

Module 16 Lab:

Binary Classification with Perceptron

OBJECTIVE

The simplest NN is the perceptron that contains one hidden artificial neuron. The goal of this lab is to implement the perceptron for binary image classification from scratch, where the activation function is sigmoid function and mean square error is the loss function.

PREREQUISITES

Install Python packages below.

- **numpy** is the fundamental package for scientific computing with Python.
- **h5py** is a common package to interact with a dataset that is stored on an H5 file.
- **matplotlib** is a famous library to plot graphs in Python.
- **PIL and scipy** are used here to test your model with your own picture at the end.

INSTRUCTIONS

- Build the simplest neural network: Perceptron, including:
 - Initializing parameters (e.g. connection weights)
 - Calculating the loss based on the loss function
 - Using an optimization algorithm (stochastic gradient descent (SGD)) to update the parameters in terms of the loss
- Merge all three functions above into a main model function to build a Perceptron.
- Utilize this function to implement cat recognition on images. The data can be downloaded from Kaggle (<https://www.kaggle.com/muhammedalkran/catvnoncat>).