

In [2]:

```

# A simple Python example with a single neuron. It has two
# inputs and one output and executes the Logic AND of the inputs.

from numpy import exp, array, random, dot

#Set up parameters =====
inputs = array([[0, 0], [1, 1], [1, 0], [0, 1]])
outputs = array([[0, 1, 1, 1]]).T
random.seed(1)
weights = 2 * random.random((2, 1)) - 1
#Define a Single Neuron function =====
def neuron(inputs, weights):
    output = 1 / (1 + exp(-(dot(inputs, weights))))
    return output
#Train the Neuron =====
for iteration in range(50000):
    output = 1 / (1 + exp(-(dot(inputs, weights))))
    weights += dot(inputs.T, (outputs - output) * output * (1 - output))
#Test the Neuron =====
x = array([1, 0])
print (neuron (x,weights))

```

[0.9968177]

In [3]:

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# A Python multiple Layer perceptron using the Scikit-Learn
# library. It has two inputs and one output and performs the Logical AND of the inputs.

from sklearn.neural_network import MLPClassifier
X = [[0., 0.], [1., 1.], [0., 1.], [1., 0.]]
y = [0, 1, 1, 1]
clf = MLPClassifier(solver='lbfgs', alpha=1e-5,
                    hidden_layer_sizes=(5, 2), random_state=1)
clf.fit(X, y)
print(clf.predict([[2., 2.], [-1., -2.])))
print([coef.shape for coef in clf.coefs_])

```

```

[1 0]
[(2, 5), (5, 2), (2, 1)]

```

In [4]:

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# A simple Keras multiple layer perceptron for the breast
# cancer classification. It has an input layer, a hidden layer (dense layer) of 10 neurons,
# The dense layer is a neural network layer that each
# neuron in the dense layer receives input from all neurons of its previous layer.
# Multiple Layer Perceptron Classification

from keras.models import Sequential
from keras.layers import Activation, Dense
from keras import optimizers
from sklearn.datasets import load_breast_cancer
from sklearn.model_selection import train_test_split
whole_data = load_breast_cancer()
X_data = whole_data.data
y_data = whole_data.target
X_train, X_test, y_train, y_test = train_test_split(X_data, y_data, test_size = 0.3, random
features = X_train.shape[1]
#MPL 3-Layer Model =====
model = Sequential()
model.add(Dense(10, activation='relu', input_shape=[X_train.shape[1]]))
model.add(Dense(10, activation='relu'))
model.add(Dense(1))
print(model.summary())
print(model.get_config())
model.compile(optimizer = 'adam', loss = 'mean_squared_error',
metrics = ['mse'])
model.fit(X_train, y_train, batch_size = 50, validation_split=0.2,
epochs = 100, verbose = 1)
results = model.evaluate(X_test, y_test)
print('loss: ', results[0])
print('accuracy: ', results[1])

```

Model: "sequential"

Layer (type)	Output Shape	Param #
=====		
dense (Dense)	(None, 10)	310
dense_1 (Dense)	(None, 10)	110
dense_2 (Dense)	(None, 1)	11

```

=====
Total params: 431
Trainable params: 431
Non-trainable params: 0

```

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None
{'name': 'sequential', 'layers': [{'class_name': 'InputLayer', 'config':
{'batch_input_shape': (None, 30), 'dtype': 'float32', 'sparse': False, 'ra
gged': False, 'name': 'dense_input'}}, {'class_name': 'Dense', 'config':

```