In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df = pd.read_csv('bank%2B%2B.csv')
```

In [3]:
```
df.head()
```

Out[3]:

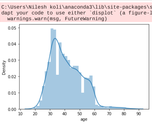
	age	job	marital	education	default	balance	housing	loan	contact	day	month	duration	campaign	pdays	previous	poutcome	y
0	30	unemployed	married	primary	no	1787	no	no	cellular	19	oct	79	1	-1	0	unknown	no
1	33	services	married	secondary	no	4789	yes	yes	cellular	11	may	220	1	339	4	failure	no
2	35	management	single	tertiary	no	1350	yes	no	cellular	16	apr	185	1	330	1	failure	no
3	30	management	married	tertiary	no	1476	yes	yes	unknown	3	jun	199	4	-1	0	unknown	no
4	59	blue-collar	married	secondary	no	0	yes	no	unknown	5	may	226	1	-1	0	unknown	no

In [4]:
```
df.shape
```

Out[4]:
```
(4521, 17)
```

In [5]:
```
sns.distplot(df['age'])
plt.show()
```

```
C:\Users\Nilesh koli\anaconda3\lib\site-packages\seaborn\distributions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please a
dapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```



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

Out[6]:

	age	balance	day	duration	campaign	pdays	previous
count	4521.000000	4521.000000	4521.000000	4521.000000	4521.000000	4521.000000	4521.000000
mean	41.170096	1422.657819	15.915284	263.961292	2.793630	39.766645	0.542579
std	10.576211	3009.638142	8.247667	259.856633	3.109807	100.121124	1.693562
min	19.000000	-3313.000000	1.000000	4.000000	1.000000	-1.000000	0.000000
25%	33.000000	69.000000	9.000000	104.000000	1.000000	-1.000000	0.000000
50%	39.000000	444.000000	16.000000	185.000000	2.000000	-1.000000	0.000000
75%	49.000000	1480.000000	21.000000	329.000000	3.000000	-1.000000	0.000000
max	87.000000	71188.000000	31.000000	3025.000000	50.000000	871.000000	25.000000

In [10]:
```
df['job'].value_counts().df.shape
```

Out[10]:
```
management       969
blue-collar      946
technician       768
admin.           478
services         417
retired          230
self-employed    183
entrepreneur     168
unemployed       128
housemaid        112
student           84
unknown           38
Name: job, dtype: int64,
 (4521, 17))
```

In [13]:
```
df['marital'].value_counts()
```

Out[13]:
```
married     2797
single      1196
divorced     528
Name: marital, dtype: int64
```

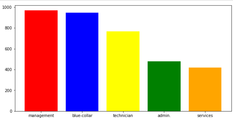
In [14]:
```
df['job'].value_counts().keys()
```

Out[14]:
```
Index(['management', 'blue-collar', 'technician', 'admin.', 'services',
       'retired', 'self-employed', 'entrepreneur', 'unemployed', 'housemaid',
       'student', 'unknown'],
      dtype='object')
```

In [15]:
```
df['job'].value_counts().values
```

Out[15]:
```
array([969, 946, 768, 478, 417, 230, 183, 168, 128, 112,  84,  38],
      dtype=int64)
```

In [26]:
```
plt.figure(figsize=(10,5))
plt.bar(list(df['job'].value_counts().keys())[0:5],list(df['job'].value_counts())[0:5],color=['red','blue','yellow','green','orange'])
plt.show()
```



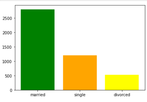
In [27]:
```
df['marital'].value_counts().keys()
```

Out[27]:
```
Index(['married', 'single', 'divorced'], dtype='object')
```

In [28]:
```
df['marital'].value_counts().values
```

Out[28]:
```
array([2797, 1196,  528], dtype=int64)
```

In [35]:
```
plt.bar(list(df['marital'].value_counts().keys()),list(df['marital'].value_counts()),color=['green','orange','yellow'])
plt.show()
```



In [36]:
```
df.head()
```

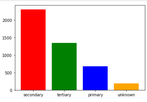
Out[36]:

	age	job	marital	education	default	balance	housing	loan	contact	day	month	duration	campaign	pdays	previous	poutcome	y
0	30	unemployed	married	primary	no	1787	no	no	cellular	19	oct	79	1	-1	0	unknown	no
1	33	services	married	secondary	no	4789	yes	yes	cellular	11	may	220	1	339	4	failure	no
2	35	management	single	tertiary	no	1350	yes	no	cellular	16	apr	185	1	330	1	failure	no
3	30	management	married	tertiary	no	1476	yes	yes	unknown	3	jun	199	4	-1	0	unknown	no
4	59	blue-collar	married	secondary	no	0	yes	no	unknown	5	may	226	1	-1	0	unknown	no

In [37]:
```
df['education'].value_counts()
```

Out[37]:
```
secondary    2306
tertiary     1350
primary       678
unknown       187
Name: education, dtype: int64
```

In [38]:
```
plt.bar(list(df['education'].value_counts().keys()),list(df['education'].value_counts()),color=['red','green','blue','orange'])
plt.show()
```



In [40]:
```
df.head()
```

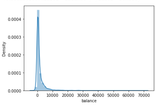
Out[40]:

	age	job	marital	education	default	balance	housing	loan	contact	day	month	duration	campaign	pdays	previous	poutcome	y
0	30	unemployed	married	primary	no	1787	no	no	cellular	19	oct	79	1	-1	0	unknown	no
1	33	services	married	secondary	no	4789	yes	yes	cellular	11	may	220	1	339	4	failure	no
2	35	management	single	tertiary	no	1350	yes	no	cellular	16	apr	185	1	330	1	failure	no
3	30	management	married	tertiary	no	1476	yes	yes	unknown	3	jun	199	4	-1	0	unknown	no
4	59	blue-collar	married	secondary	no	0	yes	no	unknown	5	may	226	1	-1	0	unknown	no

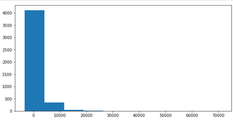
In [45]:
```
sns.distplot(df['balance'])
```

```
C:\Users\Nilesh koli\anaconda3\lib\site-packages\seaborn\distributions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please a
dapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[45]:
```
<AxesSubplot:xlabel='balance', ylabel='Density'>
```



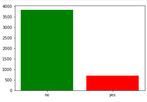
In [46]:
```
plt.figure(figsize=(10,5))
plt.hist(df['balance'])
plt.show()
```



In [48]:
```
df['loan'].value_counts().df.shape
```

Out[48]:
```
(no    3830
 yes    691
 Name: loan, dtype: int64,
 (4521, 17))
```

In [50]:
```
plt.bar(list(df['loan'].value_counts().keys()),list(df['loan'].value_counts()),color=['green','red'])
plt.show()
```



In [51]:
```
df.head()
```

Out[51]:

	age	job	marital	education	default	balance	housing	loan	contact	day	month	duration	campaign	pdays	previous	poutcome	y
0	30	unemployed	married	primary	no	1787	no	no	cellular	19	oct	79	1	-1	0	unknown	no
1	33	services	married	secondary	no	4789	yes	yes	cellular	11	may	220	1	339	4	failure	no
2	35	management	single	tertiary	no	1350	yes	no	cellular	16	apr	185	1	330	1	failure	no
3	30	management	married	tertiary	no	1476	yes	yes	unknown	3	jun	199	4	-1	0	unknown	no
4	59	blue-collar	married	secondary	no	0	yes	no	unknown	5	may	226	1	-1	0	unknown	no

In [52]:
```
x = df[['age']]
```

In [53]:
```
y = df[['balance']]
```

In [54]:
```
from sklearn.model_selection import train_test_split
```

In [55]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
```

In [56]:
```
from sklearn.ensemble import RandomForestRegressor
```

In [57]:
```
model = RandomForestRegressor()
model
```

Out[57]:
```
RandomForestRegressor()
```

In [58]:
```
model.fit(x_train,y_train)
```

```
+ipython-input-58-4719cf73997a>:1: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().
  model.fit(x_train,y_train)
```

Out[58]:
```
RandomForestRegressor()
```

In [59]:
```
y_pred = model.predict(x_test)
```

In [60]:
```
y_test.head()
```

Out[60]:

	balance
846	4366
3336	215
3039	8544
2143	4089
3462	360

In [61]:
```
y_pred[:5]
```

Out[61]:
```
array([1081.07506495, 1524.02834084, 1473.52962843, 1524.02834084,
       1289.94869541])
```

In [62]:
```
from sklearn.metrics import mean_squared_error
```

In [63]:
```
print(mean_squared_error(y_test,y_pred))
```

```
10457944.10326088
```