# ANN

Keras is a powerful easy-to-use Python library for developing and evaluating deep learning models.

It wraps the efficient numerical computation libraries Theano and TensorFlow and allows you to define and train neural network models in a few short lines of code.

## Steps:

1. Load Data.
2. Define Model.
3. Compile Model.
4. Fit Model.
5. Evaluate Model.
6. Make Predictions

```
from keras.models import Sequential
from keras.layers import Dense
import numpy as np
# fix random seed for reproducibility
np.random.seed(7)
```

```
# Load CSV from dataset
from numpy import loadtxt
from urllib.request import urlopen

dataset = loadtxt(open("all_branch.csv"), delimiter=",",skiprows=1)
print(dataset.shape)
X = dataset[:,1:12]
Y = dataset[:,-1]
Y.shape
```

```
(1959, 13)
(1959,)
```

```
print(X)
```

```
[[ 5.22  4.27  3.92 ... 10.   24.97  0.  ]
 [ 9.39 10.    8.5  ... 50.   78.92  0.  ]
 [ 8.7   8.55  8.17 ... 12.   73.79  0.  ]
 ...
 [ 8.62  8.19  7.81 ... 53.   95.66  0.  ]
 [ 8.71  9.24  8.58 ... 55.   98.    0.  ]
 [ 8.38  8.76  8.19 ... 82.   78.2   1.  ]]
```

```
print(Y)
```

```
[2. 0. 0. ... 0. 0. 0.]
```

```
from keras.utils import np_utils
Y = np_utils.to_categorical(Y)
```

```
Y.shape
```

```
(1959, 3)
```

```
model = Sequential()
model.add(Dense(12, input_dim=11, activation='relu'))
model.add(Dense(24, activation='relu'))
model.add(Dense(3, activation='softmax'))
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
model.fit(X, Y, epochs=150, batch_size=3)
```

```
Epoch 1/150
1959/1959 [==============================] - 3s 2ms/step - loss: 1.7311 - acc: 0.7
Epoch 2/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.4475 - acc: 0.8
Epoch 3/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.4218 - acc: 0.8
Epoch 4/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3998 - acc: 0.8
```

```
# evaluate the model
scores = model.evaluate(X, Y)
print("\n%s: %.2f%%" % (model.metrics_names[1], scores[1]*100))
```

```
1599/1599 [==============================] - 0s 77us/step

acc: 92.27%
Epoch 9/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3624 - acc: 0.8
Epoch 10/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3499 - acc: 0.8
Epoch 11/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3492 - acc: 0.8
Epoch 12/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3369 - acc: 0.8
Epoch 13/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3313 - acc: 0.8
Epoch 14/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3202 - acc: 0.8
Epoch 15/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3137 - acc: 0.8
Epoch 16/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.3087 - acc: 0.8
Epoch 17/150
1959/1959 [==============================] - 3s 1ms/step - loss: 0.3025 - acc: 0.8
Epoch 18/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.2905 - acc: 0.8
Epoch 19/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.2818 - acc: 0.8
Epoch 20/150
1959/1959 [==============================] - 3s 2ms/step - loss: 0.2704 - acc: 0.8
```