Converting Un-structured cropped face data to structured data for data preprocessing

Import required libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import cv2
from PIL import Image
from glob import glob

%matplotlib inline
```

Import the cropped images

In [2]:
```
male = glob('./Data/Crop/Male-Crop/*.png')
female = glob('./Data/Crop/Female-Crop/*.png')
```

In [5]:
```
path = male + female
```

Check Image size

In [8]:
```
img = Image.open(path[0])
img
```

Out[8]:

In [9]:
```
img.size
```

Out[9]:
```
(182, 182)
```

In [12]:
```
#Define a function to get the size of each image
#As seen from above, we are getting size as a square matrix (182, 182). Hence
 we will return only 1 value

def get_size(path):
    img = Image.open(path)
    #return img.size
    return img.size[0]
```

In [13]:
```
get_size(path[1])
```

Out[13]: 81

Load Image data into a pandas DataFrame

In [15]:
```
df = pd.DataFrame(data=path,columns=['Path'])
df.head()
```

Out[15]:

	Path
0	./Data/Crop/Male-Crop\male_0.png
1	./Data/Crop/Male-Crop\male_1.png
2	./Data/Crop/Male-Crop\male_1003.png
3	./Data/Crop/Male-Crop\male_1005.png
4	./Data/Crop/Male-Crop\male_1007.png

Add a new column corresponding to the size of each face image

In [17]:
```
df['Size'] = df['Path'].apply(get_size)
df.head()
```

Out[17]:

	Path	Size
0	./Data/Crop/Male-Crop\male_0.png	182
1	./Data/Crop/Male-Crop\male_1.png	81
2	./Data/Crop/Male-Crop\male_1003.png	81
3	./Data/Crop/Male-Crop\male_1005.png	122
4	./Data/Crop/Male-Crop\male_1007.png	273

In [18]:
```
df.tail()
```

Out[18]:

	Path	Size
6048	./Data/Crop/Female-Crop\female_994.png	182
6049	./Data/Crop/Female-Crop\female_995.png	81
6050	./Data/Crop/Female-Crop\female_997.png	122
6051	./Data/Crop/Female-Crop\female_998.png	182
6052	./Data/Crop/Female-Crop\female_999.png	182

Do Exploratory Data Analysis

In [19]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6053 entries, 0 to 6052
Data columns (total 2 columns):
Path    6053 non-null object
Size    6053 non-null int64
dtypes: int64(1), object(1)
memory usage: 94.7+ KB
```

In [21]:
```
df.columns
```

Out[21]:
```
Index(['Path', 'Size'], dtype='object')
```

In [22]:
```
df.describe()
```

Out[22]:

	Size
count	6053.000000
mean	155.638361
std	72.296008
min	24.000000
25%	81.000000
50%	122.000000
75%	182.000000
max	410.000000

In [23]:
```
df.describe().transpose()
```

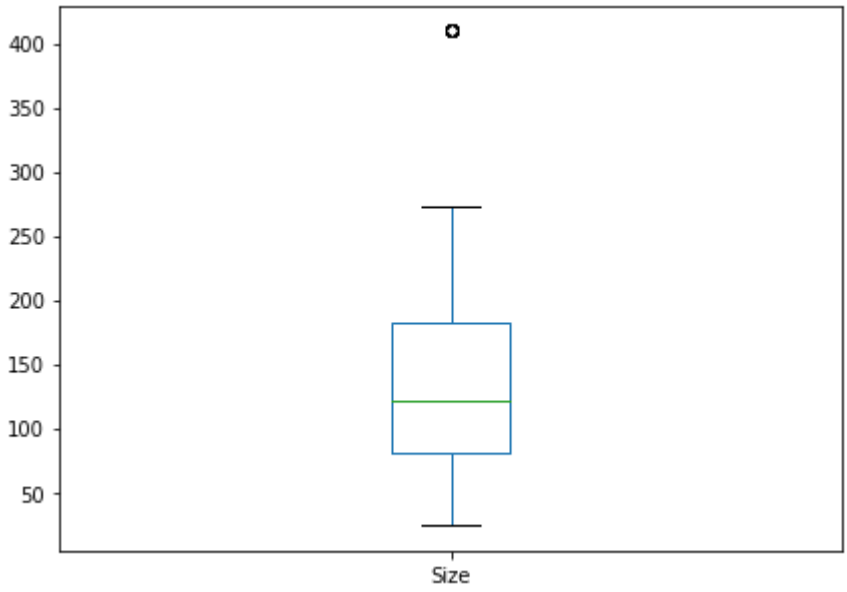
Out[23]:

	count	mean	std	min	25%	50%	75%	max
Size	6053.0	155.638361	72.296008	24.0	81.0	122.0	182.0	410.0

Visualize data using plots

In [26]:
```
plt.figure(figsize=(7,5))
df['Size'].plot(kind='box')
```

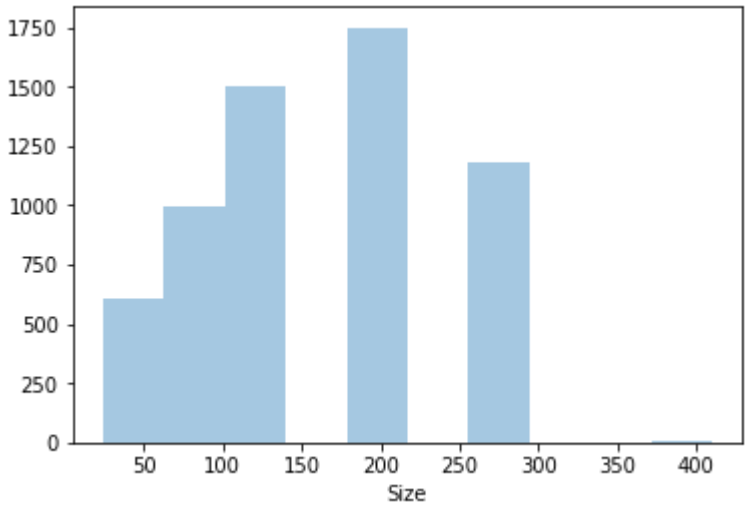
Out[26]: <matplotlib.axes._subplots.AxesSubplot at 0x2b104fb9f60>



In [29]:
```
import seaborn as sns
```

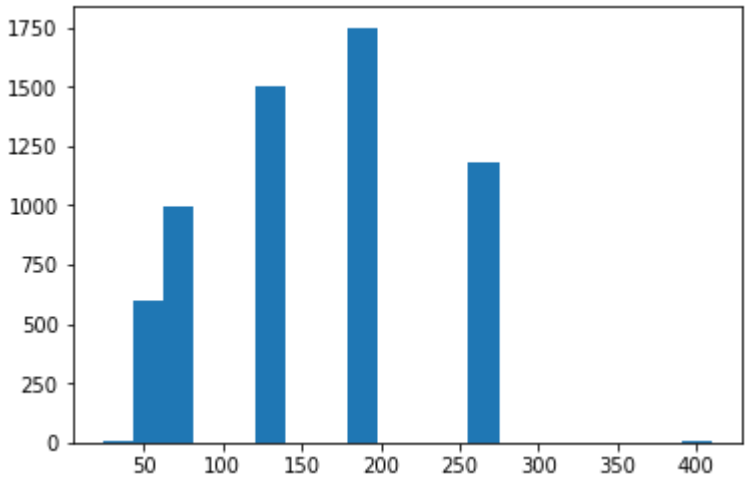
In [38]:
```
sns.distplot(df['Size'], bins=10, kde=False)
```

Out[38]: <matplotlib.axes._subplots.AxesSubplot at 0x2b10df37588>



In [40]:
```
plt.hist(df['Size'], bins=20)
```

Out[40]:
```
(array([   9.,  600.,  997.,    0.,    0., 1505.,    0.,    0., 1750.,
           0.,    0.,    0., 1184.,    0.,    0.,    0.,    0.,    0.,
           0.,    8.]),
 array([ 24. ,  43.3,  62.6,  81.9, 101.2, 120.5, 139.8, 159.1, 178.4,
        197.7, 217. , 236.3, 255.6, 274.9, 294.2, 313.5, 332.8, 352.1,
        371.4, 390.7, 410. ]),
 <a list of 20 Patch objects>)
```



Removing Images of size less than 60

In [42]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6053 entries, 0 to 6052
Data columns (total 2 columns):
Path    6053 non-null object
Size    6053 non-null int64
dtypes: int64(1), object(1)
memory usage: 94.7+ KB
```

In [43]:
```
new_df = df[df['Size']>60]
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 5444 entries, 0 to 6052
Data columns (total 2 columns):
Path    5444 non-null object
Size    5444 non-null int64
dtypes: int64(1), object(1)
memory usage: 127.6+ KB
```

Calculate no of male and female samples

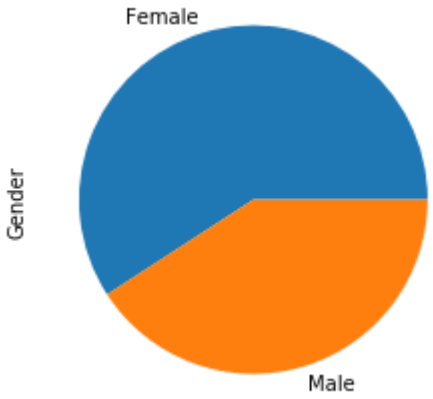
In [49]:
```
sample = new_df['Path'][0]
sample

def gender(sample):
    try:
        return sample.split('-')[0].split('/')[-1]
    except:
        return None
```

In [50]:
```
df['Gender'] = df['Path'].apply(gender)
df['Gender'].value_counts()
```

Out[50]:
```
Female    3581
Male      2472
Name: Gender, dtype: int64
```

In [52]:
```
df['Gender'].value_counts().plot(kind='pie')
```

Out[52]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2b10f02c208>
```

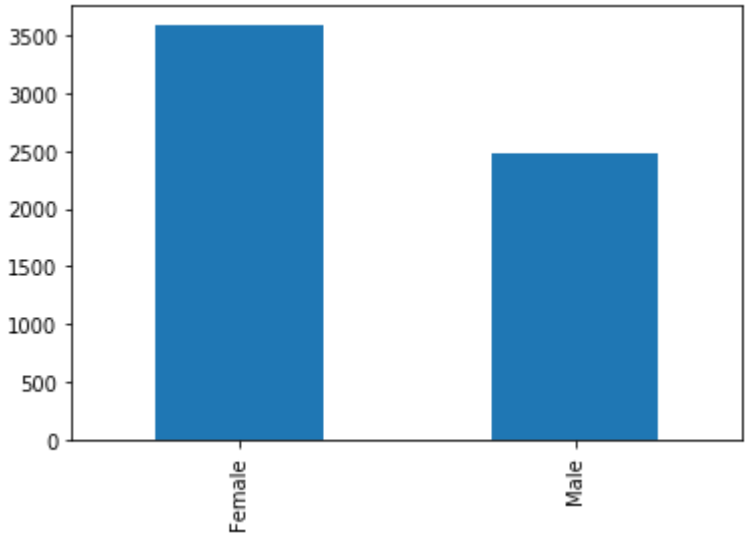


In [53]:
```
df['Gender'].value_counts(normalize=True)
```

Out[53]:
```
Female    0.591607
Male      0.408393
Name: Gender, dtype: float64
```

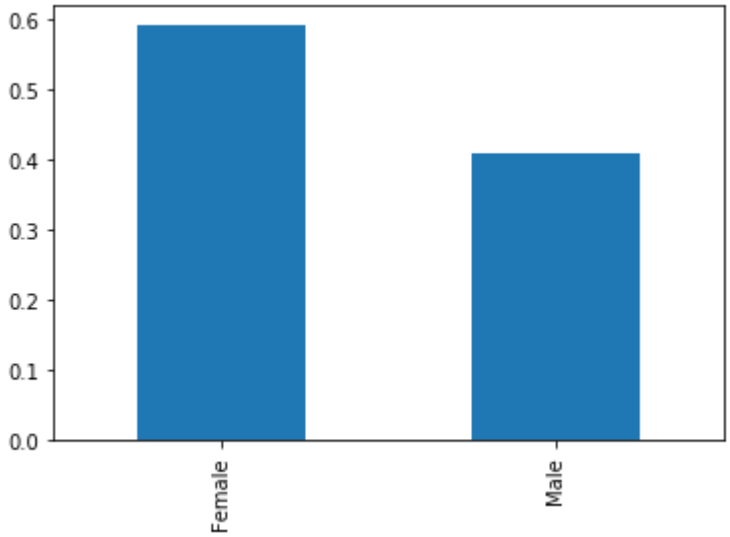
In [54]:
```
df['Gender'].value_counts().plot(kind='bar')
```

Out[54]: <matplotlib.axes._subplots.AxesSubplot at 0x2b10f0f4be0>



In [55]:
```
df['Gender'].value_counts(normalize=True).plot(kind='bar')
```

Out[55]: <matplotlib.axes._subplots.AxesSubplot at 0x2b10f1374e0>



In [57]:
```
new_df['Size'].min()
```

Out[57]: 81

Conclusion:

1. **All the Images are greter than equal to 81**
2. **60% sample data is female and 40% is male**

Resizing all Images to 100 X 100:

In [64]:
```
image_path = df['Path'][0]
image_path
```

Out[64]:
```
'./Data/Crop/Male-Crop\\male_0.png'
```

In [65]:
```
#Read the Image
def resize_img(image_path):
    image_path = df['Path'][0]

    img = cv2.imread(image_path)
    #Convert to Grayscale
    gray_img = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
    #Resize into 100 X 100
    #Find size and apply correct interpolation technique
    size = gray_img.shape[0]

    if size<= 100:
        gray_re = cv2.resize(gray_img,(100,100),cv2.INTER_CUBIC) #Enlarge
    else:
        gray_re = cv2.resize(gray_img,(100,100),cv2.INTER_AREA) #Shrink

    #Flatten Image
    flat_img = gray_re.flatten()
    return flat_img
```

In [66]:
```
resize_img(path[0])
```

Out[66]:
```
array([106, 100,  81, ...,  29,  31,  31], dtype=uint8)
```

In [68]:
```
len(resize_img(path[0]))
```

Out[68]:
```
10000
```

Apply resize and gender function to dataframe:

In [69]:
```
new_df.head()
```

Out[69]:

	Path	Size
0	./Data/Crop/Male-Crop\male_0.png	182
1	./Data/Crop/Male-Crop\male_1.png	81
2	./Data/Crop/Male-Crop\male_1003.png	81
3	./Data/Crop/Male-Crop\male_1005.png	122
4	./Data/Crop/Male-Crop\male_1007.png	273

In [70]:
```
new_df['Gender'] = new_df['Path'].apply(gender)
new_df.head()
```

```
e:\users\user.desktop-3hhgvth\anaconda3\envs\opencv\lib\site-packages\ipykern
el_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/st
able/user_guide/indexing.html#returning-a-view-versus-a-copy
  """Entry point for launching an IPython kernel.
```

Out[70]:

	Path	Size	Gender
0	./Data/Crop/Male-Crop\male_0.png	182	Male
1	./Data/Crop/Male-Crop\male_1.png	81	Male
2	./Data/Crop/Male-Crop\male_1003.png	81	Male
3	./Data/Crop/Male-Crop\male_1005.png	122	Male
4	./Data/Crop/Male-Crop\male_1007.png	273	Male

In [71]:
```
new_df.tail()
```

Out[71]:

	Path	Size	Gender
6048	./Data/Crop/Female-Crop\female_994.png	182	Female
6049	./Data/Crop/Female-Crop\female_995.png	81	Female
6050	./Data/Crop/Female-Crop\female_997.png	122	Female
6051	./Data/Crop/Female-Crop\female_998.png	182	Female
6052	./Data/Crop/Female-Crop\female_999.png	182	Female

In [72]:
```
#Resize
new_df['Structured_Data'] = new_df['Path'].apply(resize_img)
```

```
e:\users\user.desktop-3hhgvth\anaconda3\envs\opencv\lib\site-packages\ipykern
el_launcher.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/st
able/user_guide/indexing.html#returning-a-view-versus-a-copy
```

In [73]:
```
new_df.head()
```

Out[73]:

	Path	Size	Gender	Structured_Data
0	./Data/Crop/Male-Crop\male_0.png	182	Male	[106, 100, 81, 69, 71, 48, 51, 55, 41, 17, 30,...
1	./Data/Crop/Male-Crop\male_1.png	81	Male	[106, 100, 81, 69, 71, 48, 51, 55, 41, 17, 30,...
2	./Data/Crop/Male-Crop\male_1003.png	81	Male	[106, 100, 81, 69, 71, 48, 51, 55, 41, 17, 30,...
3	./Data/Crop/Male-Crop\male_1005.png	122	Male	[106, 100, 81, 69, 71, 48, 51, 55, 41, 17, 30,...
4	./Data/Crop/Male-Crop\male_1007.png	273	Male	[106, 100, 81, 69, 71, 48, 51, 55, 41, 17, 30,...

In [74]:
```
new_df['Gender'].value_counts()
```

Out[74]:
```
Female    3242
Male      2202
Name: Gender, dtype: int64
```

Form new dataframe

In [77]:
```
df1 = new_df['Structured_Data'].apply(pd.Series)
df1.head()
```

Out[77]:

	0	1	2	3	4	5	6	7	8	9	...	9990	9991	9992	9993	9994	9995	9996	99
0	106	100	81	69	71	48	51	55	41	17	...	17	18	26	28	31	30	31	
1	106	100	81	69	71	48	51	55	41	17	...	17	18	26	28	31	30	31	
2	106	100	81	69	71	48	51	55	41	17	...	17	18	26	28	31	30	31	
3	106	100	81	69	71	48	51	55	41	17	...	17	18	26	28	31	30	31	
4	106	100	81	69	71	48	51	55	41	17	...	17	18	26	28	31	30	31	

5 rows × 10000 columns

In [78]:
```
df2 = pd.concat((new_df['Gender'],df1),axis=1)
df2.head()
```

Out[78]:

	Gender	0	1	2	3	4	5	6	7	8	...	9990	9991	9992	9993	9994	9995	999
0	Male	106	100	81	69	71	48	51	55	41	...	17	18	26	28	31	30	3
1	Male	106	100	81	69	71	48	51	55	41	...	17	18	26	28	31	30	3
2	Male	106	100	81	69	71	48	51	55	41	...	17	18	26	28	31	30	3
3	Male	106	100	81	69	71	48	51	55	41	...	17	18	26	28	31	30	3
4	Male	106	100	81	69	71	48	51	55	41	...	17	18	26	28	31	30	3

5 rows × 10001 columns

In [83]:
```
df2.loc[0].shape
```

Out[83]:
```
(10001,)
```

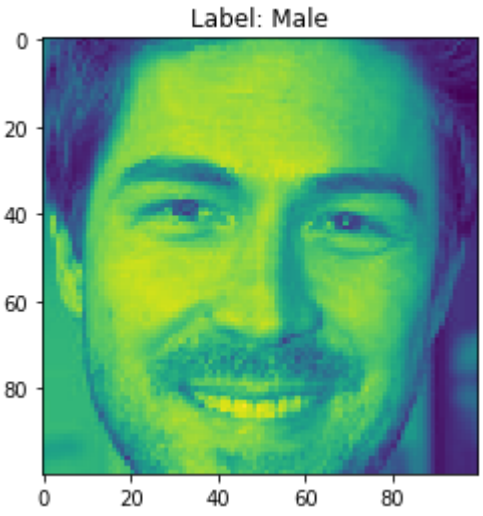
Visualize values of new DataFrame

In [86]:
```
df2.loc[0][1:].values.reshape(100,100).astype('int')
```

Out[86]:
```
array([[106, 100,  81, ...,  23,  20,  34],
       [104,  93,  54, ...,  28,  24,  32],
       [109,  89,  66, ...,  18,  26,  37],
       ...,
       [141, 144, 147, ...,  30,  32,  31],
       [143, 148, 151, ...,  29,  32,  31],
       [147, 151, 152, ...,  29,  31,  31]])
```

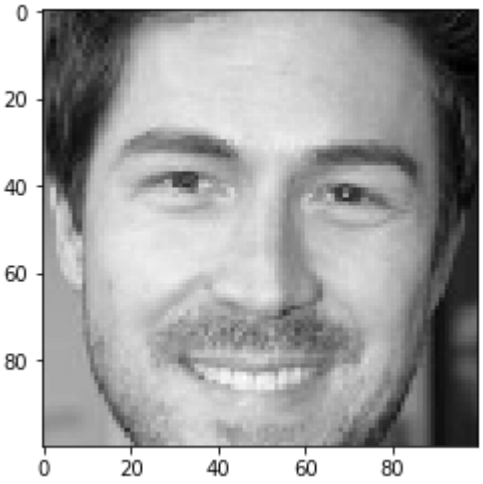
In [89]:
```
plt.title('Label: '+ df2.loc[0]['Gender'])
plt.imshow(df2.loc[0][1:].values.reshape(100,100).astype('int'))
```

Out[89]:
```
<matplotlib.image.AxesImage at 0x2b10f169828>
```



In [93]:
```
plt.imshow(df2.loc[0][1:].values.reshape(100,100).astype('int'),cmap='gray')
```

Out[93]: <matplotlib.image.AxesImage at 0x2b10fc79550>



Save DataFrame in Pickle format

In [90]:
```
import pickle
```

In [91]:
```
pickle.dump(df2,open('./Data/Dataframe_images_100_100.pickle', 'wb'))
```

In [92]:
```
#wb ->Signifies write bytes for writing data to file, rb->signifies read bytes for reading data to file
```

In [ ]:
```

```