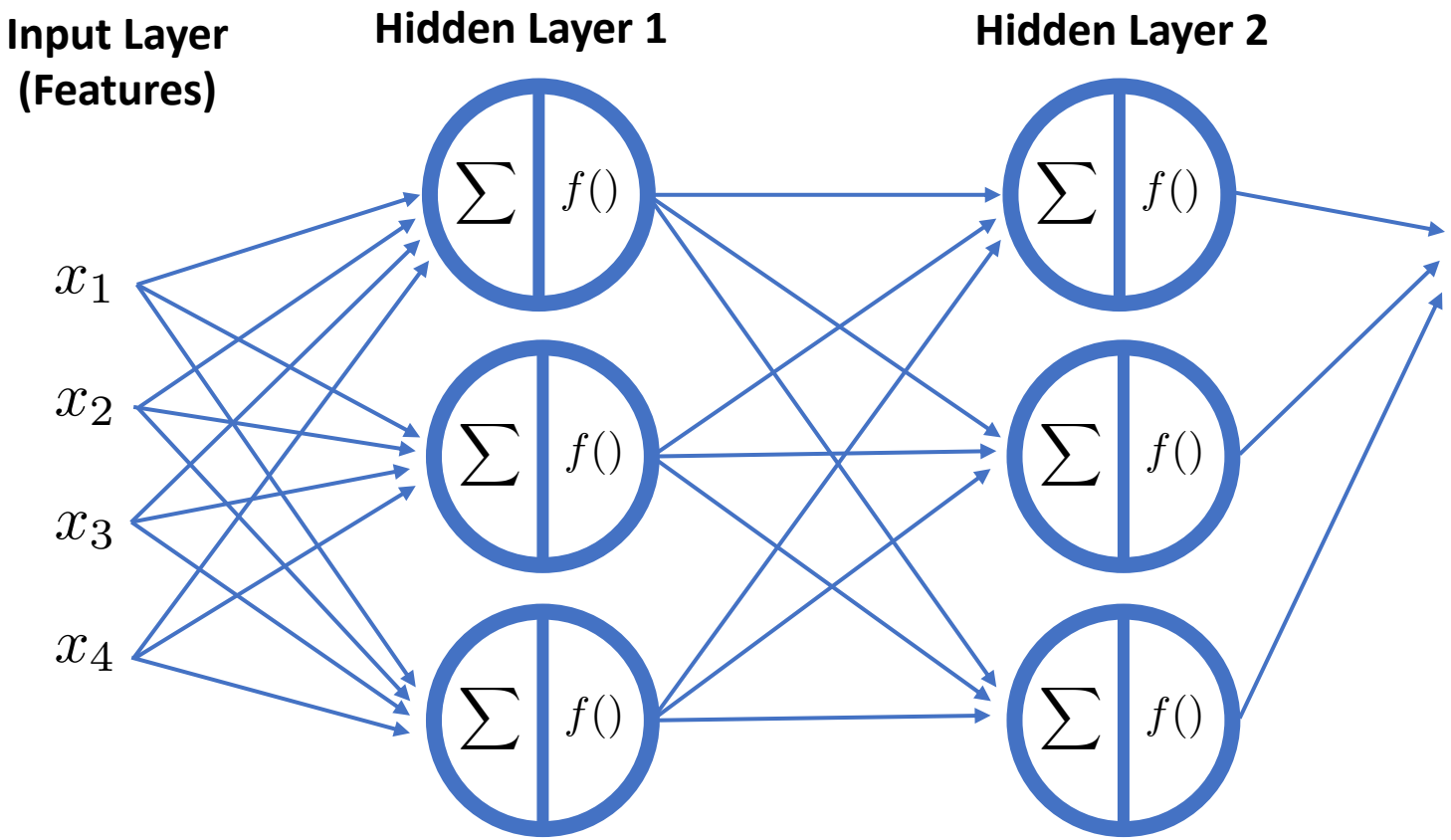
Outline

- FNN Review
- Hyperparameters Review
- Keras
- Fashion MNIST
- Programming Practice



Feed-Forward Neural Network

- Several layers to model complicated nonlinear functions



Works for multiclass or regression with only minor changes

$$\hat{y} = f(\mathbf{W}_o^\intercal\, f(\mathbf{W}_{h2}^\intercal\, f(\mathbf{W}_{h1}^\intercal\, \mathbf{x} + \mathbf{b}_{h1}) + \mathbf{b}_{h2}) + \mathbf{b}_o)$$

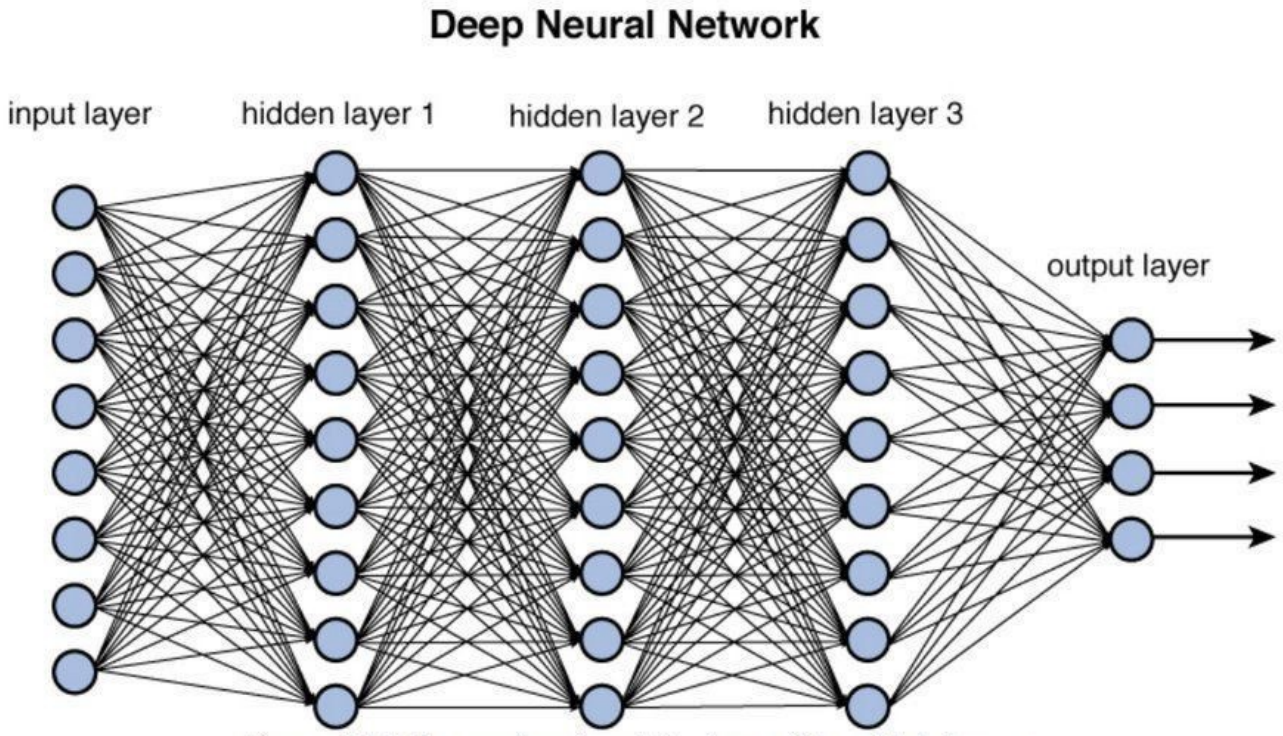
Hidden layer 1

Hidden layer2

Output layer

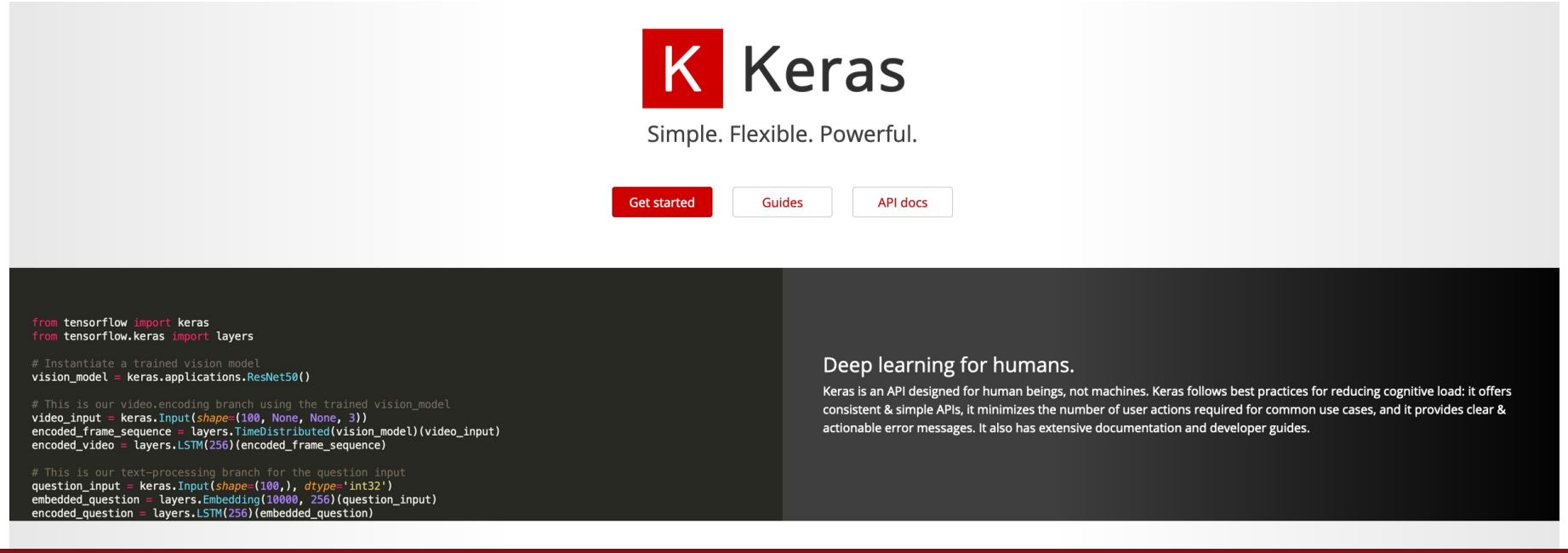
FNN Hyperparameters

- FNNs have many hyperparameters before we even get to the training algorithm
  - Number of layers
  - Number of nodes per layer
  - Activation function
  - Parameter initialization method
  - Learning rate schedule
  - Overfitting prevention
  - …



Keras

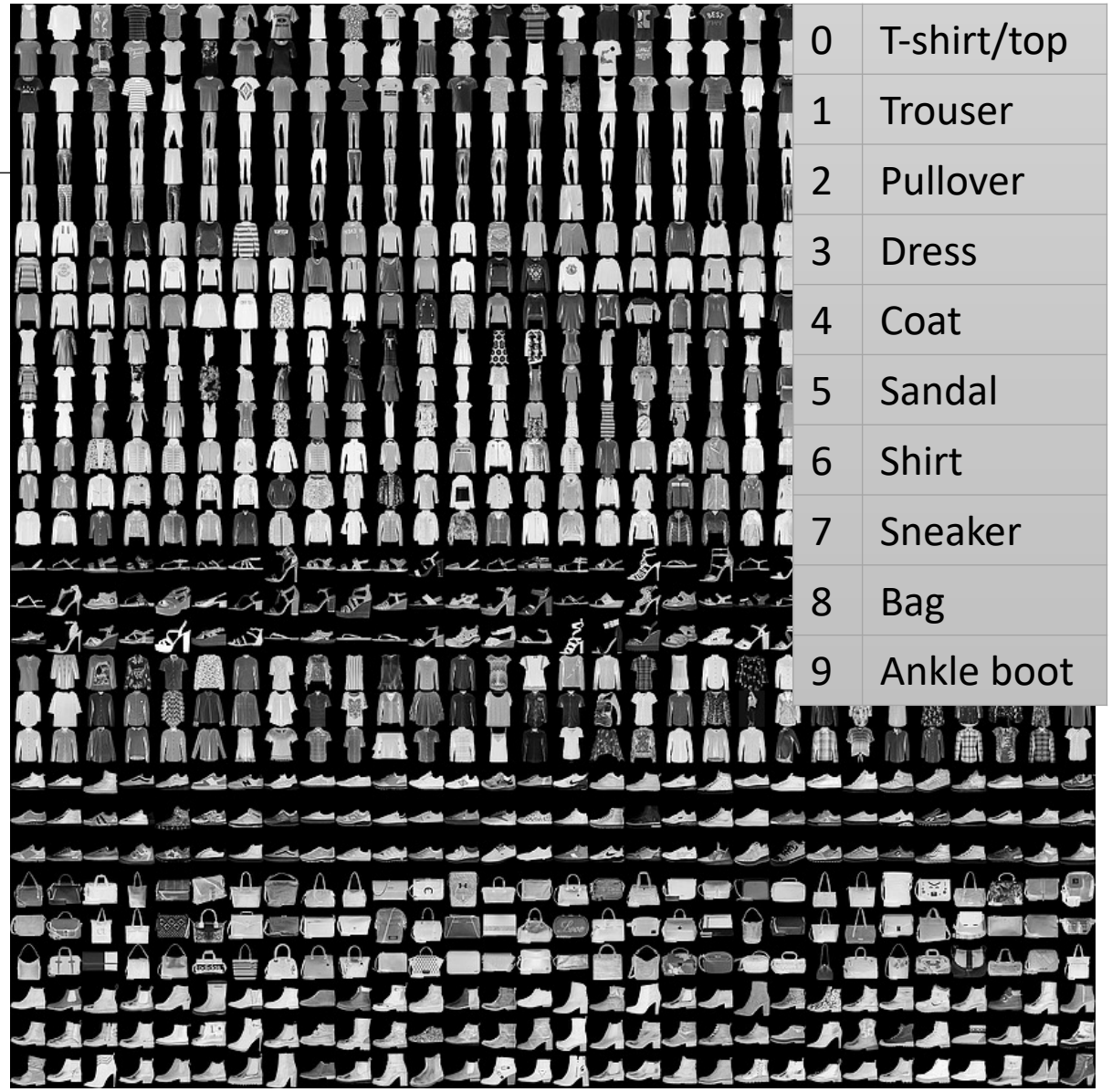
- Python library for deep learning
- High-level API (wrapper) for TensorFlow



Fashion MNIST

- Images of clothes in 10 categories

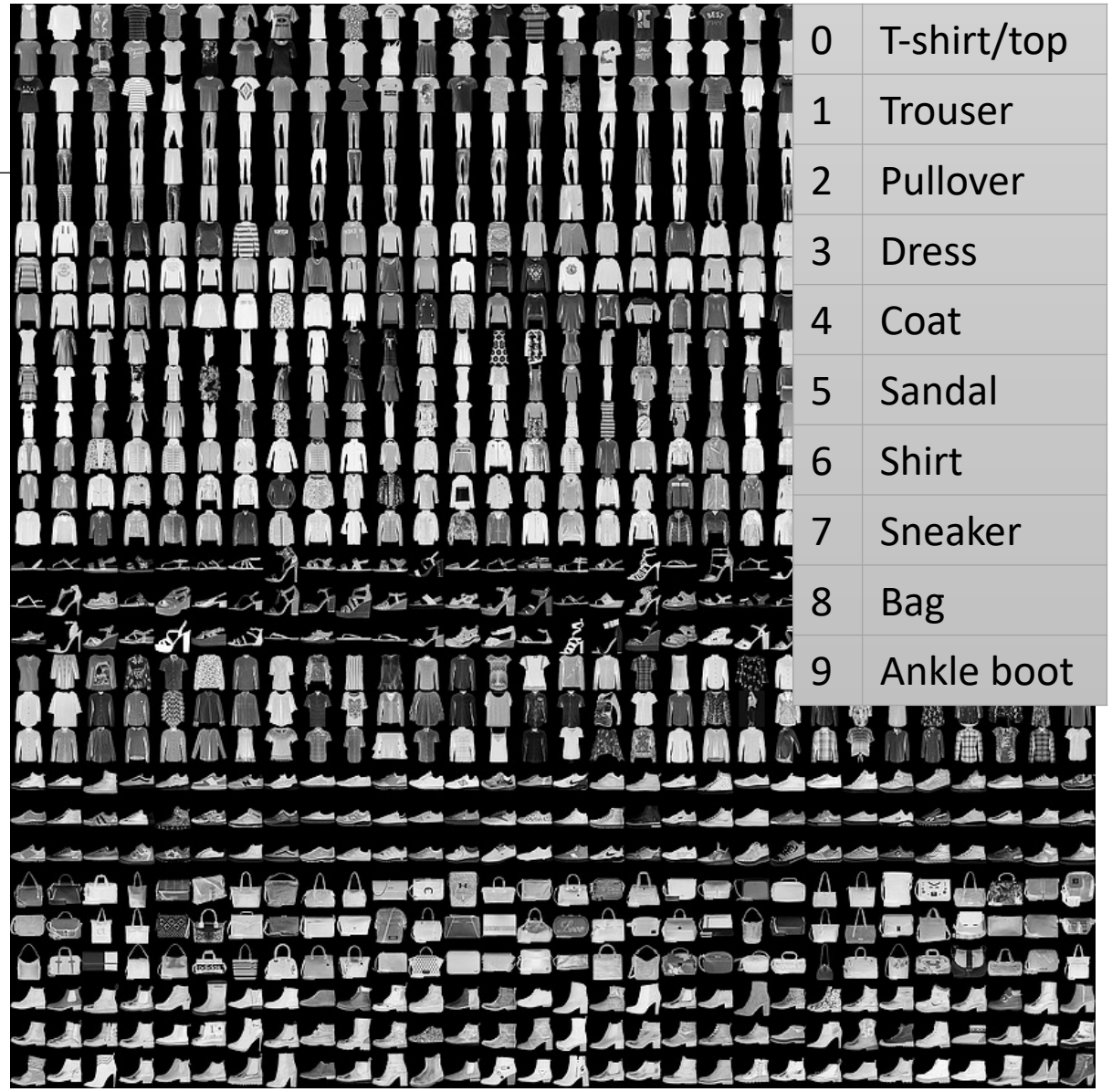
- Each image is 28x28 pixels grayscale
  - How many features per image?



0	T-shirt/top
1	Trouser
2	Pullover
3	Dress
4	Coat
5	Sandal
6	Shirt
7	Sneaker
8	Bag
9	Ankle boot

Fashion MNIST

- Images of clothes in 10 categories
- Each image is 28x28 pixels grayscale
  - 784 features per image
- 60,000 example training set
  10,000 example test set



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Programming Practice

FNN-KerasSequential.ipynb