penelitian_kln_2021_ser_beais_github

July 23, 2022

1 Connect to Github and Download dataset

[1]:
```
#!git clone https://github.com/2black0/sound-emotion-recognition-javanese.git
```

```
Cloning into 'sound-emotion-recognition-javanese'…
remote: Enumerating objects: 1697, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (10/10), done.
remote: Total 1697 (delta 1), reused 6 (delta 0), pack-reused 1687
Receiving objects: 100% (1697/1697), 124.20 MiB | 26.08 MiB/s, done.
Resolving deltas: 100% (1/1), done.
Checking out files: 100% (1686/1686), done.
```

2 Check Dataset

[6]:
```
import os
rootdir = os.getcwd()
dirdataset = rootdir+"/dataset"
```

[7]:
```
%cd $dirdataset
```

```
/home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/dataset
```

[8]:
```
%pwd
```

[8]:
```
'/home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/dataset'
```

[ ]:
```
!ls
```

3 Check the train and test file

[10]:
```
dirmodel = rootdir+"/model"
%cd $dirmodel
```

```
/home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/model
```

[11]:
```
!ls -l
```

```
total 840
-rw-rw-r-- 1 ubuntu ubuntu 125192 Jul 22 21:28 final_model_NeuralNetwork.sav
-rw-rw-r-- 1 ubuntu ubuntu 125192 Jul 22 21:28 final_model.sav
-rw-rw-r-- 1 ubuntu ubuntu 134528 Jul 22 05:59 x_test.npy
-rw-rw-r-- 1 ubuntu ubuntu 403008 Jul 22 05:59 x_train.npy
-rw-rw-r-- 1 ubuntu ubuntu  15248 Jul 22 05:59 y_test.npy
-rw-rw-r-- 1 ubuntu ubuntu  45452 Jul 22 05:59 y_train.npy
```

4 Training & Testing

Notes: check comment above the code before running!

[12]:
```
#load module used
import os
import re
import glob
import pickle
import soundfile
import librosa
import optuna
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.neural_network import MLPClassifier
from sklearn.metrics import accuracy_score, classification_report,␣
 ↪confusion_matrix, ConfusionMatrixDisplay
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.gaussian_process import GaussianProcessClassifier
from sklearn.gaussian_process.kernels import RBF
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier, AdaBoostClassifier
from sklearn.neural_network import MLPClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.discriminant_analysis import QuadraticDiscriminantAnalysis
import matplotlib.pyplot as plt

plt.style.use('seaborn-whitegrid')
%matplotlib inline
```

4.1 Get list of file

[13]:
```
#get the all file
def getListOfFiles(dirName):
  listOfFile = os.listdir(dirName)
  allFiles = list()
  for entry in listOfFile:
    fullPath = os.path.join(dirName, entry)
    if os.path.isdir(fullPath):
      allFiles = allFiles + getListOfFiles(fullPath)
    else:
      allFiles.append(fullPath)
  return allFiles
```

[14]:
```
#list of all the file, change dirName to directory of the dataset used
listOfFiles = getListOfFiles(dirdataset)
```

[ ]:
```
print(listOfFiles)
```

4.2 Get the feature of each sound

[16]:
```
#feature extraction using mfcc, chroma, and mel
def feature_extractor(file, mfcc, chroma, mel):
  with soundfile.SoundFile(file) as sound_file:
    file_array = sound_file.read(dtype="float32")
    sample_rate=sound_file.samplerate
    result=np.array([])
    if mfcc:
      mfccs=np.mean(librosa.feature.mfcc(y=file_array, sr=sample_rate,␣
 ↪n_mfcc=40).T, axis=0)
      result=np.hstack((result, mfccs))
    if chroma:
      stft=np.abs(librosa.stft(file_array))
      chroma=np.mean(librosa.feature.chroma_stft(S=stft, sr=sample_rate).
 ↪T,axis=0)
      result=np.hstack((result, chroma))
    if mel:
      mel=np.mean(librosa.feature.melspectrogram(file_array, sr=sample_rate).
 ↪T,axis=0)
      result=np.hstack((result, mel))
  return result
```

4.3 labeling the data

[17]:
```
#list of emotion
emotions={
        '01':'neutral',
        '02':'sad',
        '03':'happy',
        '04':'surprised',
        '05':'fearful',
        '06':'angry',
        }

observed_emotions=['neutral', 'sad', 'happy', 'surprised', 'fearful', 'angry']
```

[ ]:
```
#pastikan tercetak 3 data:
# -path lengkap dari file dataset (contoh: /content/drive/MyDrive/Colab/
 ↪penelitian-kln/clean-dataset/04-01-06_02.wav)
# -nama file (contoh: 04-01-06_02.wav)
# -emotion(contoh: angry)

for file in listOfFiles:
  #print(file)
  file_name=os.path.basename(file)
  emotion=emotions[re.split("-|_", file_name)[2]]
  print('file:{} file_name:{} emotion:{}'.format(file, file_name, emotion))
```

4.4 Split the data for test and trial

[19]:
```
def data_loarder(listOfFiles, test_size=0.25):
  x,y=[],[]
  for file in listOfFiles:
    file_name=os.path.basename(file)
    emotion=emotions[re.split("-|_", file_name)[2]]
    if emotion not in observed_emotions:
      continue
    feature=feature_extractor(file, mfcc=True, chroma=False, mel=False)
    x.append(feature)
    y.append(emotion)
  return train_test_split(np.array(x), y, test_size=test_size)
```

4.5 PERHATIAN:

Apabila sudah terdapat file x_test.npy x_train.npy y_test.npy y_train.npy pada folder model tidak perlu menjalankan cell ini

[ ]:
```
#cukup jalankan 1x saja apabila file2 di bawah ini belum ada
x_train, x_test, y_train, y_test = data_loarder(listOfFiles, test_size=0.25)

%cd /home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/model
np.save('x_train.npy', x_train)
np.save('x_test.npy', x_test)
np.save('y_train.npy', y_train)
np.save('y_test.npy', y_test)
```

PERHATIAN: Apabila pada bagian ini error, silahkan jalankan kode di atas dan pastikan sudah terdapat file *x_test.npy x_train.npy y_test.npy y_train.npy pada folder model

[20]:
```
%cd $dirmodel
x_trains = np.load('x_train.npy')
x_tests = np.load('x_test.npy')
y_trains = np.load('y_train.npy')
y_tests = np.load('y_test.npy')
```

```
/home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/model
```

[21]:
```
#menghitung persebaran dataset yang ada pada train dan test pada masing2 label
emotions, counts = np.unique(y_trains, return_counts=True)
print('label train:', dict(zip(emotions, counts)))

emotions, counts = np.unique(y_tests, return_counts=True)
print('label test:', dict(zip(emotions, counts)))
```

```
label train: {'angry': 196, 'fearful': 219, 'happy': 213, 'neutral': 208, 'sad':
216, 'surprised': 207}
label test: {'angry': 84, 'fearful': 61, 'happy': 66, 'neutral': 72, 'sad': 64,
'surprised': 73}
```

4.6 Classfication

[23]:
```
#beberapa algoritma untuk klasifikasi
classifiers = [
    KNeighborsClassifier(),
    SVC(kernel="linear", C=0.025),
    RandomForestClassifier(max_depth=5, random_state=43),
    MLPClassifier(alpha=0.01, max_iter=1000),
    QuadraticDiscriminantAnalysis()]
```

[24]:
```
names = ["KNearest Neighbors", "Linear SVC", "Random Forest", "Neural Network",␣
 ↪"Quadratic Discriminant Analysis"]
```

[25]:
```
# iterate over classifiers
for name, clf in zip(names, classifiers):
    clf.fit(x_trains, y_trains)
    score = clf.score(x_tests, y_tests)
    print(f"Accuracy of {name} Classifier is:{score}")
```

```
Accuracy of KNearest Neighbors Classifier is:0.8119047619047619
Accuracy of Linear SVC Classifier is:0.7214285714285714
Accuracy of Random Forest Classifier is:0.6952380952380952
Accuracy of Neural Network Classifier is:0.8523809523809524
Accuracy of Quadratic Discriminant Analysis Classifier is:0.8642857142857143
```

5 Hyper Parameter Tuning

5.1 KNN Hyperparameter

[ ]:
```
def objective(trial):
    optimizer = trial.suggest_categorical('algorithm',␣
 ↪['auto','ball_tree','kd_tree','brute'])
    rf_max_depth = trial.suggest_int("k_n_neighbors", 2, 15, log=True)
    clf = KNeighborsClassifier(algorithm=optimizer, n_neighbors=rf_max_depth)

    score = cross_val_score(clf, x_trains, y_trains, n_jobs=-1, cv=3)
    accuracy = score.mean()
    return accuracy

    #classifier_obj.fit(x_trains, y_trains)
    #return classifier_obj.score(x_tests, y_tests)

study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)
print(study.best_params)
```

[51]:
```
classifier = KNeighborsClassifier(algorithm='kd_tree', n_neighbors=3)

classifier.fit(x_trains, y_trains)
score = classifier.score(x_tests, y_tests)
print(f"Accuracy of KNeighbors Classifier is:{score}")
```

```
Accuracy of KNeighbors Classifier is:0.8261904761904761
```

5.2 SVM Hyperparameter

[ ]:
```
def objective(trial):
    kernel = trial.suggest_categorical('kernel', ['linear', 'poly', 'rbf'])
    regularization = trial.suggest_uniform('svm-regularization', 0.01, 5)
    degree = trial.suggest_discrete_uniform('degree', 1, 5, 1)
```

```
    gamma=trial.suggest_categorical('gamma',['auto','scale'])
    clf = SVC(kernel=kernel, C=regularization, degree=degree, gamma=gamma)

    score = cross_val_score(clf, x_trains, y_trains, n_jobs=-1, cv=3)
    accuracy = score.mean()
    return accuracy

study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)
print(study.best_params)
```

{'kernel': 'poly', 'svm-regularization': 3.6857184965283647, 'degree': 3.0, 'gamma': 'auto'}

[31]:
```
#classifier = SVC(kernel='linear', C=1.4965680888866226, degree=1.0)
#classifier = SVC(kernel='linear', C=1.48730298796247 68, degree=2.0)
classifier = SVC(kernel='poly', C=3.6857184965283647, degree=3.0, gamma='auto')

classifier.fit(x_trains, y_trains)
score = classifier.score(x_tests, y_tests)
print(f"Accuracy of SVM Classifier is:{score}")
```

```
Accuracy of SVM Classifier is:0.8785714285714286
```

5.3 Random Forest Hyperparameter

[ ]:
```
def objective(trial):
    #rf_n_estimators = trial.suggest_int("rf_n_estimators", 10, 1000)
    #rf_max_depth = trial.suggest_int("rf_max_depth", 2, 32, log=True)
    #classifier_obj = RandomForestClassifier(max_depth=rf_max_depth,␣
 ↪n_estimators=rf_n_estimators)

    max_depth = trial.suggest_int('max_depth', 1, 10)
    max_leaf_nodes = trial.suggest_int('max_leaf_nodes', 2, 1000)
    n_estimators =  trial.suggest_int('n_estimators', 100, 500)
    clf = RandomForestClassifier(max_depth = max_depth, max_leaf_nodes =␣
 ↪max_leaf_nodes,n_estimators = n_estimators,n_jobs=2,random_state=25)


    score = cross_val_score(clf, x_trains, y_trains, n_jobs=-1, cv=3)
    accuracy = score.mean()
    return accuracy

study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)
print(study.best_params)
```

{'max_depth': 10, 'max_leaf_nodes': 391, 'n_estimators': 458}

[35]:
```
classifier = RandomForestClassifier(max_depth=10, n_estimators=458,␣
↪max_leaf_nodes=391)

classifier.fit(x_trains, y_trains)
score = classifier.score(x_tests, y_tests)
print(f"Accuracy of Random Forest Classifier is:{score}")
```

```
Accuracy of Random Forest Classifier is:0.8452380952380952
```

5.4 Neural Network Hyperparameter

[ ]:
```
def objective(trial):
    hidden_layer_sizes = trial.suggest_categorical('hidden_layer_sizes', [1,2])
    h1 = trial.suggest_int('h1', 10, 500)
    max_iter = trial.suggest_int('max_iter', 10, 1000)
    activation = trial.suggest_categorical('activation', ['logistic', 'tanh',␣
↪'relu'])
    solver = trial.suggest_categorical('solver', ['sgd', 'adam'])
    n_iter_no_change = trial.suggest_int('n_iter_no_change',10,30)
    learning_rate_init = trial.suggest_uniform('learning_rate_init',0.00001,0.1)
    alpha = trial.suggest_uniform('alpha',0.00001,0.01)


    if hidden_layer_sizes == 1:
        clf = MLPClassifier(random_state=1,
                            hidden_layer_sizes=(h1),
                            max_iter=max_iter,
                            learning_rate_init=learning_rate_init,
                            n_iter_no_change=n_iter_no_change,
                            alpha=alpha,
                            solver=solver,
                            activation=activation
                            )
    else:
        h2 = trial.suggest_int('h2',10,500)
        clf = MLPClassifier(random_state=1,
                    hidden_layer_sizes=(h1,h2),
                    max_iter=max_iter,
                    learning_rate_init=learning_rate_init,
                    n_iter_no_change=n_iter_no_change,
                    alpha=alpha,
                    solver=solver,
                    activation=activation
                    )

    score = cross_val_score(clf, x_trains, y_trains, n_jobs=-1, cv=3)
    accuracy = score.mean()
```

```
    return accuracy

study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)
print(study.best_params)
```

{'hidden_layer_sizes': 2, 'h1': 488, 'max_iter': 325, 'activation': 'tanh', 'solver': 'adam', 'n_iter_no_change': 27, 'learning_rate_init': 0.002339011669493108, 'alpha': 0.0018523110526642262, 'h2': 443}

[40]:
```
#classifier = MLPClassifier(learning_rate_init=6.885053259405357e-05,␣
 ↪max_iter=679, n_iter_no_change=25, hidden_layer_sizes=(406,374))
classifier = MLPClassifier(random_state=1,
             hidden_layer_sizes=(488,443),
             max_iter=325,
             learning_rate_init=0.002339011669493108,
             n_iter_no_change=27,
             alpha=0.0018523110526642262,
             solver='adam',
             activation='tanh'
             )

classifier.fit(x_trains, y_trains)
score = classifier.score(x_tests, y_tests)
print(f"Accuracy of Neural Network Classifier is:{score}")
```

```
Accuracy of Neural Network Classifier is:0.8976190476190476
```

5.5 Different between before and after tuning hyperparameter

[49]:
```
# before tuning
classifiers = [
    KNeighborsClassifier(),
    SVC(kernel="linear", C=0.025),
    RandomForestClassifier(max_depth=5, random_state=43),
    MLPClassifier(alpha=0.01, max_iter=1000),
    QuadraticDiscriminantAnalysis()]

names = ["KNearest Neighbors", "Linear SVC", "Random Forest", "Neural Network",␣
 ↪"Quadratic Discriminant Analysis"]

# iterate over classifiers
for name, clf in zip(names, classifiers):
    clf.fit(x_trains, y_trains)
    score = clf.score(x_tests, y_tests)
    print(f"Accuracy of {name} Classifier is:{score}")
```

```
Accuracy of KNearest Neighbors Classifier is:0.8119047619047619
```

```
Accuracy of Linear SVC Classifier is:0.7214285714285714
Accuracy of Random Forest Classifier is:0.6952380952380952
Accuracy of Neural Network Classifier is:0.8142857142857143
Accuracy of Quadratic Discriminant Analysis Classifier is:0.8642857142857143
```

[50]:
```
# after tuning
classifiers = [
    KNeighborsClassifier(algorithm='kd_tree', n_neighbors=3),
    SVC(kernel='poly', C=3.6857184965283647, degree=3.0, gamma='auto'),
    RandomForestClassifier(max_depth=10, n_estimators=458, max_leaf_nodes=391),
    MLPClassifier(random_state=1, hidden_layer_sizes=(488,443), max_iter=325, ␣
 ↪learning_rate_init=0.002339011669493108, n_iter_no_change=27, alpha=0.
 ↪0018523110526642262, solver='adam', activation='tanh'),
    QuadraticDiscriminantAnalysis()]

names = ["KNearest Neighbors", "Poly SVC", "Random Forest", "Neural Network",␣
 ↪"Quadratic Discriminant Analysis"]

# iterate over classifiers
for name, clf in zip(names, classifiers):
    clf.fit(x_trains, y_trains)
    score = clf.score(x_tests, y_tests)
    print(f"Accuracy of {name} Classifier is:{score}")
```

```
Accuracy of KNearest Neighbors Classifier is:0.8261904761904761
Accuracy of Poly SVC Classifier is:0.8785714285714286
Accuracy of Random Forest Classifier is:0.85
Accuracy of Neural Network Classifier is:0.8976190476190476
Accuracy of Quadratic Discriminant Analysis Classifier is:0.8642857142857143
```

---

6 Report

[64]:
```
#change font for confusion matrix
font = {'weight' : 'bold', 'size'   : 18}
plt.rc('font', **font)
```

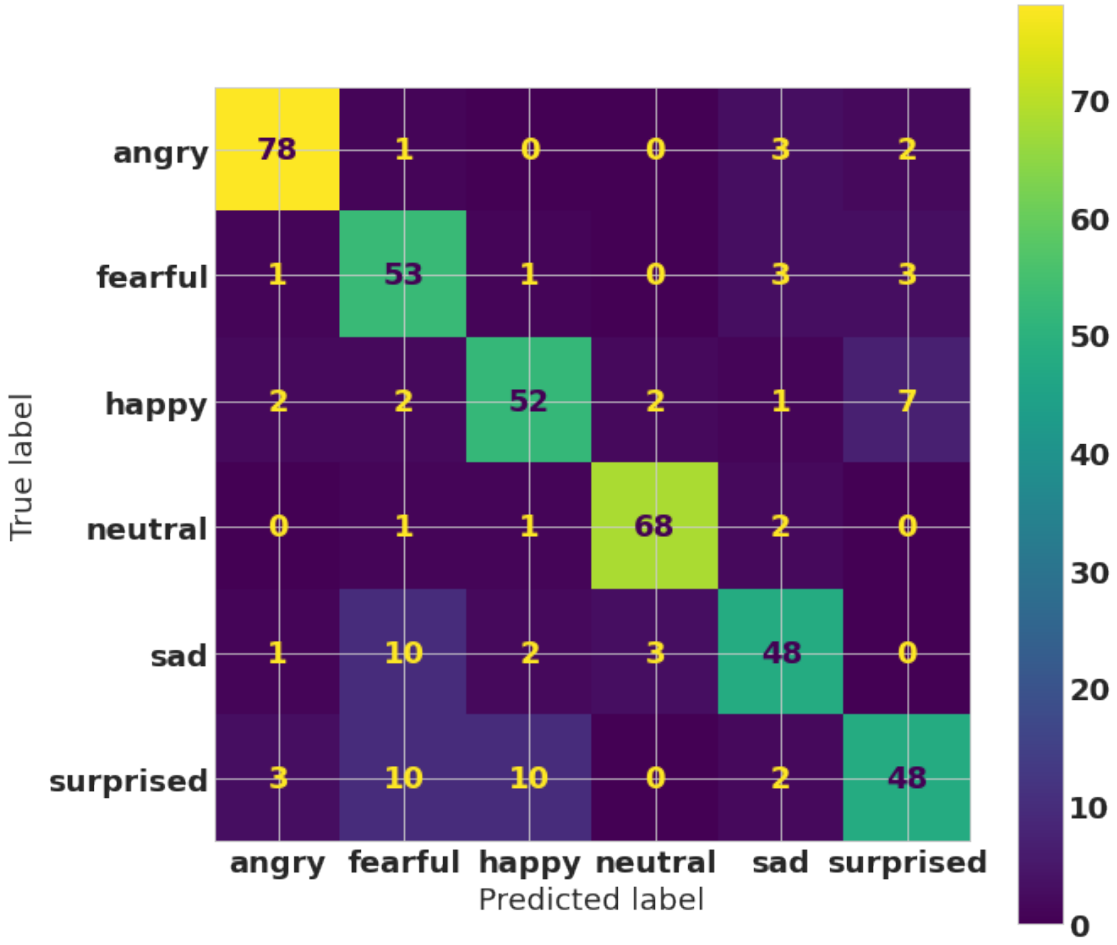
6.1 Kearest Neighbors Classifier

[65]:
```
#cetak precision, recall, f1-score, dan support dari Nearest Neighbors␣
 ↪Classifier
y_pred=classifiers[0].predict(x_tests)

print("Classification Report of KNearest Neighbors Classifier")
print("Accuracy = %0.2f" % accuracy_score(y_tests, y_pred))
print(classification_report(y_tests, y_pred))
```

```
Classification Report of KNearest Neighbors Classifier
Accuracy = 0.83
              precision    recall  f1-score   support

       angry       0.92      0.93      0.92        84
     fearful       0.69      0.87      0.77        61
       happy       0.79      0.79      0.79        66
     neutral       0.93      0.94      0.94        72
         sad       0.81      0.75      0.78        64
   surprised       0.80      0.66      0.72        73

    accuracy                           0.83       420
   macro avg       0.82      0.82      0.82       420
weighted avg       0.83      0.83      0.83       420
```

[66]:
```
#plot confusion matrix Nearest Neighbors Classifier
cm = confusion_matrix(y_tests, y_pred)
cmp = ConfusionMatrixDisplay(cm, display_labels=classifiers[0].classes_)
fig, ax = plt.subplots(figsize=(10,10))
cmp.plot(ax=ax)
```

[66]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7f58f24feb80>
```



6.2 Poly SVC

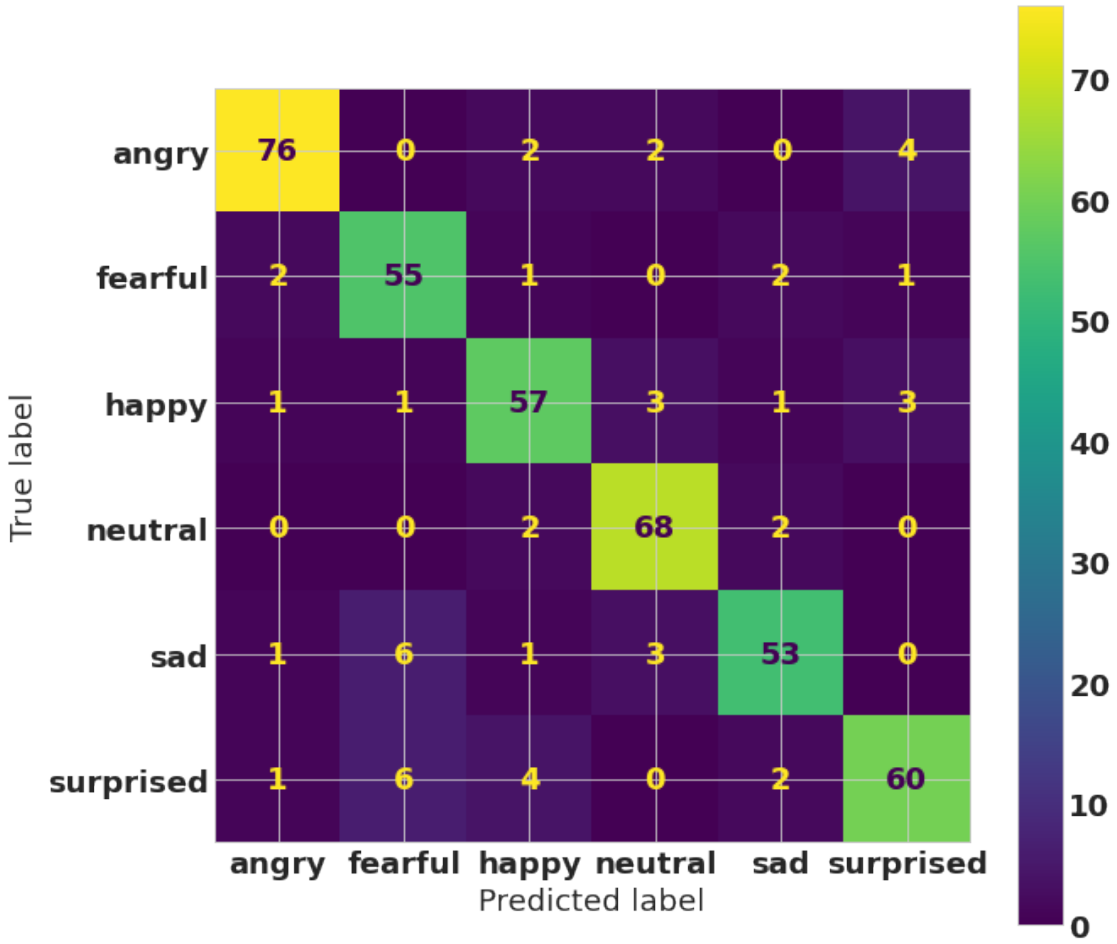
[67]:
```
#cetak precision, recall, f1-score, dan support dari Linear SVC Classifier
y_pred=classifiers[1].predict(x_tests)

print("Classification Report of Linear SVC Classifier")
print("Accuracy = %0.2f" % accuracy_score(y_tests, y_pred))
print(classification_report(y_tests, y_pred))
```

```
Classification Report of Linear SVC Classifier
Accuracy = 0.88
              precision    recall  f1-score   support

       angry       0.94      0.90      0.92        84
     fearful       0.81      0.90      0.85        61
       happy       0.85      0.86      0.86        66
     neutral       0.89      0.94      0.92        72
```

```
              sad       0.88      0.83      0.85        64
        surprised       0.88      0.82      0.85        73

         accuracy                           0.88       420
        macro avg       0.88      0.88      0.88       420
     weighted avg       0.88      0.88      0.88       420
```

[68]:
```
#plot confusion matrix Nearest Neighbors Classifier
cm = confusion_matrix(y_tests, y_pred)
cmp = ConfusionMatrixDisplay(cm, display_labels=classifiers[1].classes_)
fig, ax = plt.subplots(figsize=(10,10))
cmp.plot(ax=ax)
```

[68]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7f58f23d75e0>
```



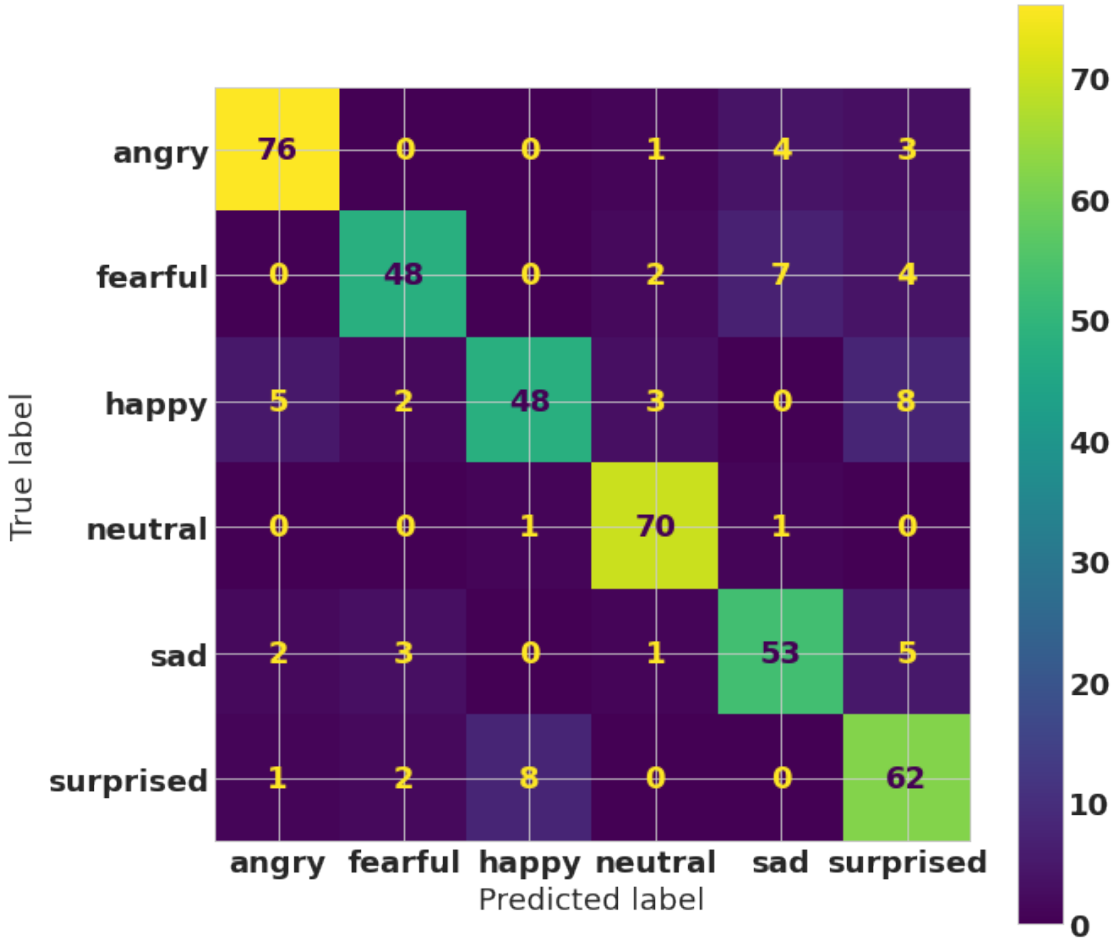
6.3 Random Forest

[69]:
```
#cetak precision, recall, f1-score, dan support dari Random Forest Classifier
y_pred=classifiers[2].predict(x_tests)

print("Classification Report of Random Forest Classifier")
print("Accuracy = %0.2f" % accuracy_score(y_tests, y_pred))
print(classification_report(y_tests, y_pred))
```

```
Classification Report of Random Forest Classifier
Accuracy = 0.85
              precision    recall  f1-score   support

       angry       0.90      0.90      0.90        84
     fearful       0.87      0.79      0.83        61
       happy       0.84      0.73      0.78        66
     neutral       0.91      0.97      0.94        72
         sad       0.82      0.83      0.82        64
   surprised       0.76      0.85      0.80        73

    accuracy                           0.85       420
   macro avg       0.85      0.84      0.85       420
weighted avg       0.85      0.85      0.85       420
```

[70]:
```
#plot confusion matrix Nearest Neighbors Classifier
cm = confusion_matrix(y_tests, y_pred)
cmp = ConfusionMatrixDisplay(cm, display_labels=classifiers[2].classes_)
fig, ax = plt.subplots(figsize=(10,10))
cmp.plot(ax=ax)
```

[70]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7f59231a56d0>
```



6.4 Neural Network

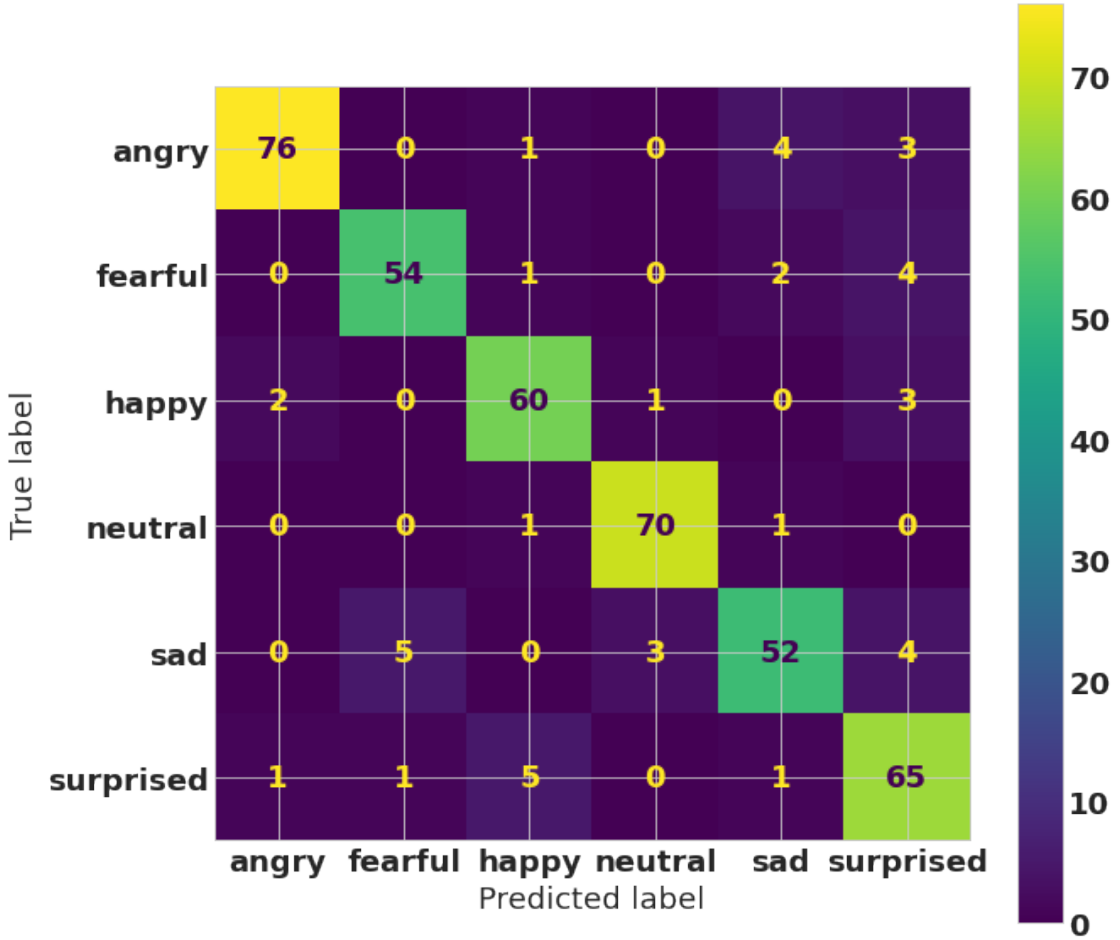
[71]:
```
#cetak precision, recall, f1-score, dan support dari Neural Network Classifier
y_pred=classifiers[3].predict(x_tests)

print("Classification Report of Neural Network Classifier")
print("Accuracy = %0.2f" % accuracy_score(y_tests, y_pred))
print(classification_report(y_tests, y_pred))
```

```
Classification Report of Neural Network Classifier
Accuracy = 0.90
              precision    recall  f1-score   support

       angry       0.96      0.90      0.93        84
     fearful       0.90      0.89      0.89        61
       happy       0.88      0.91      0.90        66
     neutral       0.95      0.97      0.96        72
         sad       0.87      0.81      0.84        64
```

surprised	0.82	0.89	0.86	73
accuracy			0.90	420
macro avg	0.90	0.90	0.90	420
weighted avg	0.90	0.90	0.90	420

[72]:
```
#plot confusion matrix Nearest Neighbors Classifier
cm = confusion_matrix(y_tests, y_pred)
cmp = ConfusionMatrixDisplay(cm, display_labels=classifiers[3].classes_)
fig, ax = plt.subplots(figsize=(10,10))
cmp.plot(ax=ax)
```

[72]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7f58d5b35910>
```



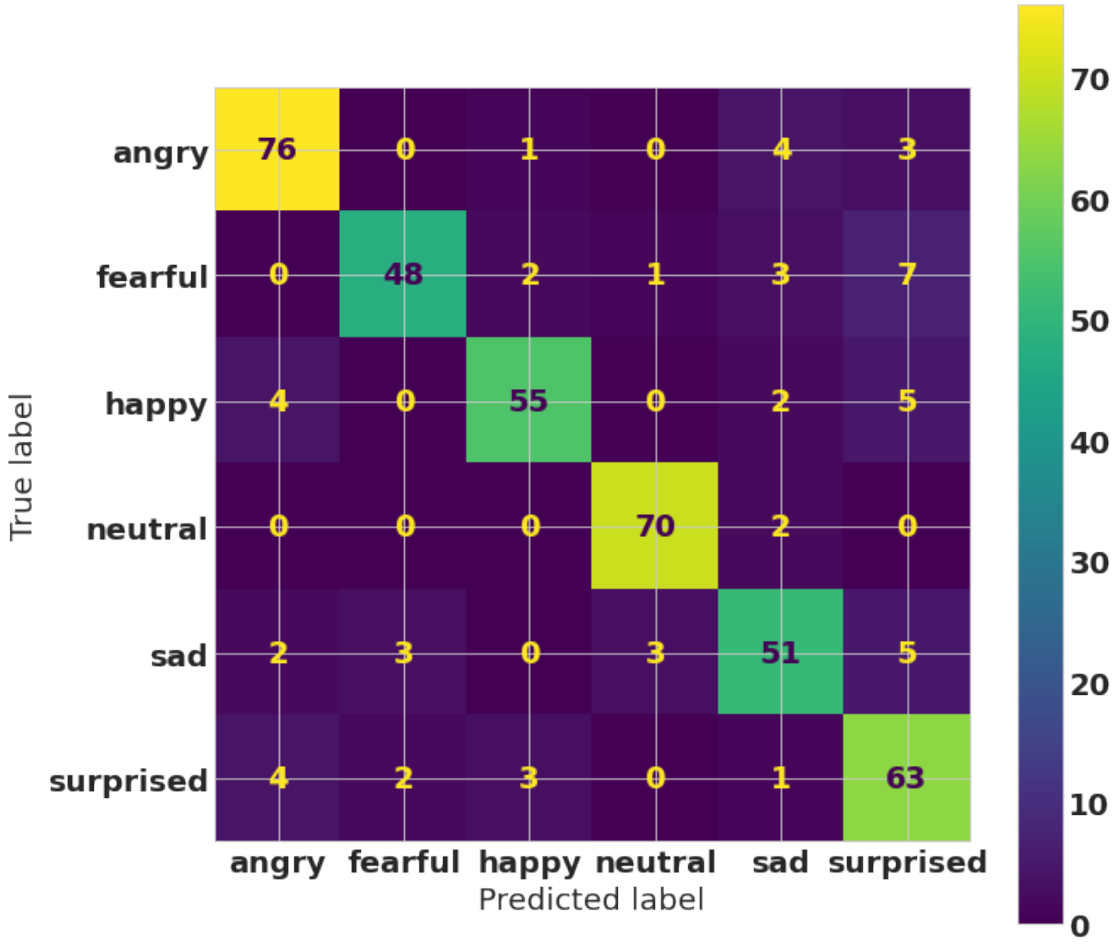
6.5 QDA Classifier

[73]:
```
#cetak precision, recall, f1-score, dan support dari QDA Classifier
y_pred=classifiers[4].predict(x_tests)

print("Classification Report of QDA Classifier ")
print("Accuracy = %0.2f" % accuracy_score(y_tests, y_pred))
print(classification_report(y_tests, y_pred))
```

```
Classification Report of QDA Classifier
Accuracy = 0.86
              precision    recall  f1-score   support

       angry       0.88      0.90      0.89        84
     fearful       0.91      0.79      0.84        61
       happy       0.90      0.83      0.87        66
     neutral       0.95      0.97      0.96        72
         sad       0.81      0.80      0.80        64
   surprised       0.76      0.86      0.81        73

    accuracy                           0.86       420
   macro avg       0.87      0.86      0.86       420
weighted avg       0.87      0.86      0.86       420
```

[74]:
```
#plot confusion matrix Nearest Neighbors Classifier
cm = confusion_matrix(y_tests, y_pred)
cmp = ConfusionMatrixDisplay(cm, display_labels=classifiers[4].classes_)
fig, ax = plt.subplots(figsize=(10,10))
cmp.plot(ax=ax)
```

[74]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7f58f21f1100>
```



7 Import Model

Bagian ini digunakan untuk menyimpan model hasil training

[117]:
```
import pickle
```

[118]:
```
#change directory
%cd $dirmodel
```

```
/home/ubuntu/Documents/GitHub/sound-emotion-recognition-javanese/model
```

[120]:
```
# save the model to disk
filename = 'final_model_NeuralNetwork.sav'
pickle.dump(classifiers[3], open(filename, 'wb'))
```

8 Test the Model

Bagian ini untuk meload file model agar bisa digunakan untuk prediksi

[122]:
```
# load the model from disk
filename = 'final_model_NeuralNetwork.sav'

loaded_model = pickle.load(open(filename, 'rb'))
result = loaded_model.score(x_tests, y_tests)
print(result)
```

```
0.8452380952380952
```

Penamaan File

aa-bb-cc-dd.wav

- aa -> Aktor 01-10
- bb -> Kalimat 01-04
- cc -> Ekspresi 01-06
- dd -> Pengulanan 01-07

Eskpresi: - 01 - Neutral / Biasa - 02 - Sadness / Susah - 03 - Happiness / Seneng - 04 - Surprise / Kaget - 05 - Fear / Wedi - 06 - Anger / Ness

contoh: *01-02-03-04.wav*

- 01 -> Aktor 01
- 02 -> Kalimat ke-02
- 03 -> Ekspresi ke-03
- 04 -> Pengulanan ke-04

[123]:
```
#feature extraction dari file yang akan di uji / di prediksi
x = []
file_test = dirdataset+"/01-03-02_04.wav"
feature=feature_extractor(file_test, mfcc=True, chroma=False, mel=False)
x.append(feature)
```

[124]:
```
#hasil prediksi berdasarkan model aktif
y=classifiers[3].predict(x)
print(y)
```

```
['sad']
```

[125]:
```
#hasil prediksi berdasarkan file model
y_m = loaded_model.predict(x)
print(y_m)
```

```
['sad']
```