**Deep Learning**

Keras Library for deep learning:-

Artificial Neural Network breakdown:

1. Prepare data as usual (preprocessing) to standardize and feed it to neural network
2. X data , y data ( specify the independent and dependent variable )
3. OPTIONAL. if data is categorical, need to encode data / add dummy variable using

LabelEncoder, OneHotEcoder

1. Split the data into training and testing data
2. Do feature scaling on the X train and X test
3. Start ANN by importing the keras library
4. Add your first input layer and hidden layer

Init.add(Dense(units = 6, kernel\_initializer = ‘uniform’, activation = ‘relu’, input\_dim=11))

Where:-

Units = the hidden layer

Activation = is the activation function used there are four which is the

* Rectifier = ‘relu’
* Sigmoid = ‘sigmoid’ for binary, ‘softmax’ for multiple classification

1. Add hidden layer as required (same step as 7 but no need input\_dim). Then finally adding the output layer

* Init.add(Dense(units=1, kernel\_initializer = 'uniform', activation= 'sigmoid'))

1. Compile the ANN.

* Init.compile(optimizer=’adam’, loss= ‘binary\_crossentropy’, metrics = [‘accuracy’])

Convolution Neural Network (CNN) breakdown:

INPUT IMAGE > CONVOLUTION > MAX POOLING > FLATTENING

1. Get image. Apply feature detector/filter to create feature map (convolution layer).
2. Import the layers

* Sequential
* Convolution2D
* MaxPooling2D
* Flatten
* Dense