Multi Layer Perceptron (MLP)

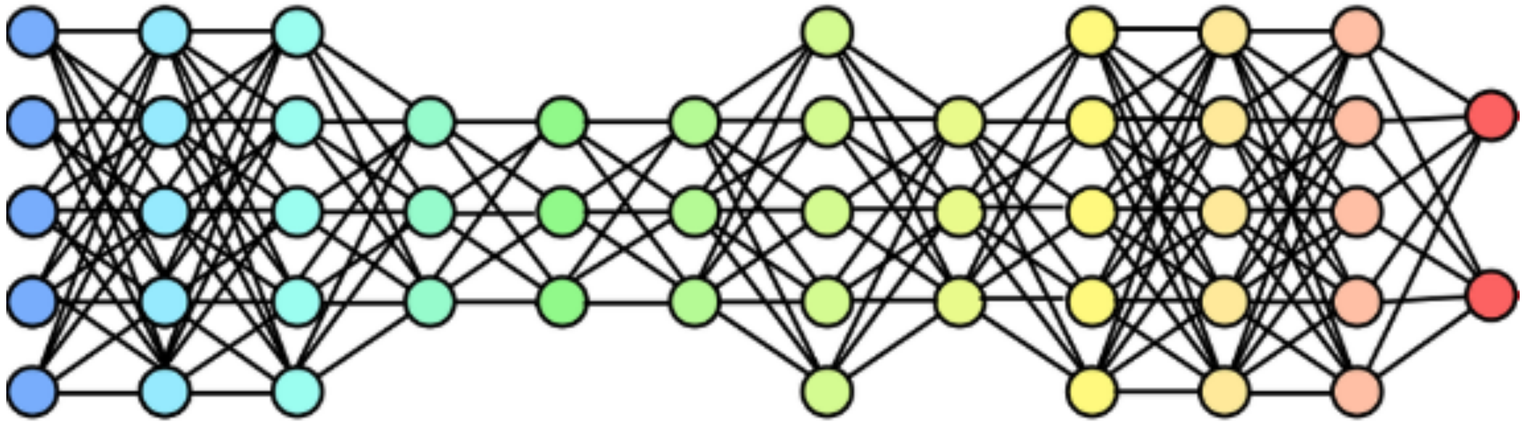
Reti Neurali Totalmente Connesse

Laura Nenzi, Gloria Pietropolli, Gaia Saveri

LICEO SCIENTIFICO GALILEO GALILEI

UNIVERSITÀ DEGLI STUDI DI TRIESTE

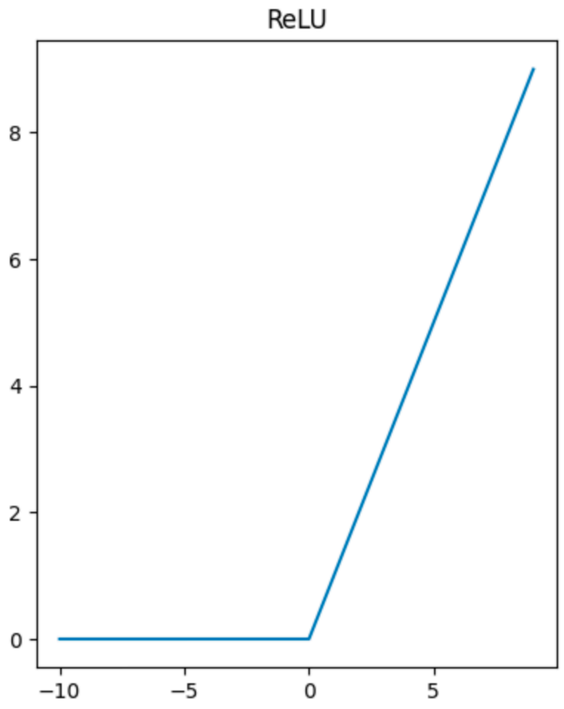
Architettura MLP



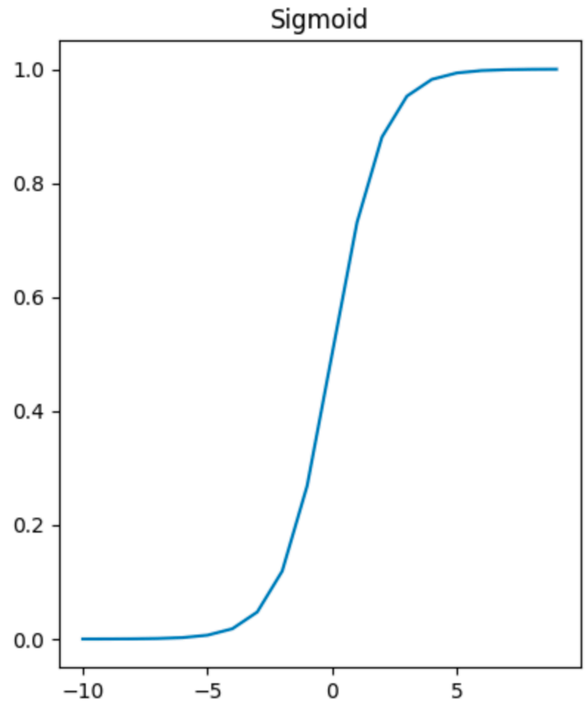
I calcoli per produrre un output dato un input vanno in questa direzione

L'errore (in funzione di w e b), ovvero la funzione di costo o perdita, viene calcolato in questa direzione

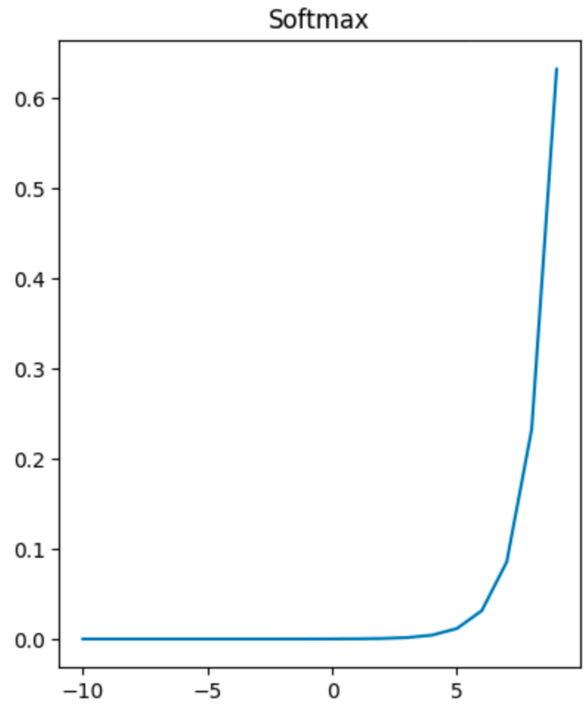
Funzioni di Attivazione



Strati Intermedi



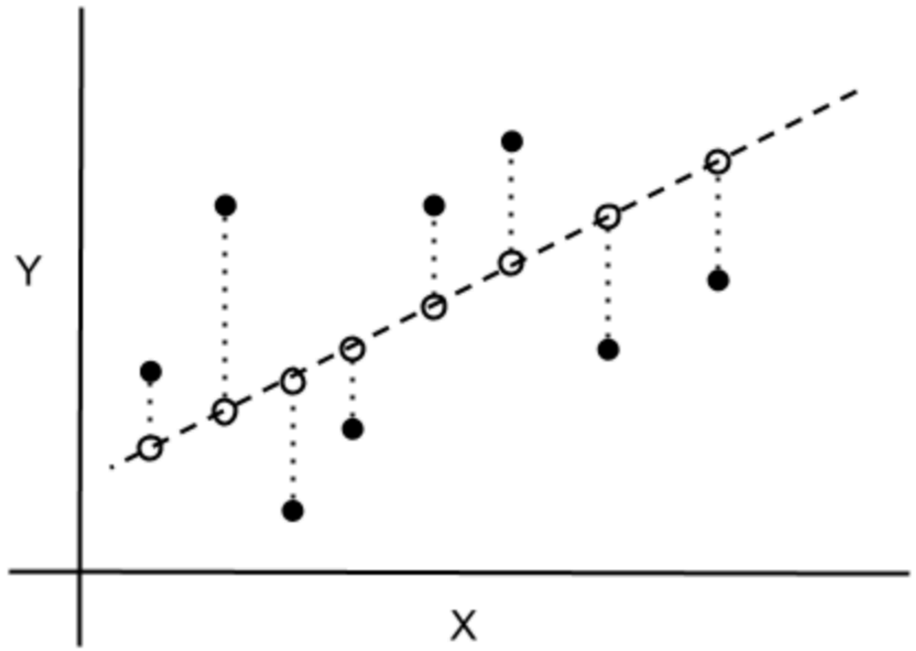
Output Classificazione Binaria



Output Classificazione Multi-classe

Metriche di Valutazione Modelli

(Root) Mean Square Error - (R)MSE

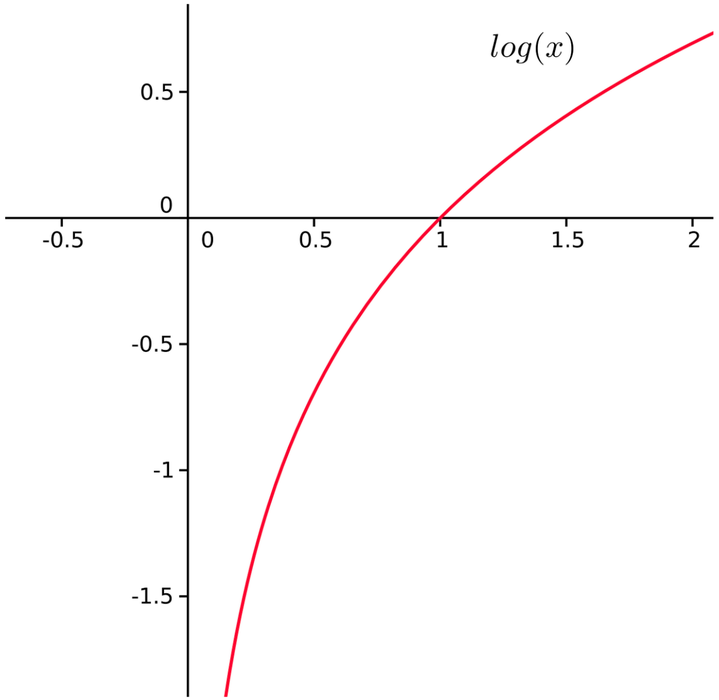


$$MSE = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)$$

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)}$$

Metriche di Valutazione Modelli

(Binary) Cross Entropy - (B)CE

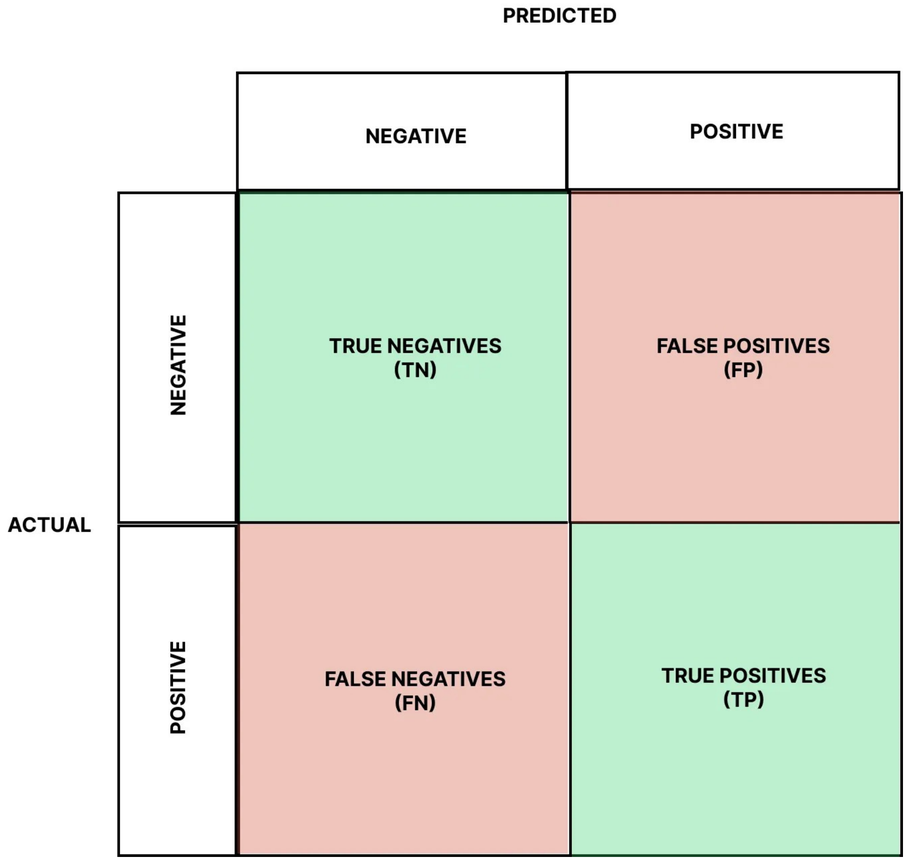


$$CE_x = -\sum_{i=1}^{C} t_i \log(p_i)$$

$$BCE_x = -\left(t \log(p) + (1-t)\log(1-p)\right)$$

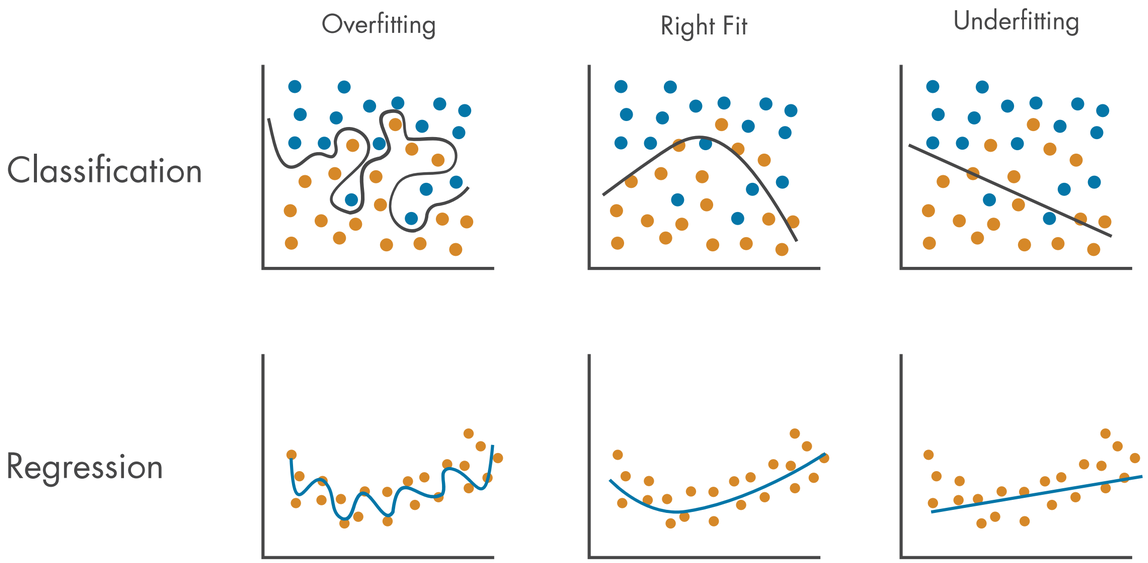
Metriche di Valutazione Modelli

Accuratezza e Confusion Matrix



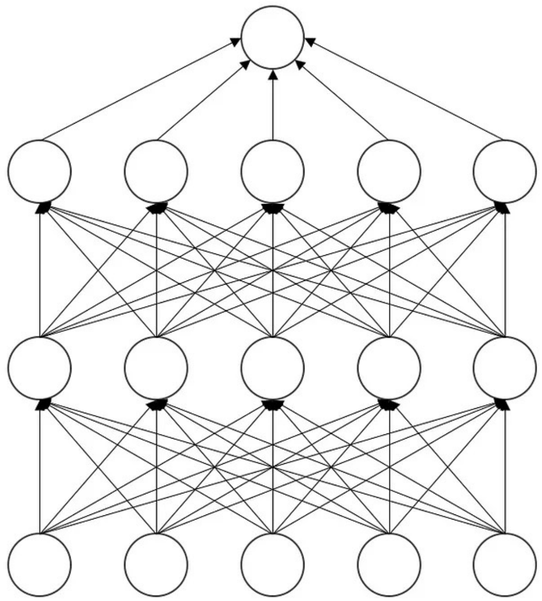
$$ACC = \frac{1}{n}\sum_{i=0}^{n} \mathbb{I}(y_i = \hat{y}_i) = \frac{\#pred\_corrette}{\#pred\_totali}$$

Overfitting e Dropout

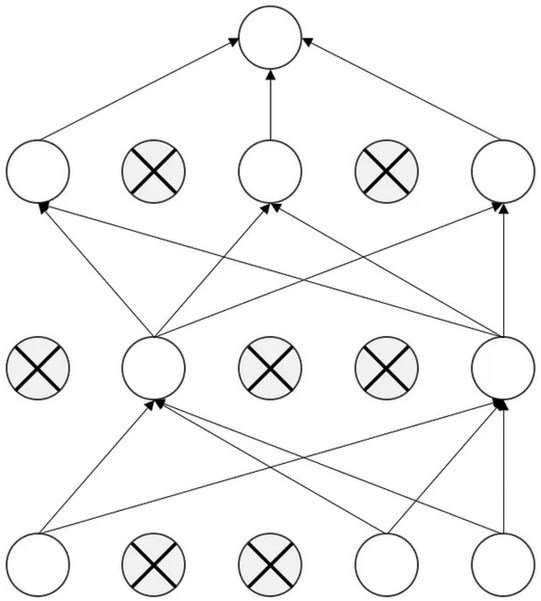


Problema

(Possibile) Soluzione



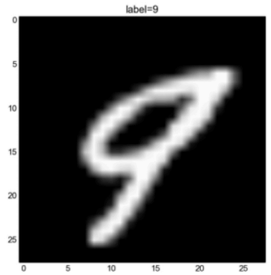
Standard Neural Net



After applying dropout

One-Hot-Encoding

Trasformare Variabili Categoriche in Vettori



0,0,0,0,0,0,0,0,0,1

0 1 2 3 4 5 6 7 8 9