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, validation, and testing : Training (90% of the training dataset) = 97,200 images Validation (10 % of the training dataset) = 10,800 images ,

Testing (100% of the testing dataset) = 13608 images

2) Implementation details:

-The hyperparameters used in the model

```
my_model=Sequential()
my_model.add(Conv2D(64, kernel_size=7, strides=1, activation='relu', input_shape=[img_size,img_size,1]))
my_model.add(MaxPooling2D(pool_size=(2, 2)))
my_model.add(Conv2D(64, kernel_size=7, strides=2, activation='relu'))
my_model.add(Dropout(0.5))
my_model.add(Conv2D(256, kernel_size=3, strides=1, activation='relu'))
my_model.add(MaxPooling2D(pool_size=(2, 2)))
my_model.add(Conv2D(256, kernel_size=3, strides=2, activation='relu'))
my_model.add(MaxPooling2D(pool_size=(2, 2)))
my_model.add(Flatten())
my_model.add(Dropout(0.5))
my_model.add(Dense(512, activation='relu'))
my_model.add(Dense(27, activation='softmax'))
my_model.summary()
```

- model summery

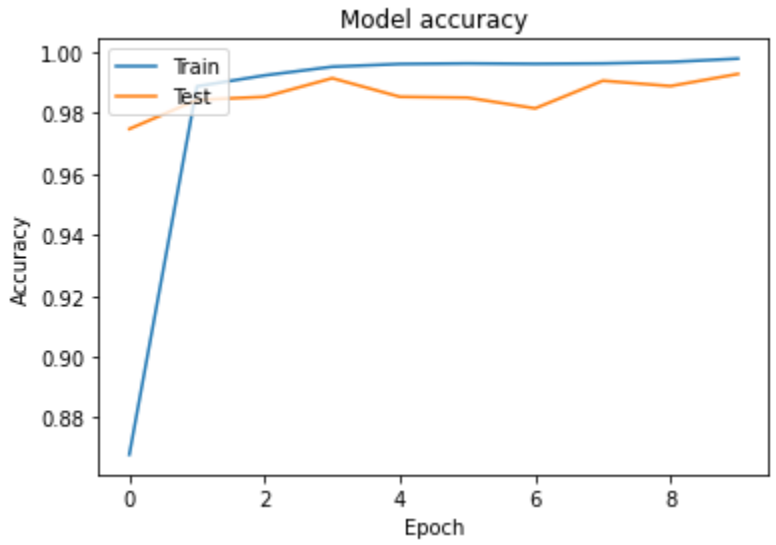
```
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_4 (Conv2D)            (None, 144, 144, 64)      3200
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 72, 72, 64)        0
_________________________________________________________________
conv2d_5 (Conv2D)            (None, 33, 33, 64)        200768
_________________________________________________________________
dropout_1 (Dropout)          (None, 33, 33, 64)        0
_________________________________________________________________
conv2d_6 (Conv2D)            (None, 31, 31, 256)       147712
_________________________________________________________________
max_pooling2d_3 (MaxPooling2 (None, 15, 15, 256)       0
_________________________________________________________________
conv2d_7 (Conv2D)            (None, 7, 7, 256)         590080
_________________________________________________________________
max_pooling2d_4 (MaxPooling2 (None, 3, 3, 256)         0
_________________________________________________________________
flatten (Flatten)            (None, 2304)              0
_________________________________________________________________
dropout_2 (Dropout)          (None, 2304)              0
_________________________________________________________________
dense (Dense)                (None, 512)               1180160
_________________________________________________________________
dense_1 (Dense)              (None, 27)                13851
=================================================================
Total params: 2,135,771
Trainable params: 2,135,771
Non-trainable params: 0
```

- running epochs details

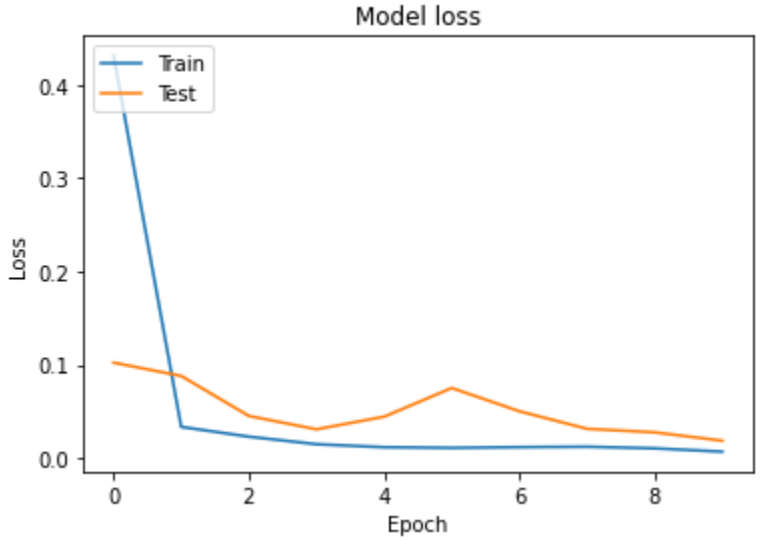
```
Epoch 1/10
380/380 [==============================] - 303s 765ms/step - loss: 0.4311 - accuracy: 0.8679 - val_loss: 0.1023 - val_accur
acy: 0.9748
Epoch 2/10
380/380 [==============================] - 225s 592ms/step - loss: 0.0336 - accuracy: 0.9888 - val_loss: 0.0881 - val_accur
acy: 0.9844
Epoch 3/10
380/380 [==============================] - 204s 536ms/step - loss: 0.0231 - accuracy: 0.9924 - val_loss: 0.0453 - val_accur
acy: 0.9854
Epoch 4/10
380/380 [==============================] - 212s 558ms/step - loss: 0.0150 - accuracy: 0.9952 - val_loss: 0.0310 - val_accur
acy: 0.9915
Epoch 5/10
380/380 [==============================] - 217s 570ms/step - loss: 0.0118 - accuracy: 0.9961 - val_loss: 0.0445 - val_accur
acy: 0.9854
Epoch 6/10
380/380 [==============================] - 217s 570ms/step - loss: 0.0111 - accuracy: 0.9963 - val_loss: 0.0752 - val_accur
acy: 0.9851
Epoch 7/10
380/380 [==============================] - 211s 555ms/step - loss: 0.0119 - accuracy: 0.9962 - val_loss: 0.0503 - val_accur
acy: 0.9816
Epoch 8/10
380/380 [==============================] - 213s 560ms/step - loss: 0.0123 - accuracy: 0.9963 - val_loss: 0.0315 - val_accur
acy: 0.9906
Epoch 9/10
380/380 [==============================] - 211s 556ms/step - loss: 0.0106 - accuracy: 0.9968 - val_loss: 0.0278 - val_accur
acy: 0.9889
Epoch 10/10
380/380 [==============================] - 214s 563ms/step - loss: 0.0071 - accuracy: 0.9979 - val_loss: 0.0188 - val_accur
acy: 0.9929
```

3) Results details:

- The Accuracy : 99.29%



- The loss : 1.88%



- The Confusion Matrix