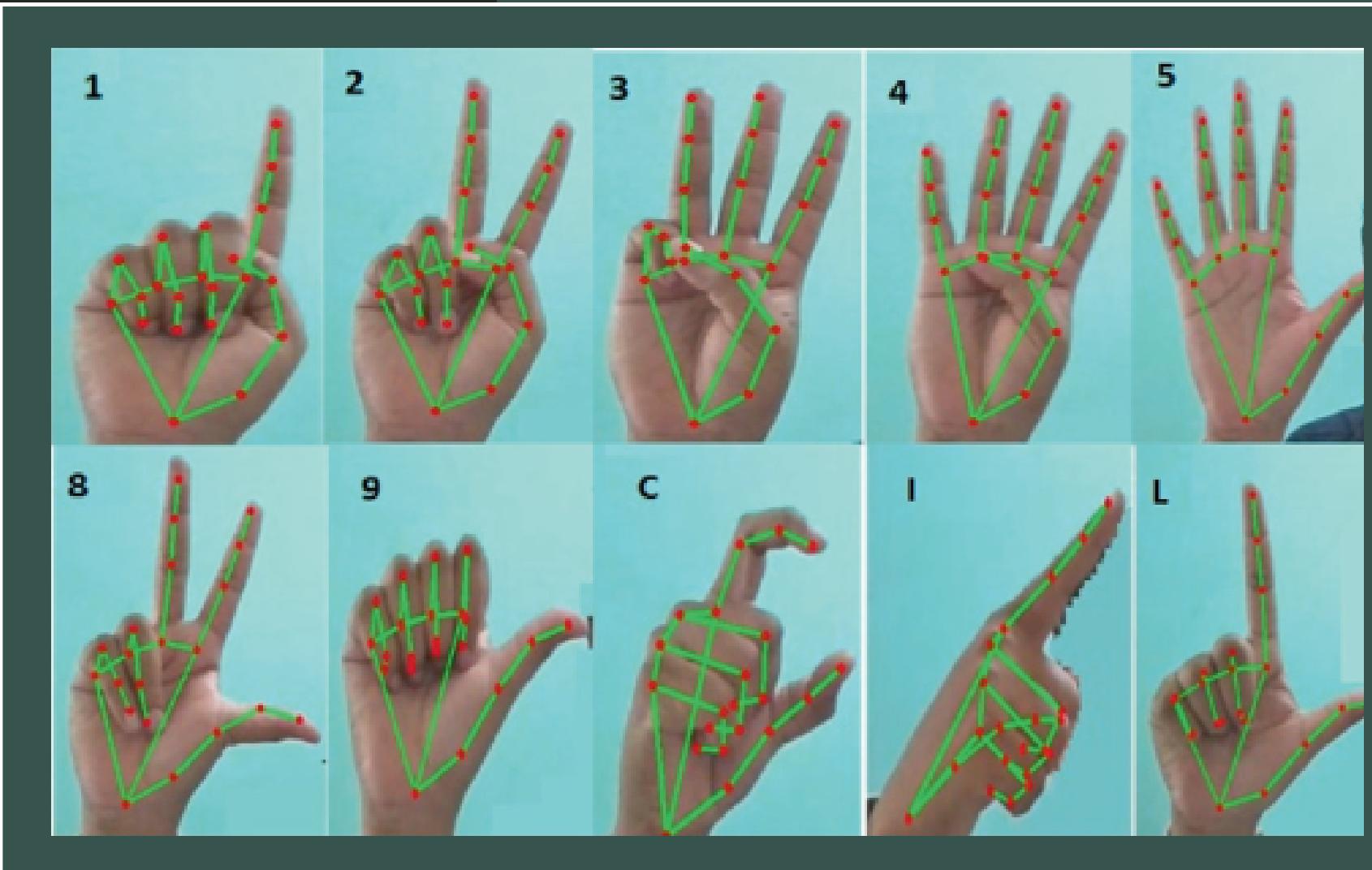


# Sign to Text Conversion using AI



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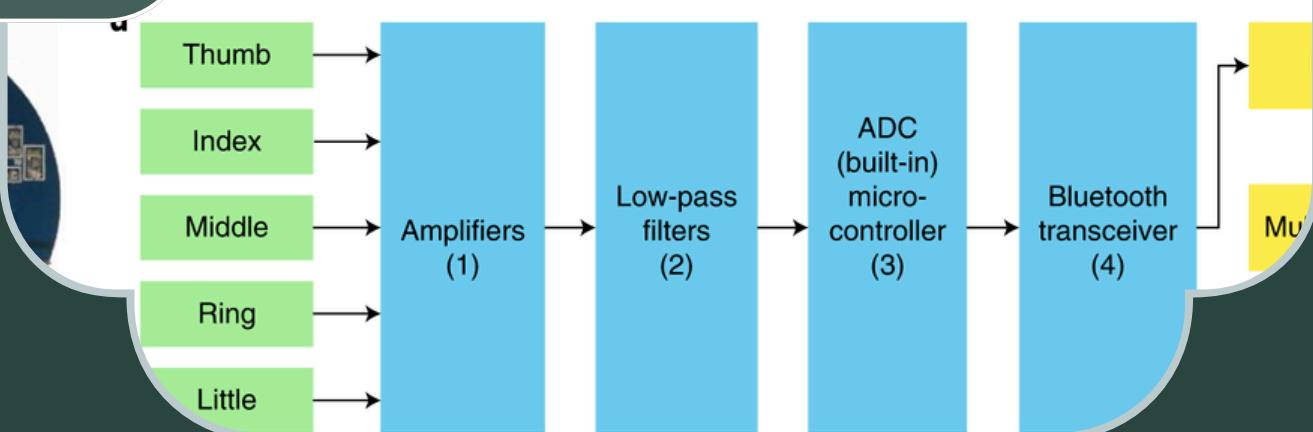
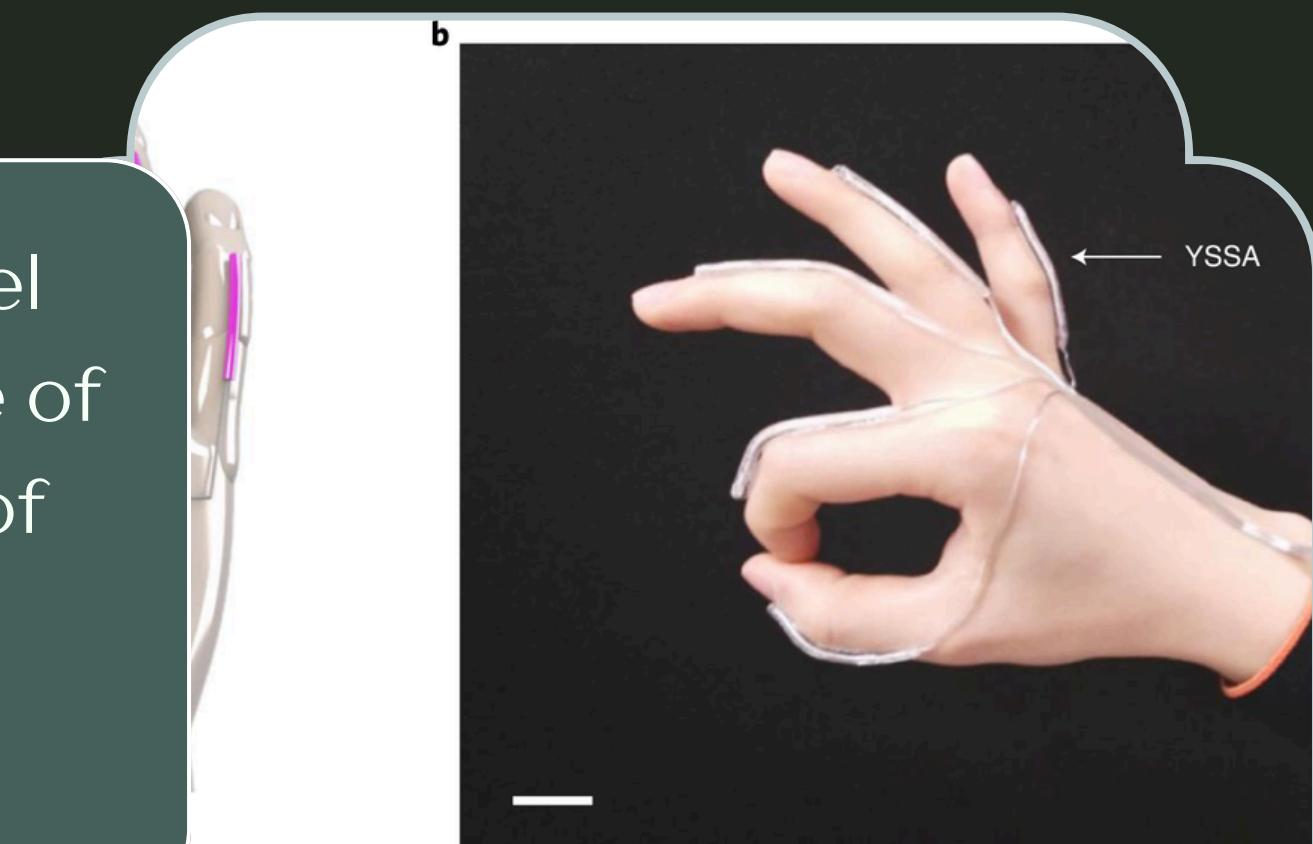
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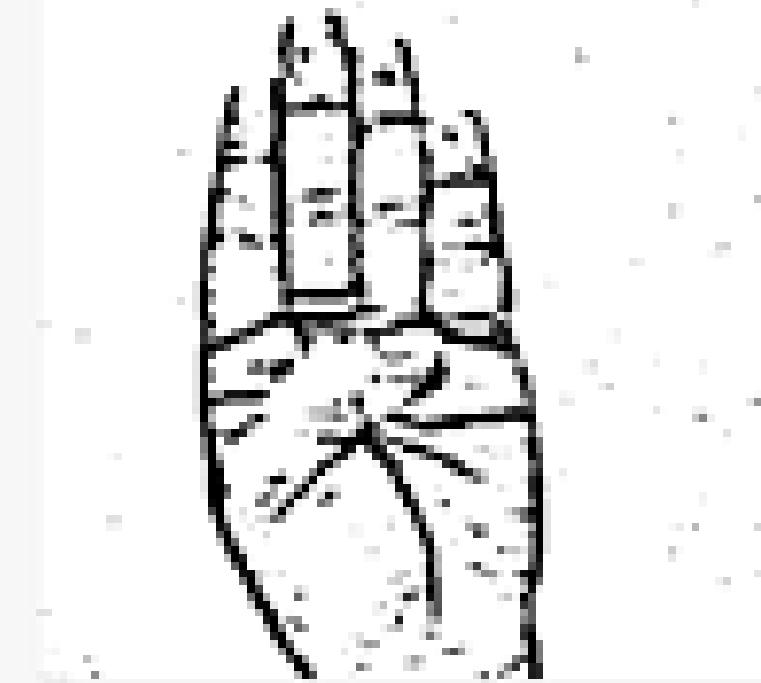
# Problem Definition

To create a computer software and train a model using CNN which takes an image of hand gesture of American Sign Language and shows the output of the particular sign language in text format .



# Objectives

To create a completely functional product for the people who are not able to hear, so that they can get connected to world easily . To use and understand technologies like OpenCV, Matplotlib,Keras,Deep Learning,Python , Heroku host etc.



To create a Web based project for detecting and understanding American sign language using Machine Learning concepts.

# Motivation of the Project

Interaction Barrier for  
D&M Peoples.

If there is a common interface that converts the sign language to text the hand gestures can be easily understood by the other people.

Develop User  
Friendly Human  
Computer Interface.

# Requirement Specification

## Software

Python 3.6.6  
Tensorflow 1.11.0  
OpenCV 3.4.3.18  
NumPy 1.15.3  
Matplotlib 3.0.0  
Keras 2.2.1

# Literature Survey

Data Acquisition :

Use of sensory devices(Gloves)

Vision based approach(Computer Camera)

Data Pre-processing and Feature Extraction :

Gaussian blur filter, Threshold filter, Gray filter

Colour segmentation

Gesture Classification :

Hidden Markov Model(HMM)

It deals with dynamic aspects of gesture. Gestures extracted from video images by tracking skin-color blobs

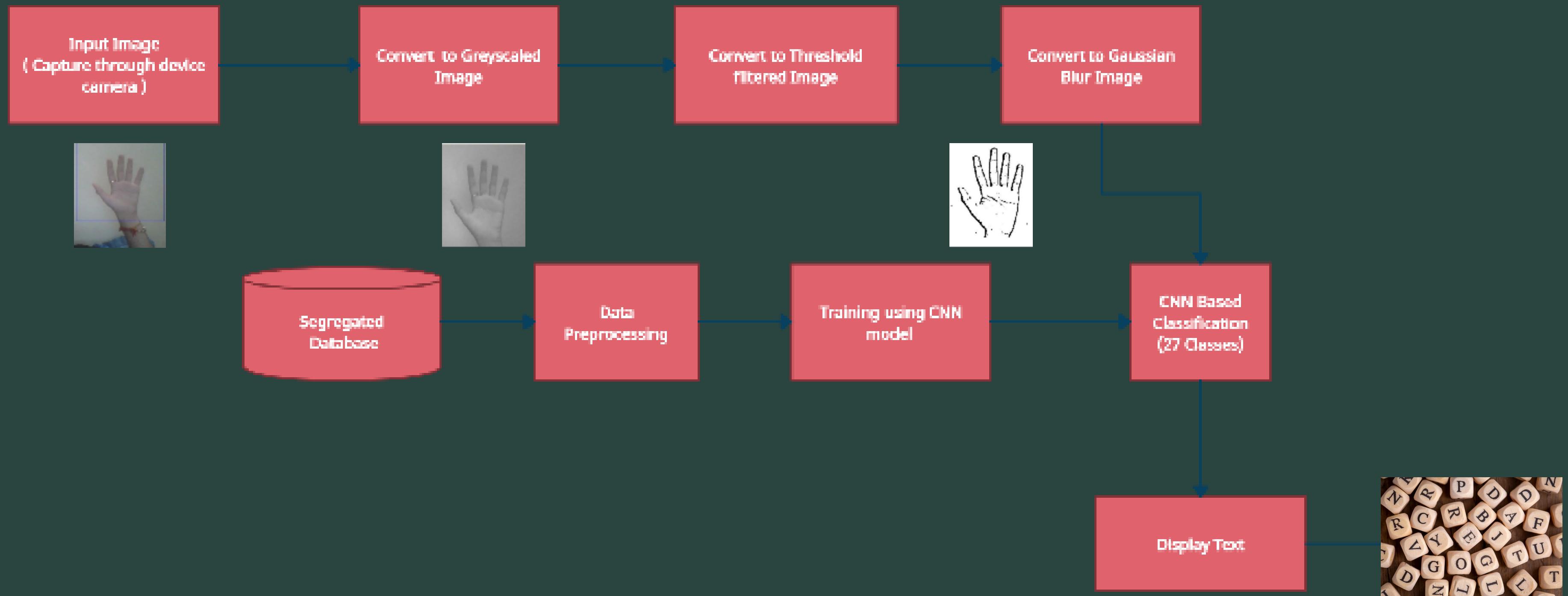
Naive Bayes classification(naive)

It deals with static aspects of gesture. Performs well with small datasets

Convolution Neural Network(CNN)

It construct a skin model to extract the hand out of an image and then apply binary threshold to the whole image

# Block Diagram



# Methodology

The project can be made using vision based approach. All the signs are represented with bare hands and so it eliminates the problem of using any artificial devices for interaction.

DATA SET :- We didn't found any database which is in a format which will help us to train our model quickly, so , we have decided to create our own database which will contain the black and white formated images , using OpenCv filters , rather than using the RGB dataset.

## GESTURE CLASSIFICATION :-

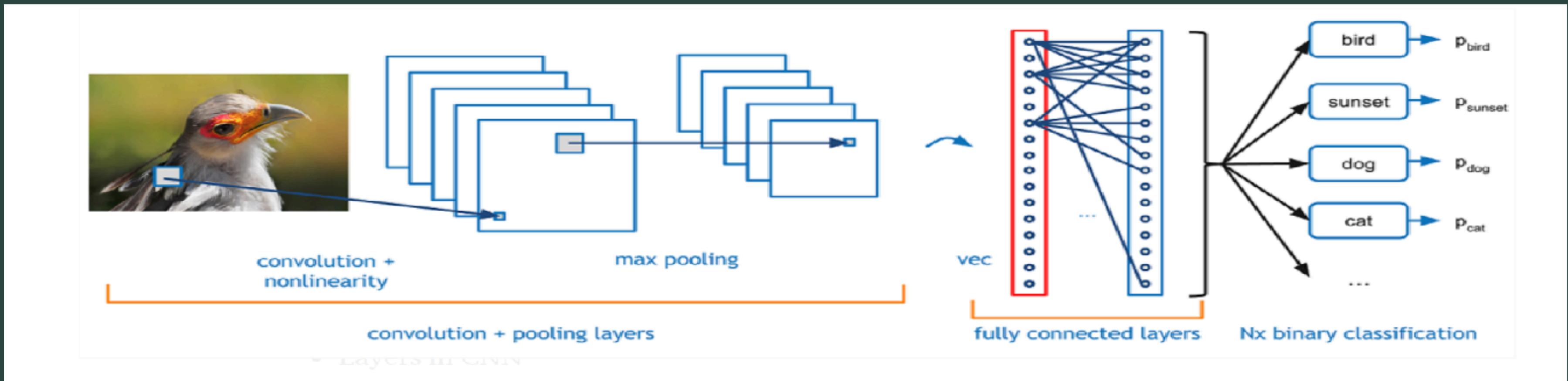
Apply gaussian blur filter and threshold to the frame taken with opencv to get the processed image after feature extraction.

This processed image is passed to the CNN model for prediction and if a letter is detected then the letter is printed and taken into consideration for forming the word. Space between the words are considered using the blank screen.

# ALGORITHMS

CNN (Convolutional Neural Network) :- It is most preferably used algorithm for operations upon the images. In simple word what CNN does is, it extract the feature of image and convert it into lower dimension without losing its characteristics .So that working upon it would not take more computational power.

Layers :-  
Convolutional Layers  
Poling Layers  
Max Pooling  
Fully Connected Layer  
Final Output Layer



**Activation Function :-** We have decided to use ReLU(Rectified Linear Unit) as our activation function in each layer. It is a simple function stated as  $f(x) = \max(0,x)$  for each input pixel .The biggest advantage is it adds the nonlinearity to the model and removes vanishing gradient problem for value greater than 0 .

**Optimizer :-** As our optimizer function we have decided to use Adam optimizer for updating the model in response to the output of the loss function. It is mostly used Gradient Descent optimizer because it use advantages of both stochastic gradient descent algorithms namely adaptive gradient algorithm(ADA GRAD) and root mean square propagation(RMSProp)

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# THANK YOU!