importing libries

In [1]:
```

import tensorflow as tf                                                        #t
import pandas as pd                                                            #j
import numpy as np                                                             #j
from sklearn.preprocessing import StandardScaler, LabelEncoder                 #j
from keras.utils import np_utils
import matplotlib.pyplot as plt                                                #j
from sklearn.metrics import ConfusionMatrixDisplay                             #j
from sklearn.metrics import confusion_matrix                                   #p
```

loading the datasets

In [2]:
```
train_data = pd.read_csv('datasets/training.csv', header = None).values        #t
test_data = pd.read_csv('datasets/testing.csv', header = None ).values         #t
```

In [18]:
```
train_data
```

Out[18]:
```
array([[1, 1, 1, ..., 0, 0, 'Fungal infection'],
       [0, 1, 1, ..., 0, 0, 'Fungal infection'],
       [1, 0, 1, ..., 0, 0, 'Fungal infection'],
       ...,
       [0, 0, 0, ..., 0, 0, 'Urinary tract infection'],
       [0, 1, 0, ..., 0, 0, 'Psoriasis'],
       [0, 1, 0, ..., 1, 1, 'Impetigo']], dtype=object)
```

spliting the data into x_train, x_test, y_tring, y_test

In [3]:
```
x_train, y_train = train_data[:,0:-1].astype(float), train_data[:,-1]
x_test, y_test = test_data[:,0:-1].astype(float), test_data[:,-1]
N,D = x_train.shape                                                            #s
```

In [4]:
```
x_test[0]
```

Out[4]:
```
array([1., 1., 1., 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., 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., 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., 0., 0., 0., 0.,
       0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0.,
       1., 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., 0., 0., 0.])
```

encoding the output variable

In [5]:

```
#encoding the labels to numbers

encoder = LabelEncoder()
encoder.fit(y_train)
encoder.fit(y_test)
train_encoded_y = encoder.transform(y_train)
test_encoded_y = encoder.transform(y_test)

#filling in the dummy values

y_train_dummy = np_utils.to_categorical(train_encoded_y)
y_test_dummy = np_utils.to_categorical(test_encoded_y)
```

In [6]:

```
y_train_dummy
```

Out[6]:

```
array([[0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.],
       ...,
       [0., 0., 0., ..., 1., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.],
       [0., 0., 0., ..., 0., 0., 0.]], dtype=float32)
```

building the model

In [7]:

```
model = tf.keras.models.Sequential([
    tf.keras.layers.Flatten(input_shape =(D, )),
    tf.keras.layers.Dense(254, activation = tf.nn.relu),
    tf.keras.layers.Dense(41, activation = tf.nn.softmax),



]);

model.compile (optimizer = "adam", loss = "categorical_crossentropy", metrics = [

model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 flatten (Flatten)           (None, 132)               0         
                                                                 
 dense (Dense)               (None, 254)               33782     
                                                                 
 dense_1 (Dense)             (None, 41)                10455     
                                                                 
=================================================================
Total params: 44,237
Trainable params: 44,237
Non-trainable params: 0
_________________________________________________________________
```

training the model

In [8]:

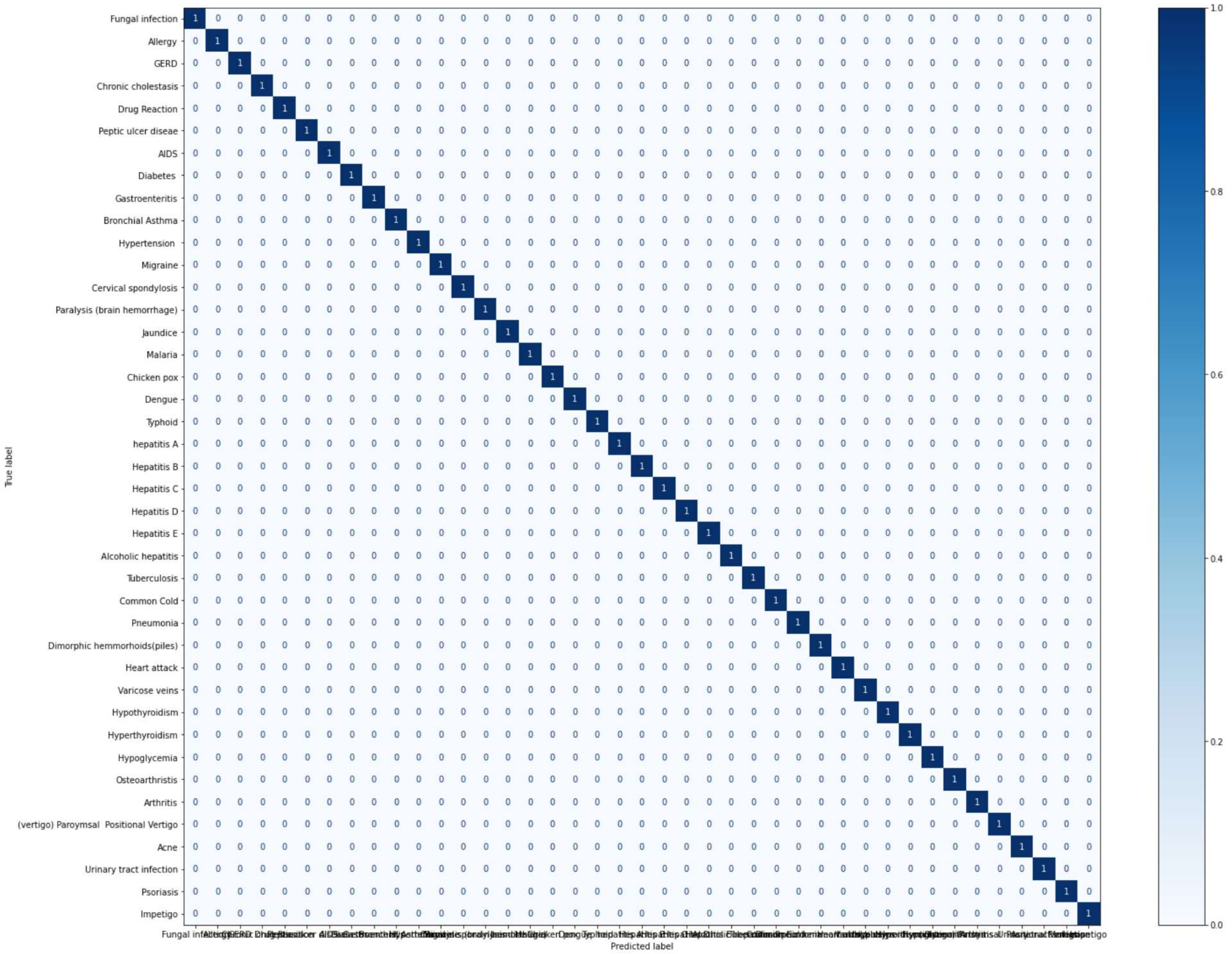
```

r =model.fit(x_train, y_train_dummy, validation_split = .2, epochs = 1)

score, acc  = model.evaluate(x_test, y_test_dummy)

print("accuracy: ",acc,", score:", score)
```

```
123/123 [==============================] - 1s 4ms/step - loss: 1.5096 - accurac
y: 0.8946 - val_loss: 0.0994 - val_accuracy: 1.0000
2/2 [==============================] - 0s 3ms/step - loss: 0.0994 - accuracy:
1.0000
accuracy:  1.0 , score: 0.09938153624534607
```

visualizing the result of the training

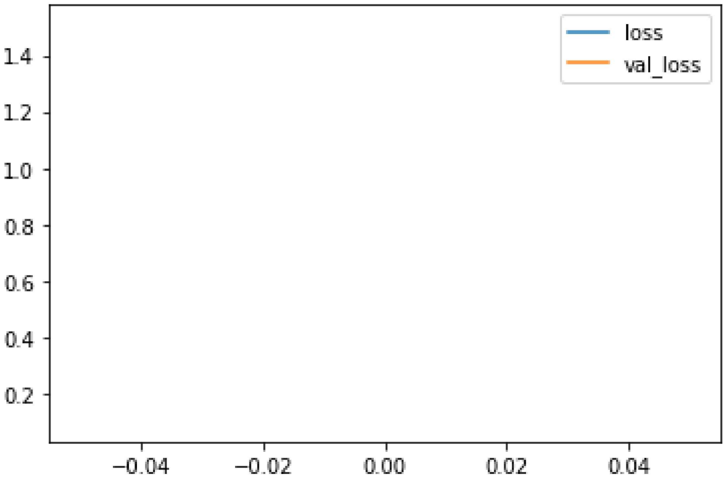
```
In [17]: #increasing plot size
         plt.rcParams["figure.figsize"] = (25,20)

         #running the classification tests
         y_pred = model.predict(x_test)
         y_test_class = np.argmax(y_pred, axis=1)

         #plotting the confussion matrix
         cm = confusion_matrix(test_encoded_y, y_test_class)
         disp = ConfusionMatrixDisplay(confusion_matrix=cm, display_labels=y_test)

         #displaying the plot
         disp.plot(cmap=plt.cm.Blues)
         plt.show()
```

```
2/2 [==============================] - 0s 3ms/step
```



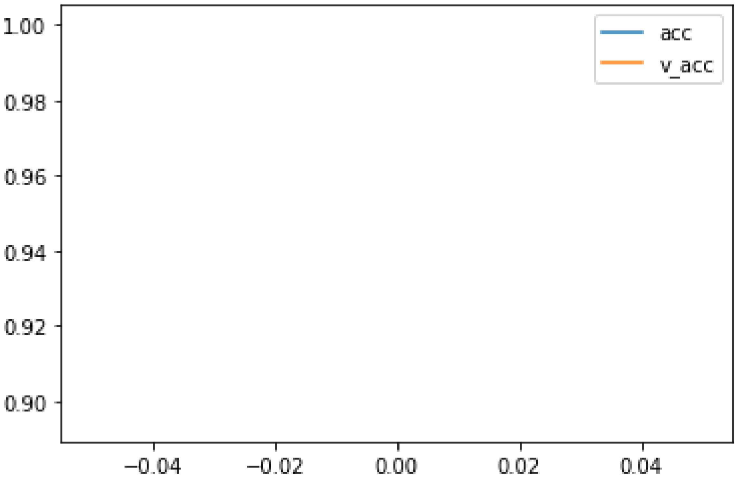
In [10]:
```
plt.plot(r.history["loss"], label ="loss")
plt.plot(r.history["val_loss"],label = "val_loss")
plt.legend()
```

Out[10]:
```
<matplotlib.legend.Legend at 0x1ea31602f50>
```



In [11]:
```
plt.plot(r.history['accuracy'], label="acc")
plt.plot(r.history['val_accuracy'], label="v_acc")
plt.legend()
```

Out[11]:
```
<matplotlib.legend.Legend at 0x1ea363dfdc0>
```



saving the model

In [12]:
```
# model.save("medical_prognosis.h5")
```

loading the model

In [13]:

```
import tensorflow as tf
model = tf.keras.models.load_model('medical_prognosis.h5')
# print(model.summary())
```

running a test prediction

In [14]:

```
import numpy as np

pred =model.predict(np.zeros((1,132)).astype(float))
result =np.argmax(pred, axis=1)
print(result)
```

```
1/1 [==============================] - 0s 48ms/step
[18]
```

In [ ]:

In [ ]:

In [ ]: