gender-recognition

May 19, 2022

1 Gender Recognition by Voice Machine Learning SVM

[2]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from plotly.offline import init_notebook_mode, iplot
init_notebook_mode(connected=True)
```

1.0.1 Reading Data

[3]:
```python
df=pd.read_csv("voice.csv")
```

[4]:
```python
df.sample(5)
```

[4]:
```
      meanfreq        sd    median       Q25       Q75       IQR      skew  \
1841  0.179750  0.034082  0.174082  0.167790  0.187016  0.019226  4.997551
2522  0.203236  0.038226  0.195420  0.182460  0.231912  0.049452  2.764458
558   0.111337  0.075083  0.095585  0.047542  0.172154  0.124611  1.792152
2471  0.151091  0.066940  0.147940  0.099045  0.212299  0.113254  1.047134
1122  0.186150  0.055903  0.189562  0.142044  0.235547  0.093504  0.851722

           kurt    sp.ent       sfm  …  centroid   meanfun    minfun  \
1841  34.136764  0.800227  0.223223  …  0.179750  0.164371  0.015702
2522  13.374830  0.870564  0.240827  …  0.203236  0.168331  0.046921
558    8.022700  0.962835  0.735872  …  0.111337  0.084689  0.015671
2471   6.083770  0.970128  0.725125  …  0.151091  0.179934  0.048436
1122   2.900995  0.924422  0.444776  …  0.186150  0.128891  0.047291

        maxfun  meandom    mindom    maxdom   dfrange   modindx   label
1841  0.225352  0.898828  0.164062  6.625000  6.460938  0.139258  female
2522  0.277457  1.474051  0.023438  8.039062  8.015625  0.136739  female
558   0.192771  0.195312  0.007812  0.734375  0.726562  0.247909    male
2471  0.279070  1.493304  0.023438  7.804688  7.781250  0.103473  female
1122  0.275862  1.298564  0.023438  8.929688  8.906250  0.165461    male

[5 rows x 21 columns]
```

[5]:
```
df.info()
```

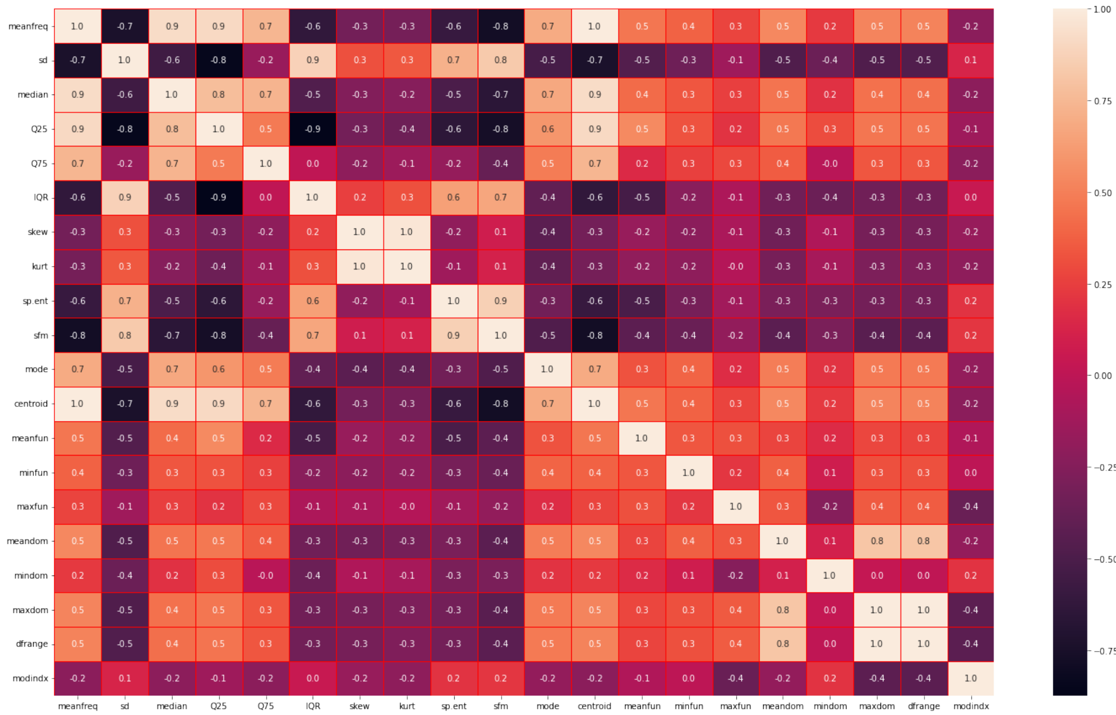
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3168 entries, 0 to 3167
Data columns (total 21 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   meanfreq  3168 non-null   float64
 1   sd        3168 non-null   float64
 2   median    3168 non-null   float64
 3   Q25       3168 non-null   float64
 4   Q75       3168 non-null   float64
 5   IQR       3168 non-null   float64
 6   skew      3168 non-null   float64
 7   kurt      3168 non-null   float64
 8   sp.ent    3168 non-null   float64
 9   sfm       3168 non-null   float64
 10  mode      3168 non-null   float64
 11  centroid  3168 non-null   float64
 12  meanfun   3168 non-null   float64
 13  minfun    3168 non-null   float64
 14  maxfun    3168 non-null   float64
 15  meandom   3168 non-null   float64
 16  mindom    3168 non-null   float64
 17  maxdom    3168 non-null   float64
 18  dfrange   3168 non-null   float64
 19  modindx   3168 non-null   float64
 20  label     3168 non-null   object
dtypes: float64(20), object(1)
memory usage: 519.9+ KB
```

2 Seaborn - Heatmap

2.0.1 Relationship between columns

- 01 –> Direct proportion
- 00 –> No relationship
- -1 –> İnverse proportion

[7]:
```
f,ax = plt.subplots(figsize=(25, 15))
sns.heatmap(df.corr(), annot=True, linewidths=0.5,linecolor="red", fmt= '.
↪1f',ax=ax)
plt.show()
```



3 Separating Features and Labels

[8]:
```
X=df.iloc[:, :-1]
X.head()
```

[8]:
```
   meanfreq        sd    median       Q25       Q75       IQR       skew  \
0  0.059781  0.064241  0.032027  0.015071  0.090193  0.075122  12.863462
1  0.066009  0.067310  0.040229  0.019414  0.092666  0.073252  22.423285
2  0.077316  0.083829  0.036718  0.008701  0.131908  0.123207  30.757155
3  0.151228  0.072111  0.158011  0.096582  0.207955  0.111374   1.232831
4  0.135120  0.079146  0.124656  0.078720  0.206045  0.127325   1.101174

          kurt    sp.ent       sfm      mode  centroid   meanfun    minfun  \
0   274.402906  0.893369  0.491918  0.000000  0.059781  0.084279  0.015702
1   634.613855  0.892193  0.513724  0.000000  0.066009  0.107937  0.015826
2  1024.927705  0.846389  0.478905  0.000000  0.077316  0.098706  0.015656
3     4.177296  0.963322  0.727232  0.083878  0.151228  0.088965  0.017798
4     4.333713  0.971955  0.783568  0.104261  0.135120  0.106398  0.016931

     maxfun   meandom    mindom    maxdom   dfrange   modindx
0  0.275862  0.007812  0.007812  0.007812  0.000000  0.000000
1  0.250000  0.009014  0.007812  0.054688  0.046875  0.052632
2  0.271186  0.007990  0.007812  0.015625  0.007812  0.046512
```

3	0.250000	0.201497	0.007812	0.562500	0.554688	0.247119
4	0.266667	0.712812	0.007812	5.484375	5.476562	0.208274

4 Converting String Value To int Type for Labels

4.0.1 Encode label category

- Male -> 1
- Female -> 0

[9]:
```
df.label.unique()
```

[9]:
```
array(['male', 'female'], dtype=object)
```

[10]:
```
from sklearn.preprocessing import LabelEncoder
y=df.iloc[:,-1]

encoder = LabelEncoder()
y = encoder.fit_transform(y)
print(y)
```

```
[1 1 1 … 0 0 0]
```

5 Data Standardisation

[11]:
```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
scaler.fit(X)
X = scaler.transform(X)
```

6 Splitting Dataset into Training Set and Testing Set

[12]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
↪random_state=1)
```

7 Build SVM Model with Default Hyperparameter

[13]:
```
from sklearn.svm import SVC
from sklearn import metrics
svc=SVC() #Default hyperparameters
svc.fit(X_train,y_train)
y_pred=svc.predict(X_test)
```

8 Accuracy Score

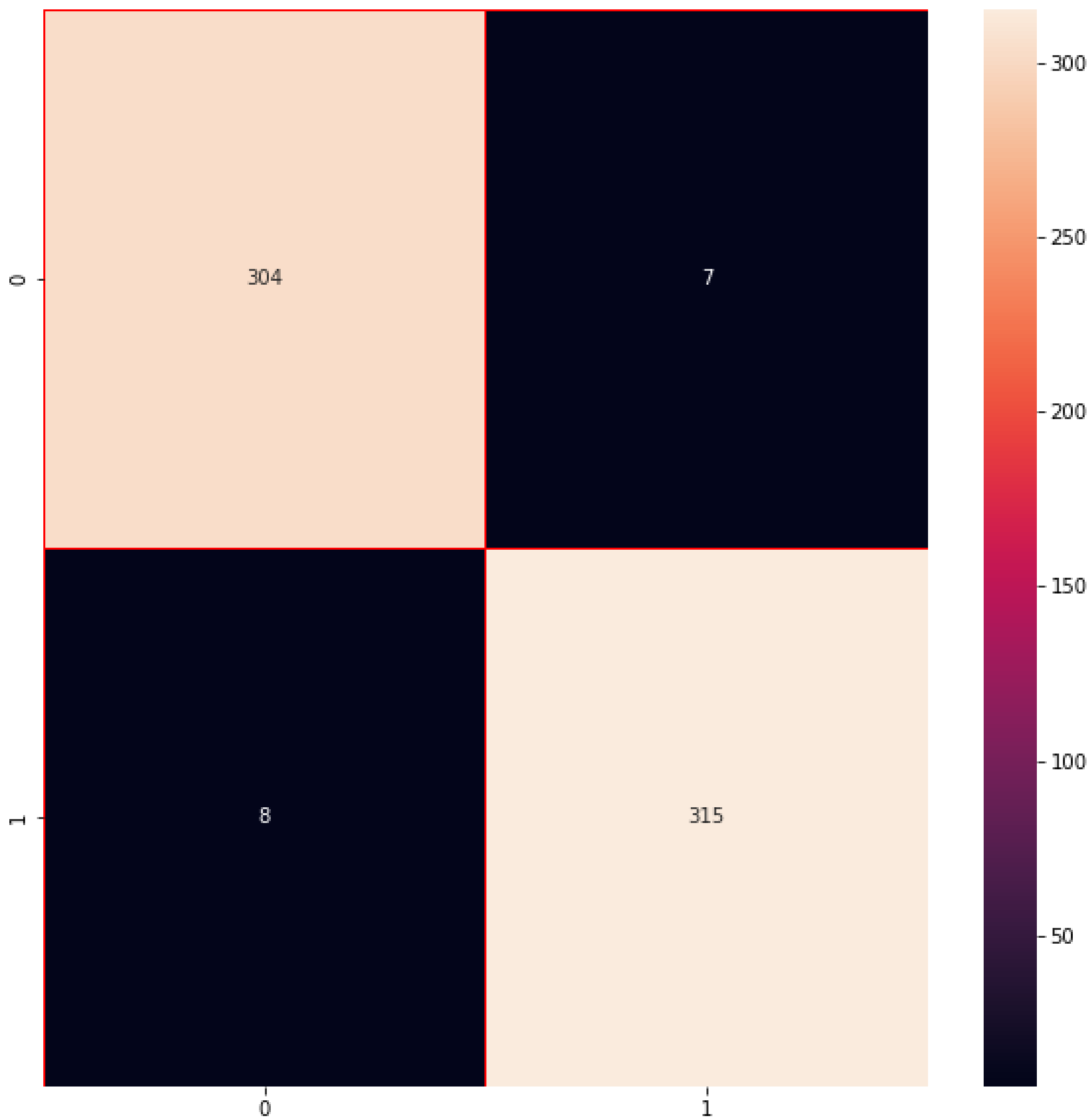
[14]:
```
print('Accuracy Score:')
print(metrics.accuracy_score(y_test,y_pred))
```

```
Accuracy Score:
0.9763406940063092
```

9 Confusion Matrix with Seaborn - Heatmap

- Male -> 1
- Female -> 0

[15]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
f,ax = plt.subplots(figsize=(10, 10))
sns.heatmap(cm, annot=True, linewidths=0.5,linecolor="red", fmt= '.0f',ax=ax)
plt.show()
plt.savefig('ConfusionMatrix.png')
```




```
<Figure size 432x288 with 0 Axes>
```

10 F1 Score

[16]:
```
from sklearn.metrics import  f1_score
f1_score = f1_score(y_test, y_pred)
print("F1 Score:")
print(f1_score)
```

```
F1 Score:
0.9767441860465117
```

11 Thank You

If you have any suggestion or advice or feedback, I will be very appreciated to hear them.

[ ]:
```

```