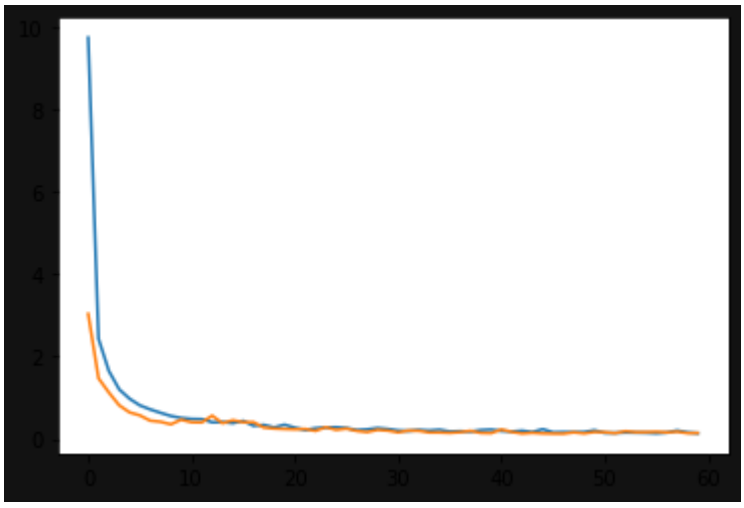
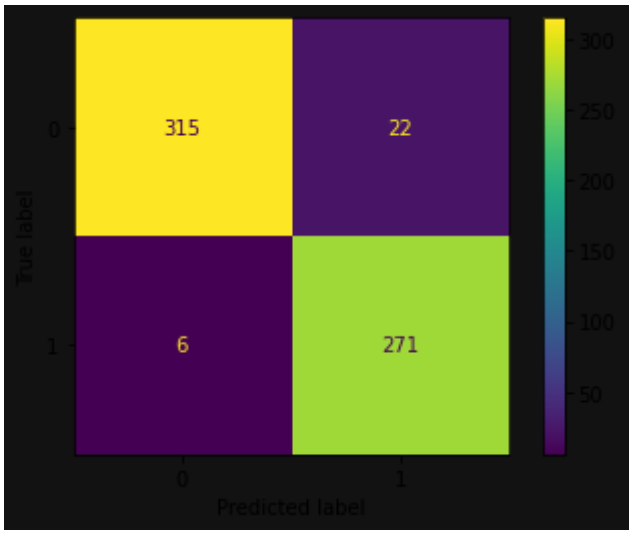
```
import tensorflow as tf
import numpy as np
import pandas as pd
from sklearn.preprocessing import OneHotEncoder
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay, accuracy_score, prec


!wget https://raw.githubusercontent.com/Hameon4/Exfiltration-dataset/main/exfil_monogram.c
dataset = pd.read_csv('/content/exfil_monogram.csv')
features = dataset.drop(columns = ['Label']).copy()
label = dataset['Label']

features_train, features_test, label_train, label_test = train_test_split(features,label ,
features_val, features_val_test, label_val, label_val_test = train_test_split(features_tes


model = tf.keras.models.Sequential([
  tf.keras.layers.Input(shape=(120, 1)),
  tf.keras.layers.Conv1D(1, 70, 5),
  tf.keras.layers.MaxPool1D(),
  tf.keras.layers.Flatten(name='regions'),
  tf.keras.layers.Dense(1, activation='sigmoid'),
])
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
History = model.fit(features_train, label_train, validation_data=(features_val, label_val)


plt.plot(History.history['loss'], label='loss')
plt.plot(History.history['val_loss'], label='val_loss')
plt.show();

print('\n\n')
print(model.evaluate(features_val, label_val))
```




```
20/20 [==============================] - 0s 2ms/step - loss: 0.1433 - accuracy: 0.954
[0.14325878024101257, 0.9543973803520203]
```

```
p_test = model.predict(features_val) > 0.5 # if less, benign, and malign vice versa
cm = confusion_matrix(label_val, p_test)
disp = ConfusionMatrixDisplay(confusion_matrix=cm)
disp.plot()
plt.show()

print('\n\n')
print(f'accuracy : {accuracy_score(label_val, p_test)}')
print(f'precision : {precision_score(label_val, p_test, zero_division=1)}')
print(f'The recall : {recall_score(label_val, p_test)}')
print(f'The f1 score : {f1_score(label_val, p_test)}')
```




```
accuracy : 0.9543973941368078
precision : 0.9249146757679181
The recall : 0.9783393501805054
The f1 score : 0.9508771929824561
```