Workshop 6

COMP90051 Statistical Machine Learning

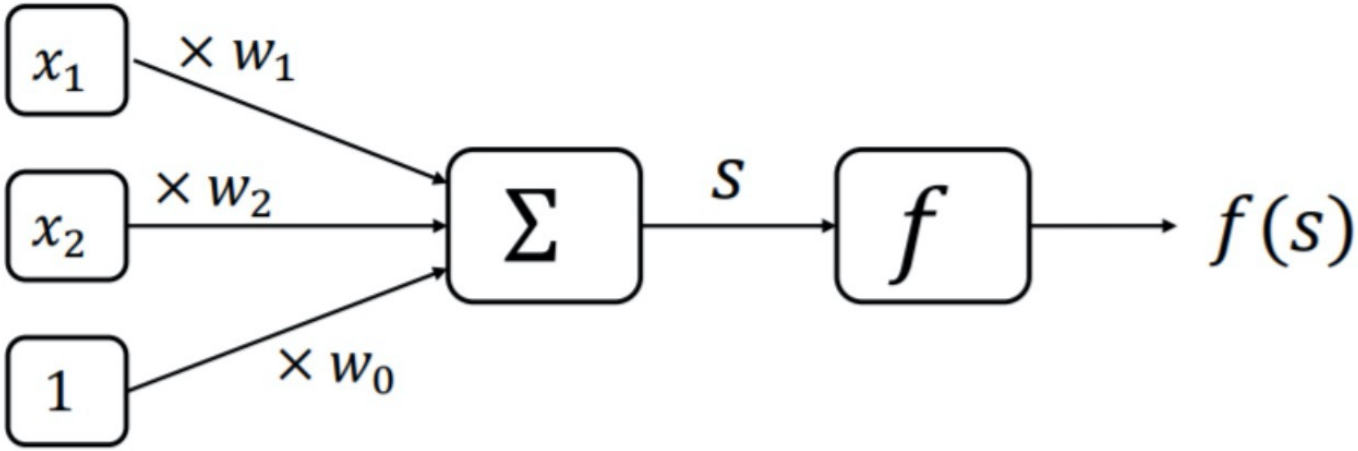
Semester 1, 2023

Learning outcomes

At the end of this workshop you should:

- Be able to implement perceptron
- Understand the perceptron behaves in two distinct scenarios
- Learn how to use PyTorch to implement the perceptron

Perceptron Model

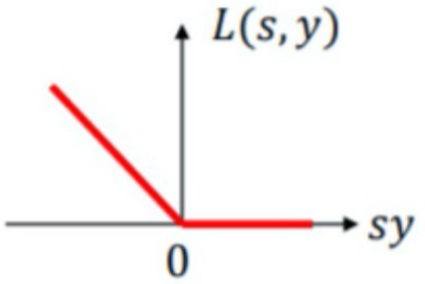


Compare this model to logistic regression

- x_1, x_2 – inputs
- w_1, w_2 – synaptic weights
- w_0 – bias weight
- f – activation function

Loss function for perceptron

- Consider a single training example. If y and s have the same sign then the example is classified correctly. If y and s have different signs, the example is misclassified
- The perceptron uses a loss function in which there is no penalty for correctly classified examples, while the penalty (loss) is equal to s for misclassified examples*
- Formally:
  - $L(s, y) = 0$ if both s, y have the same sign
  - $L(s, y) = |s|$ if both s, y have different signs



- This can be re-written as $L(s, y) = \max(0, -sy)$

* This is similar, but not identical to another widely used loss function called ***hinge loss***

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