Assignment 2

1. What happens to the softmax loss when the predicted probability for the true label increases?

2. What is the key difference between softmax loss and multi-class SVM loss in terms of their approach to handling multi-class classification?

3. For the multiclass SVM loss

$$L_i = \sum_{j \neq y_i} \max(0, s_j - s_{y_i} + 1)$$

a. At initialization W is small so all s ≈ 0. What is the loss Li, assuming N examples and C classes?

b. What if the sum was over all classes? (Including $j = y_i$)

4. For the following scores calculate softmax and multiclass SVM loss if the first class is the correct class.

a. [10, -100, -100]

b. [10, 9, 9]

What does the calculated loss tells you about the difference between the two losses?

5. Programming assignment

Build a Python function that calculates the **softmax** loss and **SVM multiclass** loss using the **numpy** library for an image given a set of weights and the true label.

The function should take the image, weights, and true label as input and return the corresponding loss.

Hint, here are some of the functions you may need: np.dot(), np.exp(), np.log(), np.sum(), …