INVESTIGATE A DATASET -

BRASILIAN MEDICAL APPOINTMENTS (NO SHOW)

> **Intro**: This is an ALX-T/Udacity Data Analysis Nano Degree project on a Brasialian No-show Medical appointment dataset. Submitted by: Temitope Olaitan - (olaitanturpe@gmail.com)

Since the dataset has been downloaded into my machine and placed into the appropriate directory, I shall go ahead to open it up in my notebook here

In [1]:
```
# importing the necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sb
%matplotlib inline
```

In [2]:
```
df=pd.read_csv('noshowappointments-kagglev2-may-2016.csv')
```

Now I shall use a few commands to get a better understand of what the data looks like

In [3]:
```
# view first few rows
df.head(2)
```

Out[3]:

	PatientId	AppointmentID	Gender	ScheduledDay	AppointmentDay	Age	Neighbourhood	Scholarship	Hipe
0	2.987250e+13	5642903	F	2016-04-29T18:38:08Z	2016-04-29T00:00:00Z	62	JARDIM DA PENHA	0	
1	5.589978e+14	5642503	M	2016-04-29T16:08:27Z	2016-04-29T00:00:00Z	56	JARDIM DA PENHA	0	

In [4]:
```
# To know the dimensions of the data
df.shape
```

Out[4]:
```
(110527, 14)
```

In [5]:
```
# Checking out for data types
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 110527 entries, 0 to 110526
Data columns (total 14 columns):
 #   Column          Non-Null Count   Dtype  
---  ------          --------------   -----  
 0   PatientId       110527 non-null  float64
 1   AppointmentID   110527 non-null  int64  
 2   Gender          110527 non-null  object 
 3   ScheduledDay    110527 non-null  object 
 4   AppointmentDay  110527 non-null  object 
 5   Age             110527 non-null  int64  
```

```
 6   Neighbourhood   110527 non-null  object
 7   Scholarship     110527 non-null  int64
 8   Hipertension    110527 non-null  int64
 9   Diabetes        110527 non-null  int64
 10  Alcoholism      110527 non-null  int64
 11  Handcap         110527 non-null  int64
 12  SMS_received    110527 non-null  int64
 13  No-show         110527 non-null  object
dtypes: float64(1), int64(8), object(5)
memory usage: 11.8+ MB
```

In [6]:
```
df.describe()
```

Out[6]:

	PatientId	AppointmentID	Age	Scholarship	Hipertension	Diabetes	Alcoholism	
count	1.105270e+05	1.105270e+05	110527.000000	110527.000000	110527.000000	110527.000000	110527.000000	1
mean	1.474963e+14	5.675305e+06	37.088874	0.098266	0.197246	0.071865	0.030400	
std	2.560949e+14	7.129575e+04	23.110205	0.297675	0.397921	0.258265	0.171686	
min	3.921784e+04	5.030230e+06	-1.000000	0.000000	0.000000	0.000000	0.000000	
25%	4.172614e+12	5.640286e+06	18.000000	0.000000	0.000000	0.000000	0.000000	
50%	3.173184e+13	5.680573e+06	37.000000	0.000000	0.000000	0.000000	0.000000	
75%	9.439172e+13	5.725524e+06	55.000000	0.000000	0.000000	0.000000	0.000000	
max	9.999816e+14	5.790484e+06	115.000000	1.000000	1.000000	1.000000	1.000000	

A bit of explanation about the data

PatientId - A unique identifier for each patient

AppointmentID - A unique identifier for each appointment

Gender - A binary description of the patient's gender

ScheduledDay - The date the appointment was scheduled

AppointmentDay - The day the appointment was scheduled for

Age - Age of the Patient (in number of years)

Neighbourhood - The locale of the hospital

Scholarship - is the appointment was sponsored by the social welfare program of the govt? (1 - means 'YES' and 0 - means 'NO')

Hipertension - is the patient hypertensive? (1 - means 'YES' and 0 - means 'NO')

Diabetes - is the patient diabetic? (1 - means 'YES' and 0 - means 'NO')

Alcoholism - is the patient an alcoholic? (1 - means 'YES' and 0 - means 'NO')

Handcap - is the patient handicapped? (1 - means 'YES' and 0 - means 'NO')

SMS_received - Did the patient receive SMS_alert? (1 - means 'YES' and 0 - means 'NO')

No-show - The patient didn't show up? ('YES' means they didn't show up and NO means they showed up)

Steps to clean the dataset

In [7]:

```
# From df.describe() above, I discovered that min age is -1(which is not a realistic numbe
# All data set that falls in to this category should be removed.
```

In [8]:
```
# Searching for data where age is less than 0

df.query('Age < 0')
```

Out[8]:

	PatientId	AppointmentID	Gender	ScheduledDay	AppointmentDay	Age	Neighbourhood	Scholarship
99832	4.659432e+14	5775010	F	2016-06-06T08:58:13Z	2016-06-06T00:00:00Z	-1	ROMÃO	0

In [9]:
```
# we have only 1 row and it shall be dropped.

df.drop(df[(df.Age < 0)].index, inplace=True)

# '.index' will help to maintain the column index
# 'inplace' will help to make the change permanent
# Therefore we now have 110526 rows and 14 columns.
```

In [10]:
```
# checking for duplicates

df.duplicated().any().sum()

# Fortunately! there are no duplicates. Hooray!
```

Out[10]:
```
0
```

In [11]:
```
# checking for null values

df.isnull().sum()

# Fortunately! there are no null values. Hooray!
```

Out[11]:
```
PatientId          0
AppointmentID      0
Gender             0
ScheduledDay       0
AppointmentDay     0
Age                0
Neighbourhood      0
Scholarship        0
Hipertension       0
Diabetes           0
Alcoholism         0
Handcap            0
SMS_received       0
No-show            0
dtype: int64
```

In [12]:
```
# Renaming all the columns to suit my typing preference.

df.columns = ['patient_id','appointment_id','gender',
              'scheduled_day','appointment_day','age','neighbourhood',
              'scholarship','hypertension','diabetes','alcoholism',
              'handicap','sms_received','no_show']
```

In [13]:
```
# cleaning out time data from the 'appointment day' column

df[['appointment_date', 'time']]=df['appointment_day'].str.split('T', 1, expand=True)
df.head(2)

# We now have 2 extra columns.... All irrelevant columns will soon be dropped.
```

Out[13]:

	patient_id	appointment_id	gender	scheduled_day	appointment_day	age	neighbourhood	scholarship	hype
0	2.987250e+13	5642903	F	2016-04-29T18:38:08Z	2016-04-29T00:00:00Z	62	JARDIM DA PENHA	0	
1	5.589978e+14	5642503	M	2016-04-29T16:08:27Z	2016-04-29T00:00:00Z	56	JARDIM DA PENHA	0	

In [14]:
```
# Converting the appointment day to DateTime datatype.

df['appointment_date']=pd.to_datetime(df['appointment_date'])
df.info()

# I wont do same to the 'Schedule day' because I deem it not so relevant to my investigati
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 110526 entries, 0 to 110526
Data columns (total 16 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   patient_id        110526 non-null  float64
 1   appointment_id    110526 non-null  int64
 2   gender            110526 non-null  object
 3   scheduled_day     110526 non-null  object
 4   appointment_day   110526 non-null  object
 5   age               110526 non-null  int64
 6   neighbourhood     110526 non-null  object
 7   scholarship       110526 non-null  int64
 8   hypertension      110526 non-null  int64
 9   diabetes          110526 non-null  int64
 10  alcoholism        110526 non-null  int64
 11  handicap          110526 non-null  int64
 12  sms_received      110526 non-null  int64
 13  no_show           110526 non-null  object
 14  appointment_date  110526 non-null  datetime64[ns]
 15  time              110526 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(8), object(6)
memory usage: 14.3+ MB
```

In [15]:
```
# Finally, I want to drop columns 'patient_id','appointment_id' and'scheduled_day'.
# I deem them to be irrelevant to my analysis.

# I wont be using the drop() function. Rather I will mask out the unwanted columns

df = df[['appointment_date','gender','age','neighbourhood','scholarship','hypertension',
         'diabetes','alcoholism','handicap','sms_received','no_show']]
df.head(2)
```

Out[15]:

	appointment_date	gender	age	neighbourhood	scholarship	hypertension	diabetes	alcoholism	handicap	sms_
0	2016-04-29	F	62	JARDIM DA PENHA	0	1	0	0	0	
1	2016-04-29	M	56	JARDIM DA PENHA	0	0	0	0	0	

In [16]:
```
df.shape
```

Out[16]:
```
(110526, 11)
```

Investigations

In this investigation, my independent variable is 'no_show', which other features will be analysed upon.

What percentage of Female missed their appointment?

To solve this, I will find out the number of female who didnt show (where 'no_show' is yes), and divide it by total number of female

In [17]:
```
# selecting all females in the data

all_F=df[df.gender=='F']
all_F.head(2)
```

Out[17]:

	appointment_date	gender	age	neighbourhood	scholarship	hypertension	diabetes	alcoholism	handicap	sms_
0	2016-04-29	F	62	JARDIM DA PENHA	0	1	0	0	0	
2	2016-04-29	F	62	MATA DA PRAIA	0	0	0	0	0	

In [18]:
```
# counting number of Female who didn't show (no-show==Yes)

noshowF=all_F[all_F.no_show=='Yes'].count()
noshowF.no_show
```

Out[18]:
```
14594
```

In [19]:
```
# counting number of female in general

count_female=df.gender.value_counts()['F']
count_female
```

Out[19]:
```
71839
```

In [20]:
```
# converting to percentage

(noshowF.no_show/count_female)*100
```

Out[20]:
```
20.314870752655242
```

What percentage of Male missed their appointment?

In [21]:
```
# selecting all males in the data

all_M=df[df.gender=='M']
all_M.head(2)
```

Out[21]:

	appointment_date	gender	age	neighbourhood	scholarship	hypertension	diabetes	alcoholism	handicap	sm

	appointment_date	gender	age	neighbourhood	scholarship	hypertension	diabetes	alcoholism	handicap	sm
1	2016-04-29	M	56	JARDIM DA PENHA	0	0	0	0	0	
11	2016-04-29	M	29	NOVA PALESTINA	0	0	0	0	0	

In [22]:
```
# counting number of male who didn't show (no-show==Yes)

noshowM=all_M[all_M.no_show=='Yes'].count()
noshowM.no_show
```

Out[22]:
```
7725
```

In [23]:
```
# counting number of female in general

count_male=df.gender.value_counts()['M']
count_male
```

Out[23]:
```
38687
```

In [24]:
```
# converting to percentage

(noshowM.no_show/count_male)*100
```

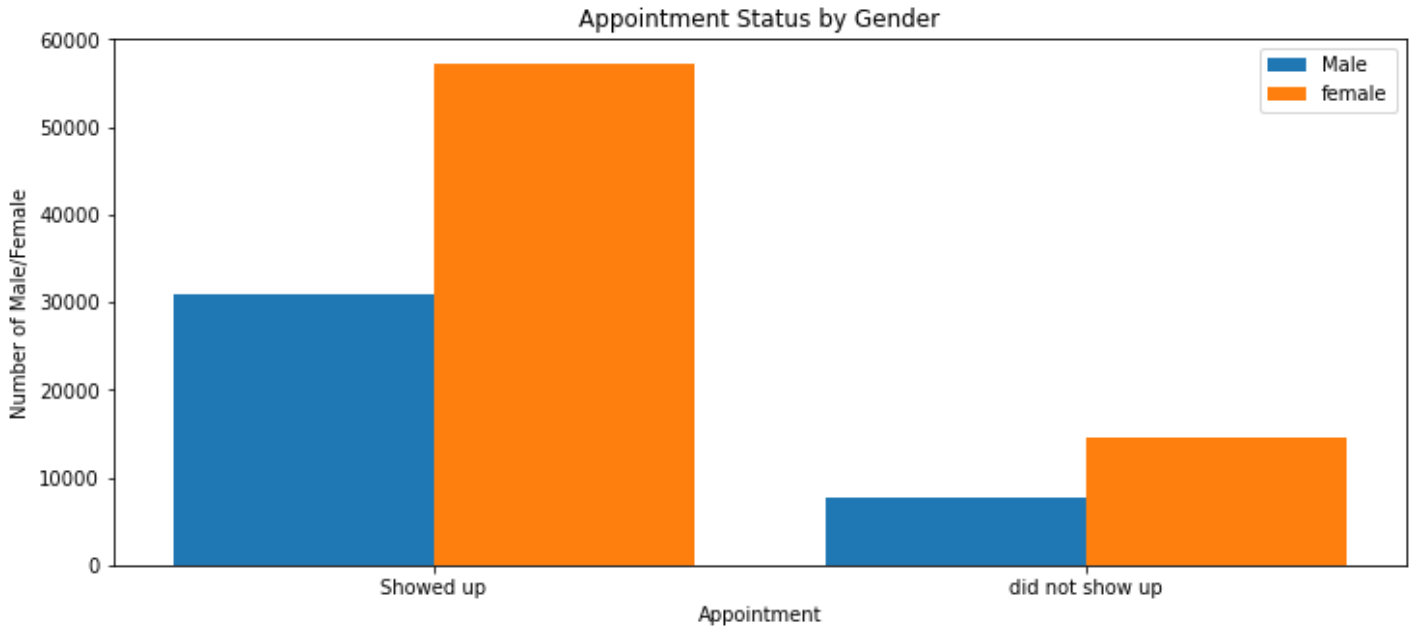
Out[24]:
```
19.967947889471915
```

Visualizing Appointment Status by Gender

In [25]:
```
male_noshow=df.gender[(df.gender=='M')&(df.no_show=='Yes')].count()
female_noshow=df.gender[(df.gender=='F')&(df.no_show=='Yes')].count()
```

In [26]:
```
male_show=df.gender[(df.gender=='M')&(df.no_show=='No')].count()
female_show=df.gender[(df.gender=='F')&(df.no_show=='No')].count()
```

In [31]:
```
width=0.4
my_locus=["Showed up", "did not show up"]
male=[male_show, male_noshow]
female=[female_show, female_noshow]

bar1=np.arange(len(my_locus))
bar2=[i+width for i in bar1]

plt.figure(figsize=(12,5))

plt.bar(my_locus,male,width,label='Male')
plt.bar(bar2,female,width,label='female')

plt.xlabel('Appointment')
plt.ylabel('Number of Male/Female')
plt.title('Appointment Status by Gender')
plt.xticks(bar1+width/2,my_locus)

plt.legend()
plt.show()
```



CONCLUSION

In [28]:
```
# In conclusion:
# Though we see that there isn't much difference in the percentage of missed appointments
# We realise from this visualization that we have more Female than Male who showed up for
# as well as more Female than Male who did not show up for their appointment.

# This is in coherence with the fact that in general, there are more Female observations t
```

In [29]:
```
# I watched about 35 youtube videos before I could understand the mechanism enough to be a
# with my dataset. I knew what I wanted to visualise but had to study more for about 2 day

# I JUST WANT TO SAY A BIG THANK YOU TO UDACITY AND ALX-T FOR THIS GREAT LEARNING EXPERIEI
# I thank me too for not giving up (lol).
```