College name : Computer science and artificial intelligence

Course name : Selected CS-2

Team number : 55

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(Paper Details)

- Paper Name : OBJECT DETECTION USING CNN

- Publishers Name : Ms.Gunasundari , Lokesh , Gopirengaraj

-Year Of Publication : 2 April 2018

-The Implemented Algorithm : Convolution Neural Network (CNN) , Deep learning algorithm

- The Results : After implementation , a highest accuracy 98% has been gained using Kaggle dataset

(Project Description Document)

1) General Information on the selected dataset

- Name of the dataset used: American Sign Language

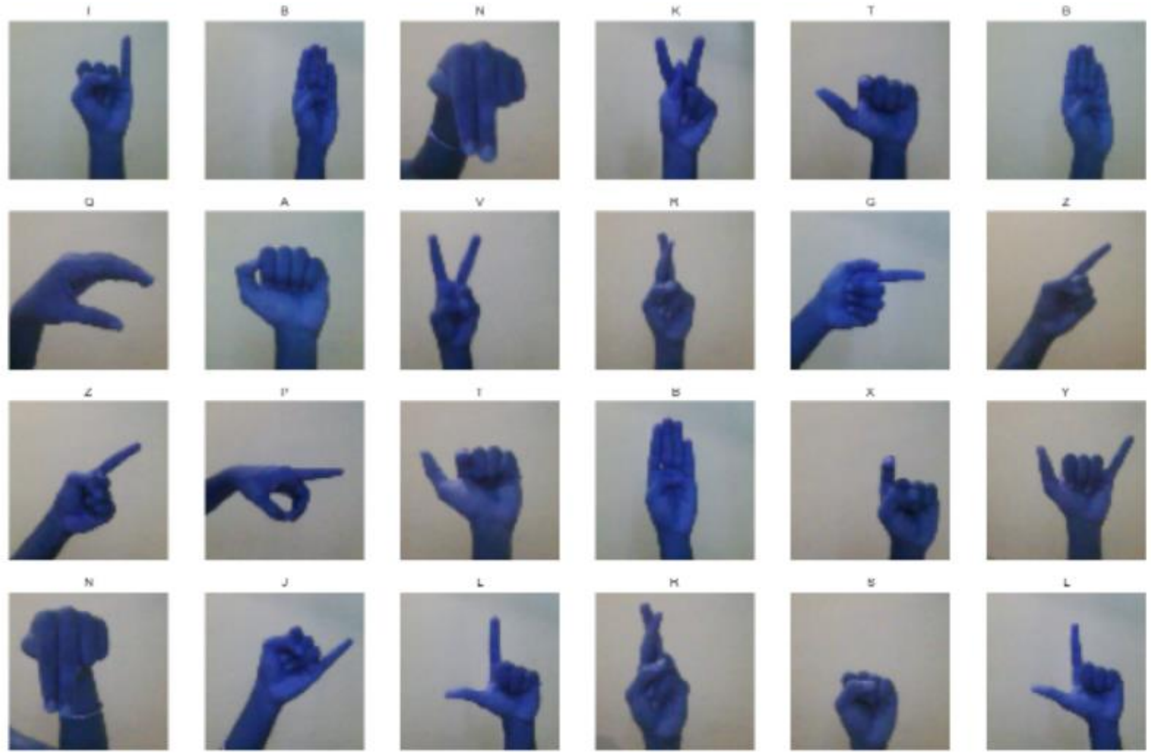
- The link of dataset: https://www.kaggle.com/datasets/kapillondhe/american-sign-language

- The total number of samples in the dataset : 121,608 samples

- Dimension of images (150 , 150)

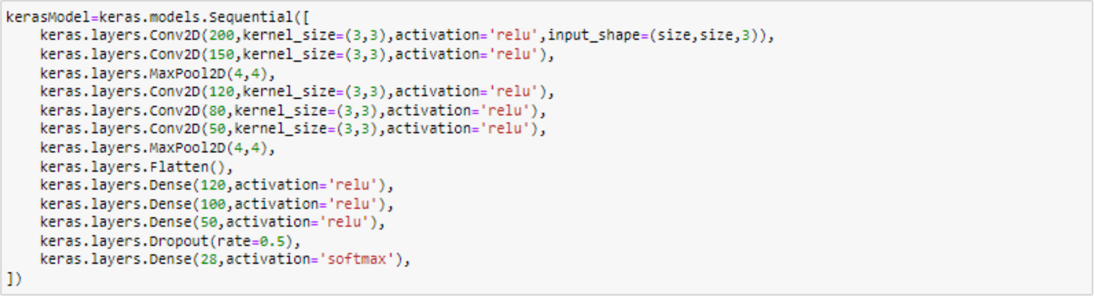
- Number of classes & their labels : 27 classes with labels (from a to z and space sign)

- The ratio used for training, and testing : Training (85.72% of the training dataset) = 84,000 images testing dataset (14.28 % of the testing dataset) = 14,000 images



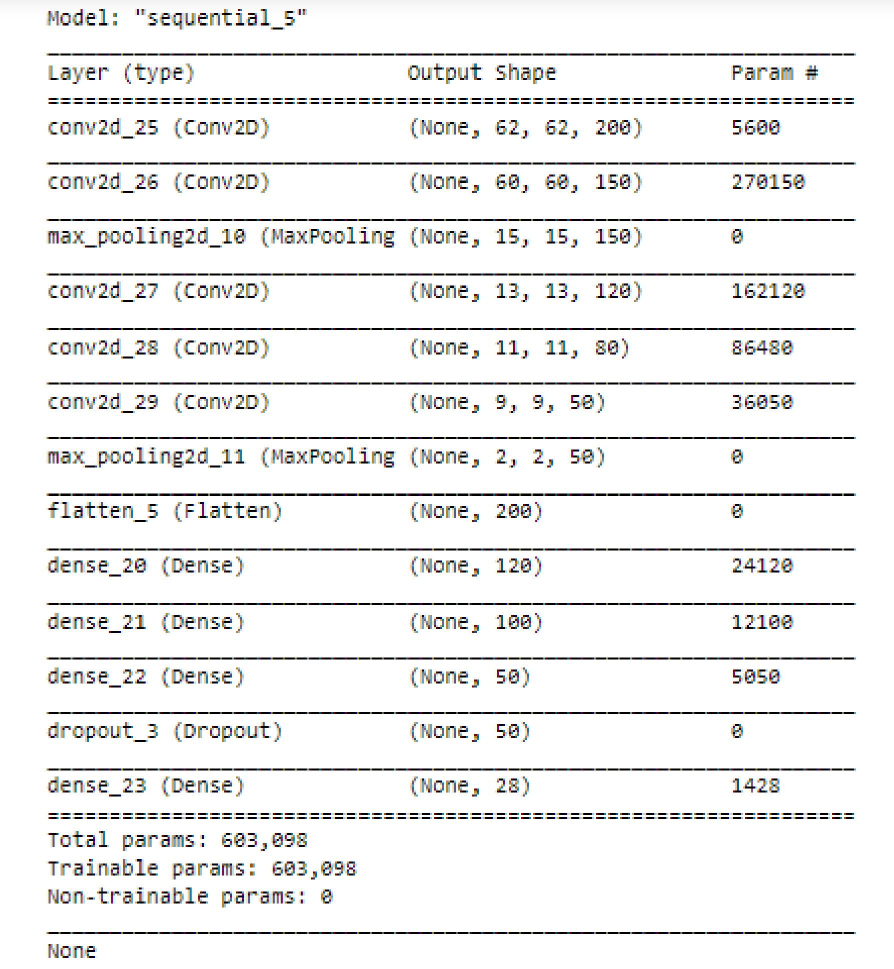
2) Implementation details:

-The hyperparameters used in the model



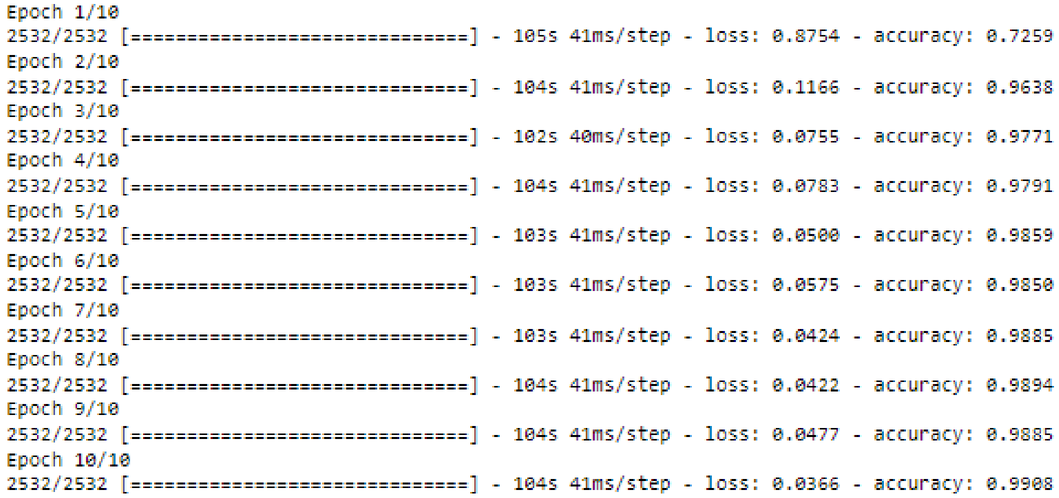
```
kerasModel=keras.models.Sequential([
    keras.layers.Conv2D(200,kernel_size=(3,3),activation='relu',input_shape=(size,size,3)),
    keras.layers.Conv2D(150,kernel_size=(3,3),activation='relu'),
    keras.layers.MaxPool2D(4,4),
    keras.layers.Conv2D(120,kernel_size=(3,3),activation='relu'),
    keras.layers.Conv2D(80,kernel_size=(3,3),activation='relu'),
    keras.layers.Conv2D(50,kernel_size=(3,3),activation='relu'),
    keras.layers.MaxPool2D(4,4),
    keras.layers.Flatten(),
    keras.layers.Dense(120,activation='relu'),
    keras.layers.Dense(100,activation='relu'),
    keras.layers.Dense(50,activation='relu'),
    keras.layers.Dropout(rate=0.5),
    keras.layers.Dense(28,activation='softmax'),
])
```

- model summery



```
Model: "sequential_5"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
conv2d_25 (Conv2D)           (None, 62, 62, 200)       5600      
_________________________________________________________________
conv2d_26 (Conv2D)           (None, 60, 60, 150)       270150    
_________________________________________________________________
max_pooling2d_10 (MaxPooling (None, 15, 15, 150)       0         
_________________________________________________________________
conv2d_27 (Conv2D)           (None, 13, 13, 120)       162120    
_________________________________________________________________
conv2d_28 (Conv2D)           (None, 11, 11, 80)        86480     
_________________________________________________________________
conv2d_29 (Conv2D)           (None, 9, 9, 50)          36050     
_________________________________________________________________
max_pooling2d_11 (MaxPooling (None, 2, 2, 50)          0         
_________________________________________________________________
flatten_5 (Flatten)          (None, 200)               0         
_________________________________________________________________
dense_20 (Dense)             (None, 120)               24120     
_________________________________________________________________
dense_21 (Dense)             (None, 100)               12100     
_________________________________________________________________
dense_22 (Dense)             (None, 50)                5050      
_________________________________________________________________
dropout_3 (Dropout)          (None, 50)                0         
_________________________________________________________________
dense_23 (Dense)             (None, 28)                1428      
=================================================================
Total params: 603,098
Trainable params: 603,098
Non-trainable params: 0
_________________________________________________________________
None
```

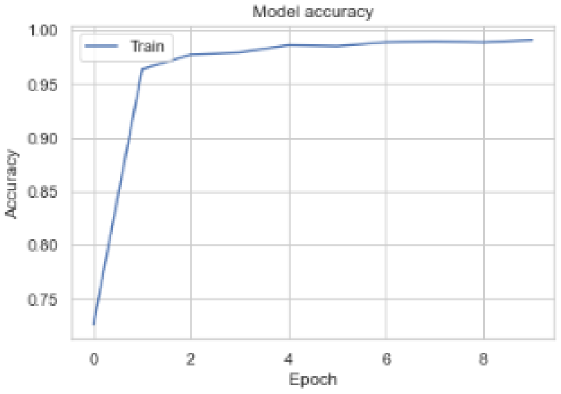
- running epochs details



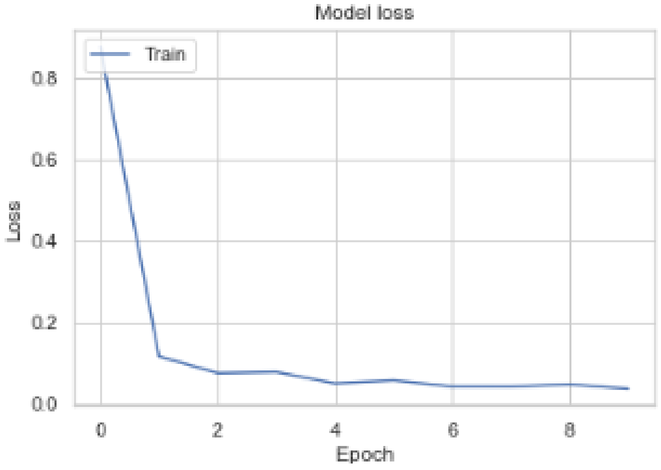
```
Epoch 1/10
2532/2532 [==============================] - 105s 41ms/step - loss: 0.8754 - accuracy: 0.7259
Epoch 2/10
2532/2532 [==============================] - 104s 41ms/step - loss: 0.1166 - accuracy: 0.9638
Epoch 3/10
2532/2532 [==============================] - 102s 40ms/step - loss: 0.0755 - accuracy: 0.9771
Epoch 4/10
2532/2532 [==============================] - 104s 41ms/step - loss: 0.0783 - accuracy: 0.9791
Epoch 5/10
2532/2532 [==============================] - 103s 41ms/step - loss: 0.0500 - accuracy: 0.9859
Epoch 6/10
2532/2532 [==============================] - 103s 41ms/step - loss: 0.0575 - accuracy: 0.9850
Epoch 7/10
2532/2532 [==============================] - 103s 41ms/step - loss: 0.0424 - accuracy: 0.9885
Epoch 8/10
2532/2532 [==============================] - 104s 41ms/step - loss: 0.0422 - accuracy: 0.9894
Epoch 9/10
2532/2532 [==============================] - 104s 41ms/step - loss: 0.0477 - accuracy: 0.9885
Epoch 10/10
2532/2532 [==============================] - 104s 41ms/step - loss: 0.0366 - accuracy: 0.9908
```

3) Results details:

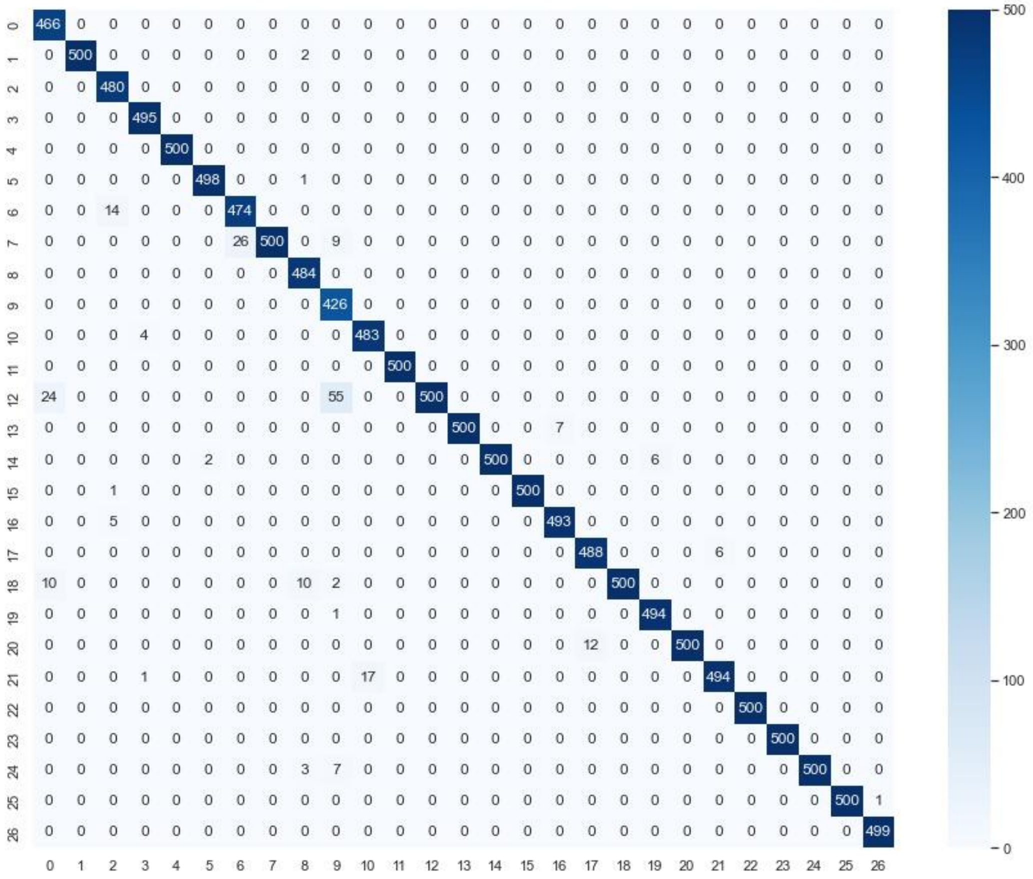
- The Accuracy : 98.3%



- The loss : 10.0%



- The Confusion Matrix



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
0	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	500	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	498	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	14	0	0	0	474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	26	500	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	484	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	4	0	0	0	0	0	0	483	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	24	0	0	0	0	0	0	0	0	55	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	7	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	2	0	0	0	0	0	0	0	0	500	0	0	0	0	6	0	0	0	0	0	0	0
15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0
16	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	493	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	488	0	0	0	6	0	0	0	0	0
18	10	0	0	0	0	0	0	0	10	2	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	494	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	500	0	0	0	0	0	0
21	0	0	0	1	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	494	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0
24	0	0	0	0	0	0	0	0	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	499