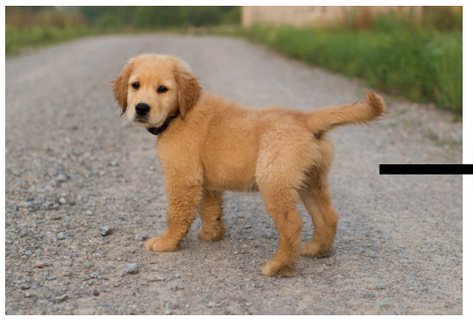
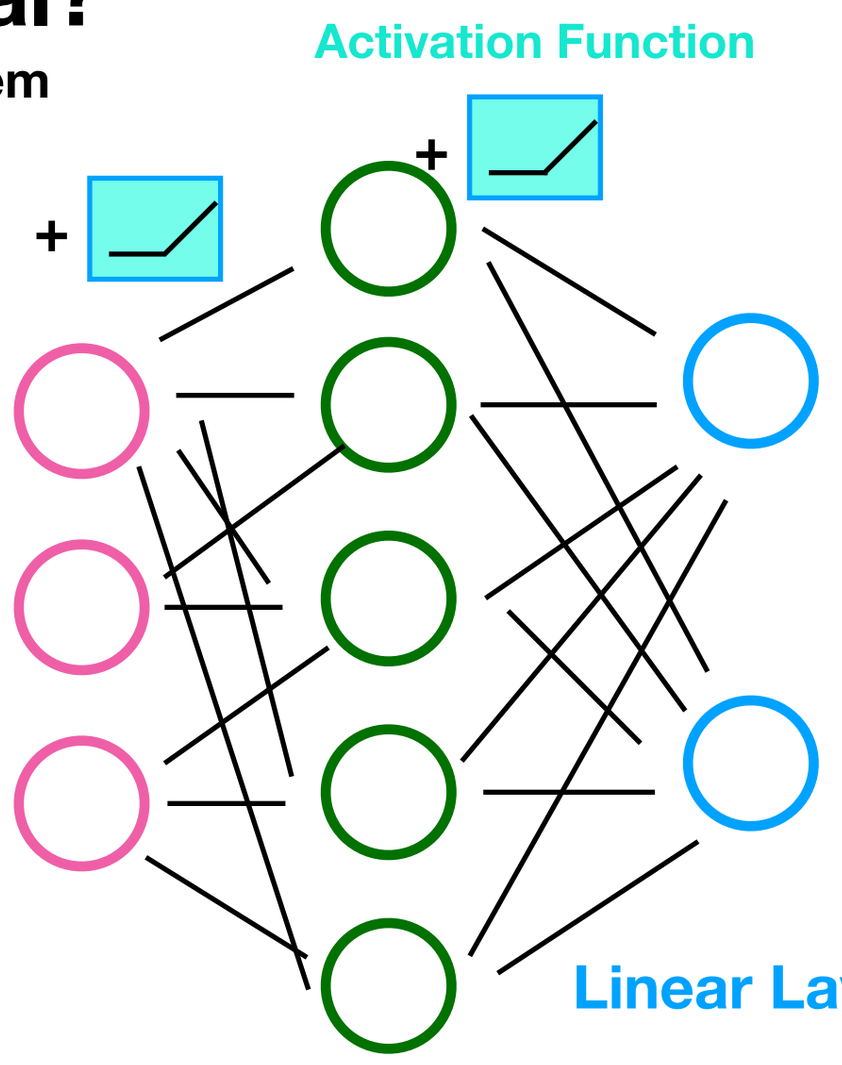
Neural Net
Softmax
Cross-Entropy

Neural Net With Softmax

Which Animal?

-> Multiclass problem





—> Map to probabilities

4 → 0.95 Dog

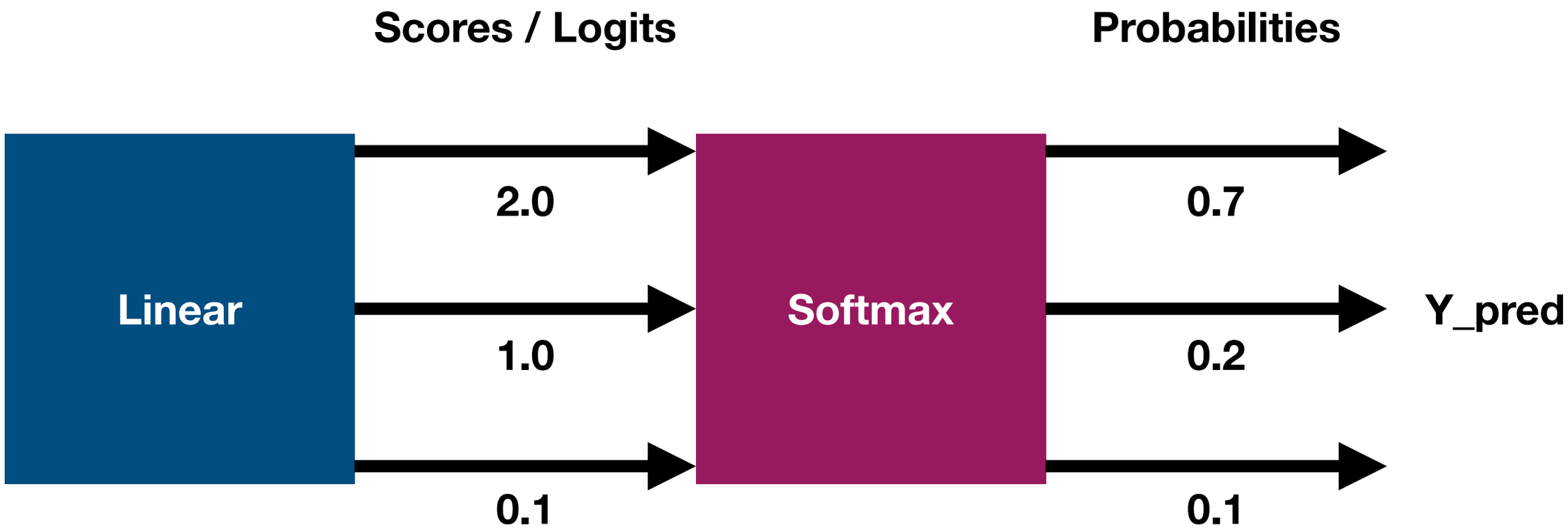
1 → 0.05 Cat

Linear Layer Softmax Layer

Softmax

$$S(y_i) = \frac{e^{y_i}}{\sum_j e^{y_j}}$$

Softmax Layer



Cross-Entropy

$$D(\hat{Y}, Y) = -\frac{1}{N} \cdot \sum Y_i \cdot \log(\hat{Y}_i)$$

Integer Labels

$$Y = 0$$

$$\hat{Y} = [0.7, 0.2, 0.1] \longrightarrow D(\hat{Y}, Y) = \mathbf{0.35}$$

Probabilities (Softmax)

$$Y = 0$$

$$\hat{Y} = [0.1, 0.3, 0.6] \longrightarrow D(\hat{Y}, Y) = \mathbf{2.30}$$

keras.losses.SparseCategoricalCrossentropy()

Cross-Entropy

$$D(\hat{Y}, Y) = -\frac{1}{N} \cdot \sum Y_i \cdot \log(\hat{Y}_i)$$

One-Hot Encoded Class Labels

$$Y = [1,0,0]$$

$$\hat{Y} = [0.7,0.2,0.1] \longrightarrow D(\hat{Y}, Y) = \mathbf{0.35}$$

Probabilities (Softmax)

$$Y = [1,0,0]$$

$$\hat{Y} = [0.1,0.3,0.6] \longrightarrow D(\hat{Y}, Y) = \mathbf{2.30}$$

keras.losses.CategoricalCrossentropy()