Data_Prepartion

July 5, 2023

```
[1]: import pandas as pd
```

```
[2]: pd.read_csv("C:\\Users\\ddaya\\OneDrive\\Documents\\Python␣
     ↪programming\\P1-OfficeSupplies.csv")
```

```
[2]:    OrderDate   Region      Rep      Item  Units  Unit Price
    0    4-Jul-14     East   Richard  Pen Set     62        4.99
    1   12-Jul-14     East      Nick   Binder     29        1.99
    2   21-Jul-14  Central    Morgan  Pen Set     55       12.49
    3   29-Jul-14     East     Susan   Binder     81       19.99
    4    7-Aug-14  Central   Matthew  Pen Set     42       23.95
    5   15-Aug-14     East   Richard   Pencil     35        4.99
    6   24-Aug-14     West     James     Desk      3      275.00
    7    1-Sep-14  Central     Smith     Desk      2      125.00
    8   10-Sep-14  Central      Bill   Pencil      7        1.29
    9   18-Sep-14     East   Richard  Pen Set     16       15.99
    10  27-Sep-14     West     James      Pen     76        1.99
    11   5-Oct-14  Central    Morgan   Binder     28        8.99
    12  14-Oct-14     West    Thomas   Binder     57       19.99
    13  22-Oct-14     East   Richard      Pen     64        8.99
    14  31-Oct-14  Central    Rachel   Pencil     14        1.29
    15   8-Nov-14     East     Susan      Pen     15       19.99
    16  17-Nov-14  Central      Alex   Binder     11        4.99
    17  25-Nov-14  Central   Matthew  Pen Set     96        4.99
    18   4-Dec-14  Central      Alex   Binder     94       19.99
    19  12-Dec-14  Central     Smith   Pencil     67        1.29
    20  21-Dec-14  Central    Rachel   Binder     28        4.99
    21  29-Dec-14     East     Susan  Pen Set     74       15.99
    22   6-Jan-15     East   Richard   Pencil     95        1.99
    23  15-Jan-15  Central      Bill   Binder     46        8.99
    24  23-Jan-15  Central   Matthew   Binder     50       19.99
    25   1-Feb-15  Central     Smith   Binder     87       15.00
    26   9-Feb-15  Central      Alex   Pencil     36        4.99
    27  18-Feb-15     East   Richard   Binder      4        4.99
    28  26-Feb-15  Central      Bill      Pen     27       19.99
    29   7-Mar-15     West     James   Binder      7       19.99
    30  15-Mar-15     West     James   Pencil     56        2.99
    31  24-Mar-15  Central      Alex  Pen Set     50        4.99
```

```
32   1-Apr-15     East  Richard   Binder    60        4.99
33  10-Apr-15  Central   Rachel   Pencil    66        1.99
34  18-Apr-15  Central   Rachel   Pencil    75        1.99
35  27-Apr-15     East     Nick      Pen    96        4.99
36   5-May-15  Central     Alex   Pencil    90        4.99
37  14-May-15  Central     Bill   Pencil    53        1.29
38  22-May-15     West   Thomas   Pencil    32        1.99
39  31-May-15  Central     Bill   Binder    80        8.99
40   8-Jun-15     East  Richard   Binder    60        8.99
41  17-Jun-15  Central  Matthew     Desk     5      125.00
42  25-Jun-15  Central   Morgan   Pencil    90        4.99
```

[3]:
```python
import os
```

[4]:
```python
print(os.getcwd()) # current working directory
```

```
C:\Users\ddaya\Documents\Practice_3
```

[5]:
```python
pd.read_csv("P1-OfficeSupplies.csv")
```

[5]:
```
    OrderDate   Region     Rep     Item  Units  Unit Price
0    4-Jul-14     East  Richard  Pen Set     62        4.99
1   12-Jul-14     East     Nick   Binder     29        1.99
2   21-Jul-14  Central   Morgan  Pen Set     55       12.49
3   29-Jul-14     East    Susan   Binder     81       19.99
4    7-Aug-14  Central  Matthew  Pen Set     42       23.95
5   15-Aug-14     East  Richard   Pencil     35        4.99
6   24-Aug-14     West    James     Desk      3      275.00
7    1-Sep-14  Central    Smith     Desk      2      125.00
8   10-Sep-14  Central     Bill   Pencil      7        1.29
9   18-Sep-14     East  Richard  Pen Set     16       15.99
10  27-Sep-14     West    James      Pen     76        1.99
11   5-Oct-14  Central   Morgan   Binder     28        8.99
12  14-Oct-14     West   Thomas   Binder     57       19.99
13  22-Oct-14     East  Richard      Pen     64        8.99
14  31-Oct-14  Central   Rachel   Pencil     14        1.29
15   8-Nov-14     East    Susan      Pen     15       19.99
16  17-Nov-14  Central     Alex   Binder     11        4.99
17  25-Nov-14  Central  Matthew  Pen Set     96        4.99
18   4-Dec-14  Central     Alex   Binder     94       19.99
19  12-Dec-14  Central    Smith   Pencil     67        1.29
20  21-Dec-14  Central   Rachel   Binder     28        4.99
21  29-Dec-14     East    Susan  Pen Set     74       15.99
22   6-Jan-15     East  Richard   Pencil     95        1.99
23  15-Jan-15  Central     Bill   Binder     46        8.99
24  23-Jan-15  Central  Matthew   Binder     50       19.99
25   1-Feb-15  Central    Smith   Binder     87       15.00
26   9-Feb-15  Central     Alex   Pencil     36        4.99
```

```
27  18-Feb-15     East  Richard   Binder     4     4.99
28  26-Feb-15  Central     Bill      Pen    27    19.99
29   7-Mar-15     West    James   Binder     7    19.99
30  15-Mar-15     West    James   Pencil    56     2.99
31  24-Mar-15  Central     Alex  Pen Set    50     4.99
32   1-Apr-15     East  Richard   Binder    60     4.99
33  10-Apr-15  Central   Rachel   Pencil    66     1.99
34  18-Apr-15  Central   Rachel   Pencil    75     1.99
35  27-Apr-15     East     Nick      Pen    96     4.99
36   5-May-15  Central     Alex   Pencil    90     4.99
37  14-May-15  Central     Bill   Pencil    53     1.29
38  22-May-15     West   Thomas   Pencil    32     1.99
39  31-May-15  Central     Bill   Binder    80     8.99
40   8-Jun-15     East  Richard   Binder    60     8.99
41  17-Jun-15  Central  Matthew     Desk     5   125.00
42  25-Jun-15  Central   Morgan   Pencil    90     4.99
```

[6]: `os.chdir("C:\\Users\\ddaya\\OneDrive\\Documents\\Python programming")`

[7]: `pd.read_csv("Movie-Ratings.csv")`

[7]:
```
                  Film      Genre  Rotten Tomatoes Ratings %  \
0    (500) Days of Summer    Comedy                       87
1          10,000 B.C.    Adventure                        9
2            12 Rounds       Action                       30
3            127 Hours    Adventure                       93
4             17 Again       Comedy                       55
..                  ...         ...                      ...
554       Your Highness      Comedy                       26
555     Youth in Revolt      Comedy                       68
556              Zodiac    Thriller                       89
557           Zombieland      Action                       90
558           Zookeeper      Comedy                       14

     Audience Ratings %  Budget (million $)  Year of release
0                    81                   8             2009
1                    44                 105             2008
2                    52                  20             2009
3                    84                  18             2010
4                    70                  20             2009
..                  ...                 ...              ...
554                  36                  50             2011
555                  52                  18             2009
556                  73                  65             2007
557                  87                  24             2009
558                  42                  80             2011
```

```
[559 rows x 6 columns]
```

```
[8]: print(os.getcwd())
```

```
C:\Users\ddaya\OneDrive\Documents\Python programming
```

```
[9]: stats2=pd.read_csv("Movie-Ratings.csv")
```

```
[10]: stats2
```

```
[10]:                      Film      Genre  Rotten Tomatoes Ratings %  \
      0      (500) Days of Summer     Comedy                         87
      1             10,000 B.C.   Adventure                          9
      2                12 Rounds     Action                         30
      3                127 Hours  Adventure                         93
      4                 17 Again     Comedy                         55
      ..                      ...        ...                        ...
      554          Your Highness     Comedy                         26
      555        Youth in Revolt     Comedy                         68
      556                 Zodiac   Thriller                         89
      557             Zombieland     Action                         90
      558             Zookeeper     Comedy                         14

           Audience Ratings %  Budget (million $)  Year of release
      0                    81                   8             2009
      1                    44                 105             2008
      2                    52                  20             2009
      3                    84                  18             2010
      4                    70                  20             2009
      ..                  ...                 ...              ...
      554                  36                  50             2011
      555                  52                  18             2009
      556                  73                  65             2007
      557                  87                  24             2009
      558                  42                  80             2011

      [559 rows x 6 columns]
```

```
[11]: stats=pd.read_csv("P1-UK-Bank-Customers.csv")
```

```
[12]: stats
```

```
[12]:      Customer ID      Name   Surname  Gender  Age            Region  \
      0      100000001     Simon     Walsh    Male   21           England
      1      400000002   Jasmine    Miller  Female   34  Northern Ireland
      2      100000003      Liam     Brown    Male   46           England
      3      300000004    Trevor      Parr    Male   32             Wales
      4      100000005   Deirdre   Pullman  Female   38           England
```

```
…          …          …          …          …   …                     …
4009    200004010       Sam      Lewis       Male    64           Scotland
4010    200004011     Keith     Hughes       Male    52           Scotland
4011    200004012    Hannah   Springer     Female    50           Scotland
4012    200004013  Christian       Reid       Male    51           Scotland
4013    300004014   Stephen        May       Male    33              Wales

     Job Classification Date Joined     Balance
0           White Collar    05.Jan.15  113810.15
1            Blue Collar    06.Jan.15   36919.73
2           White Collar    07.Jan.15  101536.83
3           White Collar    08.Jan.15    1421.52
4            Blue Collar    09.Jan.15   35639.79
…                     …            …          …
4009               Other    30.Dec.15   19711.66
4010         Blue Collar    30.Dec.15   56069.72
4011               Other    30.Dec.15   59477.82
4012         Blue Collar    30.Dec.15     239.45
4013         Blue Collar    30.Dec.15   30293.19

[4014 rows x 9 columns]
```

```
[13]: len(stats)
```

```
[13]: 4014
```

```
[14]: stats.columns
```

```
[14]: Index(['Customer ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
             'Job Classification', 'Date Joined', 'Balance'],
            dtype='object')
```

```
[15]: len(stats.columns)
```

```
[15]: 9
```

```
[16]: stats.head()
```

```
[16]:    Customer ID     Name  Surname  Gender  Age              Region  \
0      100000001    Simon    Walsh    Male   21             England
1      400000002  Jasmine   Miller  Female   34    Northern Ireland
2      100000003     Liam    Brown    Male   46             England
3      300000004   Trevor     Parr    Male   32               Wales
4      100000005  Deirdre  Pullman  Female   38             England

     Job Classification Date Joined     Balance
0           White Collar    05.Jan.15  113810.15
1            Blue Collar    06.Jan.15   36919.73
```

```
2        White Collar   07.Jan.15   101536.83
3        White Collar   08.Jan.15     1421.52
4         Blue Collar   09.Jan.15    35639.79
```

[17]: `stats.tail()`

[17]:
```
      Customer ID       Name   Surname  Gender  Age    Region  \
4009    200004010        Sam     Lewis    Male   64  Scotland
4010    200004011      Keith    Hughes    Male   52  Scotland
4011    200004012     Hannah  Springer  Female   50  Scotland
4012    200004013  Christian      Reid    Male   51  Scotland
4013    300004014    Stephen       May    Male   33     Wales

     Job Classification Date Joined   Balance
4009              Other    30.Dec.15  19711.66
4010        Blue Collar    30.Dec.15  56069.72
4011              Other    30.Dec.15  59477.82
4012        Blue Collar    30.Dec.15    239.45
4013        Blue Collar    30.Dec.15  30293.19
```

[18]: `stats.head(6)`

[18]:
```
   Customer ID      Name  Surname  Gender  Age            Region  \
0    100000001     Simon    Walsh    Male   21           England
1    400000002   Jasmine   Miller  Female   34  Northern Ireland
2    100000003      Liam    Brown    Male   46           England
3    300000004    Trevor     Parr    Male   32             Wales
4    100000005   Deirdre  Pullman  Female   38           England
5    300000006       Ava  Coleman  Female   30             Wales

  Job Classification Date Joined    Balance
0        White Collar   05.Jan.15  113810.15
1         Blue Collar   06.Jan.15   36919.73
2        White Collar   07.Jan.15  101536.83
3        White Collar   08.Jan.15    1421.52
4         Blue Collar   09.Jan.15   35639.79
5         Blue Collar   09.Jan.15  122443.77
```

[19]: `print(stats.columns)`

```
Index(['Customer ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
       'Job Classification', 'Date Joined', 'Balance'],
      dtype='object')
```

[20]: `stats.tail(6)`

[20]:
```
      Customer ID    Name  Surname  Gender  Age    Region  \
4008    200004009  Alison    Quinn  Female   64  Scotland
```

```
4009    200004010      Sam     Lewis     Male  64  Scotland
4010    200004011    Keith    Hughes     Male  52  Scotland
4011    200004012   Hannah  Springer   Female  50  Scotland
4012    200004013 Christian     Reid     Male  51  Scotland
4013    300004014  Stephen      May     Male  33     Wales

     Job Classification Date Joined   Balance
4008              Other    30.Dec.15  73503.90
4009              Other    30.Dec.15  19711.66
4010        Blue Collar    30.Dec.15  56069.72
4011              Other    30.Dec.15  59477.82
4012        Blue Collar    30.Dec.15    239.45
4013        Blue Collar    30.Dec.15  30293.19
```

[21]: `stats.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4014 entries, 0 to 4013
Data columns (total 9 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Customer ID         4014 non-null   int64
 1   Name                4014 non-null   object
 2   Surname             4014 non-null   object
 3   Gender              4014 non-null   object
 4   Age                 4014 non-null   int64
 5   Region              4014 non-null   object
 6   Job Classification  4014 non-null   object
 7   Date Joined         4014 non-null   object
 8   Balance             4014 non-null   float64
dtypes: float64(1), int64(2), object(6)
memory usage: 282.4+ KB
```

[22]: `stats.describe()`

[22]:
	Customer ID	Age	Balance
count	4.014000e+03	4014.000000	4014.000000
mean	1.696831e+08	38.611111	39766.448274
std	8.865374e+07	9.819121	29859.489192
min	1.000000e+08	15.000000	11.520000
25%	1.000020e+08	31.000000	16115.367500
50%	1.000038e+08	37.000000	33567.330000
75%	2.000031e+08	45.000000	57533.930000
max	4.000038e+08	64.000000	183467.700000

[23]: `stats.describe().transpose()`

```
[23]:              count          mean           std           min           25%  \
     Customer ID  4014.0  1.696831e+08  8.865374e+07  1.000000e+08  1.000020e+08
     Age          4014.0  3.861111e+01  9.819121e+00  1.500000e+01  3.100000e+01
     Balance      4014.0  3.976645e+04  2.985949e+04  1.152000e+01  1.611537e+04

                           50%           75%           max
     Customer ID  1.000038e+08  2.000031e+08  400003848.0
     Age          3.700000e+01  4.500000e+01         64.0
     Balance      3.356733e+04  5.753393e+04      183467.7
```

```
[24]: stats.columns
```

```
[24]: Index(['Customer ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
             'Job Classification', 'Date Joined', 'Balance'],
            dtype='object')
```

```
[25]: stats.columns=['Customer_ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
             'Job_Classification', 'Date_Joined', 'Balance']
```

```
[26]: stats
```

```
[26]:       Customer_ID       Name   Surname  Gender  Age             Region  \
     0       100000001      Simon     Walsh    Male   21            England
     1       400000002    Jasmine    Miller  Female   34   Northern Ireland
     2       100000003       Liam     Brown    Male   46            England
     3       300000004     Trevor      Parr    Male   32              Wales
     4       100000005    Deirdre   Pullman  Female   38            England
     ...           ...        ...       ...     ...  ...                ...
     4009    200004010        Sam     Lewis    Male   64           Scotland
     4010    200004011      Keith    Hughes    Male   52           Scotland
     4011    200004012     Hannah  Springer  Female   50           Scotland
     4012    200004013  Christian      Reid    Male   51           Scotland
     4013    300004014    Stephen       May    Male   33              Wales

          Job_Classification Date_Joined    Balance
     0           White Collar   05.Jan.15  113810.15
     1            Blue Collar   06.Jan.15   36919.73
     2           White Collar   07.Jan.15  101536.83
     3           White Collar   08.Jan.15    1421.52
     4            Blue Collar   09.Jan.15   35639.79
     ...                  ...         ...        ...
     4009               Other   30.Dec.15   19711.66
     4010         Blue Collar   30.Dec.15   56069.72
     4011               Other   30.Dec.15   59477.82
     4012         Blue Collar   30.Dec.15     239.45
     4013         Blue Collar   30.Dec.15   30293.19
```

```
[4014 rows x 9 columns]
```

[27]: `stats[20:30]`

[27]:
```
    Customer_ID      Name    Surname  Gender  Age            Region  \
20    300000021     Boris   Johnston    Male   37              Wales
21    200000022     Jason     Butler    Male   58           Scotland
22    300000023   Deirdre   McDonald  Female   41              Wales
23    200000024      Carl      Quinn    Male   52           Scotland
24    100000025  Jennifer     Hughes  Female   38            England
25    200000026   Richard     Fraser    Male   55           Scotland
26    400000027    Rachel     McGrath  Female   37  Northern Ireland
27    100000028    Alison     Fisher  Female   33            England
28    200000029     Lucas  Mackenzie    Male   50           Scotland
29    100000030      Luke    Wilkins    Male   42            England

   Job_Classification Date_Joined   Balance
20               Other   16.Jan.15  31778.90
21         Blue Collar   18.Jan.15  21252.97
22        White Collar   18.Jan.15  66785.78
23         Blue Collar   19.Jan.15   6580.81
24        White Collar   20.Jan.15  20505.32
25         Blue Collar   21.Jan.15  43249.26
26        White Collar   23.Jan.15   3967.20
27        White Collar   25.Jan.15   3428.56
28         Blue Collar   25.Jan.15  20516.10
29        White Collar   27.Jan.15  10813.83
```

[28]: `stats[110:120]`

[28]:
```
     Customer_ID     Name    Surname  Gender  Age            Region  \
110    300000111    Sonia  Robertson  Female   25              Wales
111    300000112   Nathan   Paterson    Male   26              Wales
112    400000113      Tim   Hardacre    Male   29  Northern Ireland
113    400000114    Fiona      Mills  Female   18  Northern Ireland
114    400000115     Ruth     Oliver  Female   43  Northern Ireland
115    100000116   Alison   Johnston  Female   36            England
116    100000117      Amy    McGrath  Female   40            England
117    200000118     Adam    McGrath    Male   52           Scotland
118    100000119  Vanessa      Lyman  Female   18            England
119    100000120   Andrea    Dickens  Female   31            England

    Job_Classification Date_Joined   Balance
110               Other   16.Mar.15  70799.64
111        White Collar   16.Mar.15  20627.65
112        White Collar   16.Mar.15  82229.52
113               Other   16.Mar.15  51171.29
```

```
114           Blue Collar   16.Mar.15    37889.38
115                Other   19.Mar.15    21806.30
116                Other   25.Mar.15    12415.50
117                Other   28.Mar.15    67682.92
118          White Collar   31.Mar.15    33524.41
119          White Collar   31.Mar.15   136370.38
```

[29]: `stats[4010:]`

[29]:
```
       Customer_ID       Name    Surname   Gender   Age      Region  \
4010    200004011      Keith     Hughes     Male    52    Scotland
4011    200004012     Hannah   Springer   Female    50    Scotland
4012    200004013  Christian       Reid     Male    51    Scotland
4013    300004014    Stephen        May     Male    33       Wales

      Job_Classification Date_Joined   Balance
4010         Blue Collar   30.Dec.15  56069.72
4011              Other   30.Dec.15  59477.82
4012         Blue Collar   30.Dec.15    239.45
4013         Blue Collar   30.Dec.15  30293.19
```

[30]: `stats[:6]`

[30]:
```
    Customer_ID      Name   Surname   Gender   Age              Region  \
0    100000001     Simon     Walsh     Male    21             England
1    400000002   Jasmine    Miller   Female    34    Northern Ireland
2    100000003      Liam     Brown     Male    46             England
3    300000004    Trevor      Parr     Male    32               Wales
4    100000005   Deirdre   Pullman   Female    38             England
5    300000006       Ava   Coleman   Female    30               Wales

   Job_Classification Date_Joined    Balance
0         White Collar   05.Jan.15  113810.15
1          Blue Collar   06.Jan.15   36919.73
2         White Collar   07.Jan.15  101536.83
3         White Collar   08.Jan.15    1421.52
4          Blue Collar   09.Jan.15   35639.79
5          Blue Collar   09.Jan.15  122443.77
```

[31]: `stats[::-1]`

[31]:
```
       Customer_ID       Name    Surname   Gender   Age         Region  \
4013    300004014    Stephen        May     Male    33          Wales
4012    200004013  Christian       Reid     Male    51       Scotland
4011    200004012     Hannah   Springer   Female    50       Scotland
4010    200004011      Keith     Hughes     Male    52       Scotland
4009    200004010        Sam      Lewis     Male    64       Scotland
```

```
   ...          ...        ...      ...       ...  ...                ...
4       100000005    Deirdre  Pullman   Female  38           England
3       300000004     Trevor     Parr     Male  32             Wales
2       100000003       Liam    Brown     Male  46           England
1       400000002    Jasmine   Miller   Female  34  Northern Ireland
0       100000001      Simon    Walsh     Male  21           England

      Job_Classification Date_Joined    Balance
4013          Blue Collar   30.Dec.15   30293.19
4012          Blue Collar   30.Dec.15     239.45
4011                Other   30.Dec.15   59477.82
4010          Blue Collar   30.Dec.15   56069.72
4009                Other   30.Dec.15   19711.66
...                  ...         ...        ...
4             Blue Collar   09.Jan.15   35639.79
3            White Collar   08.Jan.15    1421.52
2            White Collar   07.Jan.15  101536.83
1             Blue Collar   06.Jan.15   36919.73
0            White Collar   05.Jan.15  113810.15

[4014 rows x 9 columns]
```

`[32]:` `stats[130:120:-1]`

```
[32]:       Customer_ID     Name    Surname  Gender  Age   Region  \
130        100000131     Anna     Wright  Female   41  England
129        100000130   Alison    MacLeod  Female   27  England
128        100000129    Peter    Pullman    Male   47  England
127        100000128  Virginia     Berry  Female   41  England
126        100000127     Emma     Fraser  Female   27  England
125        100000126  Benjamin     Blake    Male   42  England
124        100000125  Jonathan  MacDonald    Male   27  England
123        100000124      John      Black    Male   39  England
122        100000123     Harry      Short    Male   50  England
121        100000122    Jacob      Payne    Male   25  England

      Job_Classification Date_Joined    Balance
130          White Collar   01.Apr.15   27557.08
129          White Collar   01.Apr.15   27738.77
128          White Collar   01.Apr.15   15093.04
127          White Collar   01.Apr.15    4347.79
126          White Collar   01.Apr.15   10481.48
125          White Collar   01.Apr.15   55661.50
124          White Collar   01.Apr.15   12312.49
123                Other   01.Apr.15  111149.47
122          White Collar   31.Mar.15   43234.21
121                Other   31.Mar.15    3738.10
```

```
[33]: stats[::20]
```

```
[33]:       Customer_ID       Name     Surname  Gender  Age       Region  \
      0       100000001      Simon       Walsh    Male   21      England
      20      300000021      Boris    Johnston    Male   37        Wales
      40      100000041     Edward       Terry    Male   27      England
      60      100000061      Kylie      Howard  Female   35      England
      80      100000081       Joan    Buckland  Female   36      England
      ...           ...        ...         ...     ...  ...          ...
      3920    100003921      Isaac    Buckland    Male   37      England
      3940    200003941     Joshua  Sutherland    Male   59     Scotland
      3960    100003961    Leonard       Grant    Male   48      England
      3980    200003981  Elizabeth       James  Female   43     Scotland
      4000    300004001  Gabrielle      Duncan  Female   34        Wales

           Job_Classification Date_Joined     Balance
      0           White Collar   05.Jan.15   113810.15
      20                 Other   16.Jan.15    31778.90
      40           Blue Collar   01.Feb.15    51412.60
      60          White Collar   12.Feb.15     4586.23
      80          White Collar   16.Mar.15    59935.75
      ...                  ...         ...         ...
      3920        White Collar   24.Dec.15    35743.13
      3940               Other   25.Dec.15     2114.65
      3960               Other   27.Dec.15    72061.71
      3980               Other   28.Dec.15    19695.66
      4000        White Collar   29.Dec.15    92083.79

      [201 rows x 9 columns]
```

```
[34]: stats.columns
```

```
[34]: Index(['Customer_ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
             'Job_Classification', 'Date_Joined', 'Balance'],
            dtype='object')
```

```
[35]: stats.head()
```

```
[35]:    Customer_ID     Name  Surname  Gender  Age            Region  \
      0    100000001    Simon    Walsh    Male   21           England
      1    400000002  Jasmine   Miller  Female   34  Northern Ireland
      2    100000003     Liam    Brown    Male   46           England
      3    300000004   Trevor     Parr    Male   32             Wales
      4    100000005  Deirdre  Pullman  Female   38           England

        Job_Classification Date_Joined     Balance
      0        White Collar   05.Jan.15   113810.15
```

```
1        Blue Collar    06.Jan.15    36919.73
2       White Collar    07.Jan.15   101536.83
3       White Collar    08.Jan.15     1421.52
4        Blue Collar    09.Jan.15    35639.79
```

[36]: `stats['Name']`

[36]:
```
0            Simon
1          Jasmine
2             Liam
3           Trevor
4          Deirdre
             …
4009           Sam
4010         Keith
4011        Hannah
4012     Christian
4013       Stephen
Name: Name, Length: 4014, dtype: object
```

[37]: `stats['Name'].head()`

[37]:
```
0       Simon
1     Jasmine
2        Liam
3      Trevor
4     Deirdre
Name: Name, dtype: object
```

[38]: `stats[['Name','Surname']].head()`

[38]:
```
       Name   Surname
0     Simon     Walsh
1   Jasmine    Miller
2      Liam     Brown
3    Trevor      Parr
4   Deirdre   Pullman
```

[39]: `stats.Name.head()`

[39]:
```
0       Simon
1     Jasmine
2        Liam
3      Trevor
4     Deirdre
Name: Name, dtype: object
```

[40]: `stats.head().Name`

```
[40]:  0       Simon
       1     Jasmine
       2        Liam
       3      Trevor
       4     Deirdre
       Name: Name, dtype: object
```

```
[41]:  stats[10:21][['Name','Surname']]
```

```
[41]:         Name     Surname
       10    Dominic      Lewis
       11   Benjamin      Grant
       12       Ryan  MacDonald
       13     Thomas   Lawrence
       14  Madeleine   Marshall
       15   Nicholas     Newman
       16      Grace       Hill
       17   Samantha    Coleman
       18    William       Ince
       19     Audrey      Jones
       20      Boris   Johnston
```

```
[42]:  stats[['Name','Surname']][10:21]
```

```
[42]:         Name     Surname
       10    Dominic      Lewis
       11   Benjamin      Grant
       12       Ryan  MacDonald
       13     Thomas   Lawrence
       14  Madeleine   Marshall
       15   Nicholas     Newman
       16      Grace       Hill
       17   Samantha    Coleman
       18    William       Ince
       19     Audrey      Jones
       20      Boris   Johnston
```

```
[43]:  df=stats[['Name','Surname']]
       df[2:10]
```

```
[43]:       Name    Surname
       2     Liam      Brown
       3   Trevor       Parr
       4  Deirdre    Pullman
       5      Ava    Coleman
       6  Dorothy    Thomson
       7     Lisa       Knox
       8     Ruth   Campbell
```

```
9  Dominic      Parr
```

[44]: `Result=stats['Balance*2']=stats.Balance*2`

[45]: `Result`

[45]:
```
0       227620.30
1        73839.46
2       203073.66
3         2843.04
4        71279.58
          ...
4009     39423.32
4010    112139.44
4011    118955.64
4012       478.90
4013     60586.38
Name: Balance, Length: 4014, dtype: float64
```

[46]: `stats`

[46]:

	Customer_ID	Name	Surname	Gender	Age	Region
0	100000001	Simon	Walsh	Male	21	England
1	400000002	Jasmine	Miller	Female	34	Northern Ireland
2	100000003	Liam	Brown	Male	46	England
3	300000004	Trevor	Parr	Male	32	Wales
4	100000005	Deirdre	Pullman	Female	38	England
...	...	...	...	...	...	...
4009	200004010	Sam	Lewis	Male	64	Scotland
4010	200004011	Keith	Hughes	Male	52	Scotland
4011	200004012	Hannah	Springer	Female	50	Scotland
4012	200004013	Christian	Reid	Male	51	Scotland
4013	300004014	Stephen	May	Male	33	Wales

	Job_Classification	Date_Joined	Balance	Balance*2
0	White Collar	05.Jan.15	113810.15	227620.30
1	Blue Collar	06.Jan.15	36919.73	73839.46
2	White Collar	07.Jan.15	101536.83	203073.66
3	White Collar	08.Jan.15	1421.52	2843.04
4	Blue Collar	09.Jan.15	35639.79	71279.58
...	...	...	...	...
4009	Other	30.Dec.15	19711.66	39423.32
4010	Blue Collar	30.Dec.15	56069.72	112139.44
4011	Other	30.Dec.15	59477.82	118955.64
4012	Blue Collar	30.Dec.15	239.45	478.90
4013	Blue Collar	30.Dec.15	30293.19	60586.38

```
[4014 rows x 10 columns]
```

[47]: `stats['Balance*2']=stats.Balance*2`

[48]: `stats`

[48]:
```
      Customer_ID       Name   Surname  Gender  Age            Region  \
0       100000001      Simon     Walsh    Male   21           England
1       400000002    Jasmine    Miller  Female   34  Northern Ireland
2       100000003       Liam     Brown    Male   46           England
3       300000004     Trevor      Parr    Male   32             Wales
4       100000005    Deirdre   Pullman  Female   38           England
...           ...        ...       ...     ...  ...               ...
4009    200004010        Sam     Lewis    Male   64          Scotland
4010    200004011      Keith    Hughes    Male   52          Scotland
4011    200004012     Hannah  Springer  Female   50          Scotland
4012    200004013  Christian      Reid    Male   51          Scotland
4013    300004014    Stephen       May    Male   33             Wales

     Job_Classification Date_Joined     Balance   Balance*2
0          White Collar   05.Jan.15   113810.15   227620.30
1           Blue Collar   06.Jan.15    36919.73    73839.46
2          White Collar   07.Jan.15   101536.83   203073.66
3          White Collar   08.Jan.15     1421.52     2843.04
4           Blue Collar   09.Jan.15    35639.79    71279.58
...                 ...         ...         ...         ...
4009              Other   30.Dec.15    19711.66    39423.32
4010        Blue Collar   30.Dec.15    56069.72   112139.44
4011              Other   30.Dec.15    59477.82   118955.64
4012        Blue Collar   30.Dec.15      239.45      478.90
4013        Blue Collar   30.Dec.15    30293.19    60586.38

[4014 rows x 10 columns]
```

[49]: `stats.head()`

[49]:
```
   Customer_ID     Name  Surname  Gender  Age            Region  \
0    100000001    Simon    Walsh    Male   21           England
1    400000002  Jasmine   Miller  Female   34  Northern Ireland
2    100000003     Liam    Brown    Male   46           England
3    300000004   Trevor     Parr    Male   32             Wales
4    100000005  Deirdre  Pullman  Female   38           England

  Job_Classification Date_Joined     Balance   Balance*2
0       White Collar   05.Jan.15   113810.15   227620.30
1        Blue Collar   06.Jan.15    36919.73    73839.46
2       White Collar   07.Jan.15   101536.83   203073.66
```

```
3         White Collar    08.Jan.15    1421.52     2843.04
4         Blue Collar     09.Jan.15   35639.79    71279.58
```

[50]: `stats['Balance*3']=stats.Balance*3`

[51]: `stats`

[51]:
```
      Customer_ID      Name   Surname  Gender  Age            Region  \
0       100000001     Simon     Walsh    Male   21           England
1       400000002   Jasmine    Miller  Female   34  Northern Ireland
2       100000003      Liam     Brown    Male   46           England
3       300000004    Trevor      Parr    Male   32             Wales
4       100000005   Deirdre   Pullman  Female   38           England
...           ...       ...       ...     ...  ...               ...
4009    200004010       Sam     Lewis    Male   64          Scotland
4010    200004011     Keith    Hughes    Male   52          Scotland
4011    200004012    Hannah  Springer  Female   50          Scotland
4012    200004013  Christian     Reid    Male   51          Scotland
4013    300004014   Stephen       May    Male   33             Wales

     Job_Classification Date_Joined     Balance    Balance*2   Balance*3
0          White Collar   05.Jan.15  113810.15   227620.30   341430.45
1           Blue Collar   06.Jan.15   36919.73    73839.46   110759.19
2          White Collar   07.Jan.15  101536.83   203073.66   304610.49
3          White Collar   08.Jan.15    1421.52     2843.04     4264.56
4           Blue Collar   09.Jan.15   35639.79    71279.58   106919.37
...                 ...         ...        ...          ...         ...
4009              Other   30.Dec.15   19711.66    39423.32    59134.98
4010        Blue Collar   30.Dec.15   56069.72   112139.44   168209.16
4011              Other   30.Dec.15   59477.82   118955.64   178433.46
4012        Blue Collar   30.Dec.15     239.45      478.90      718.35
4013        Blue Collar   30.Dec.15   30293.19    60586.38    90879.57

[4014 rows x 11 columns]
```

[52]: `stats.drop('Balance*3',1)`

[52]:
```
      Customer_ID     Name   Surname  Gender  Age            Region  \
0       100000001    Simon     Walsh    Male   21           England
1       400000002  Jasmine    Miller  Female   34  Northern Ireland
2       100000003     Liam     Brown    Male   46           England
3       300000004   Trevor      Parr    Male   32             Wales
4       100000005  Deirdre   Pullman  Female   38           England
...           ...      ...       ...     ...  ...               ...
4009    200004010      Sam     Lewis    Male   64          Scotland
4010    200004011    Keith    Hughes    Male   52          Scotland
4011    200004012   Hannah  Springer  Female   50          Scotland
```

```
4012    200004013   Christian      Reid    Male    51           Scotland
4013    300004014    Stephen        May    Male    33               Wales


        Job_Classification Date_Joined    Balance   Balance*2
0              White Collar   05.Jan.15  113810.15   227620.30
1               Blue Collar   06.Jan.15   36919.73    73839.46
2              White Collar   07.Jan.15  101536.83   203073.66
3              White Collar   08.Jan.15    1421.52     2843.04
4               Blue Collar   09.Jan.15   35639.79    71279.58
...                     ...         ...        ...         ...
4009                  Other   30.Dec.15   19711.66    39423.32
4010            Blue Collar   30.Dec.15   56069.72   112139.44
4011                  Other   30.Dec.15   59477.82   118955.64
4012            Blue Collar   30.Dec.15     239.45      478.90
4013            Blue Collar   30.Dec.15   30293.19    60586.38

[4014 rows x 10 columns]
```

[53]: `stats.drop('Balance*2',1)`

[53]:
```
        Customer_ID      Name   Surname  Gender  Age              Region  \
0        100000001     Simon     Walsh    Male   21             England
1        400000002   Jasmine    Miller  Female   34   Northern Ireland
2        100000003      Liam     Brown    Male   46             England
3        300000004    Trevor      Parr    Male   32               Wales
4        100000005   Deirdre   Pullman  Female   38             England
...            ...       ...       ...     ...  ...                ...
4009     200004010       Sam     Lewis    Male   64             Scotland
4010     200004011     Keith    Hughes    Male   52             Scotland
4011     200004012    Hannah  Springer  Female   50             Scotland
4012     200004013 Christian      Reid    Male   51             Scotland
4013     300004014   Stephen       May    Male   33                Wales


        Job_Classification Date_Joined    Balance   Balance*3
0              White Collar   05.Jan.15  113810.15   341430.45
1               Blue Collar   06.Jan.15   36919.73   110759.19
2              White Collar   07.Jan.15  101536.83   304610.49
3              White Collar   08.Jan.15    1421.52     4264.56
4               Blue Collar   09.Jan.15   35639.79   106919.37
...                     ...         ...        ...         ...
4009                  Other   30.Dec.15   19711.66    59134.98
4010            Blue Collar   30.Dec.15   56069.72   168209.16
4011                  Other   30.Dec.15   59477.82   178433.46
4012            Blue Collar   30.Dec.15     239.45      718.35
4013            Blue Collar   30.Dec.15   30293.19    90879.57

[4014 rows x 10 columns]
```

```
[54]: stats
```

```
[54]:       Customer_ID      Name   Surname  Gender  Age              Region  \
      0       100000001     Simon     Walsh    Male   21             England
      1       400000002   Jasmine    Miller  Female   34   Northern Ireland
      2       100000003      Liam     Brown    Male   46             England
      3       300000004    Trevor      Parr    Male   32               Wales
      4       100000005   Deirdre   Pullman  Female   38             England
      ...           ...       ...       ...     ...  ...                 ...
      4009    200004010       Sam     Lewis    Male   64            Scotland
      4010    200004011     Keith    Hughes    Male   52            Scotland
      4011    200004012    Hannah  Springer  Female   50            Scotland
      4012    200004013 Christian      Reid    Male   51            Scotland
      4013    300004014   Stephen       May    Male   33               Wales

           Job_Classification Date_Joined     Balance    Balance*2  Balance*3
      0         White Collar    05.Jan.15   113810.15   227620.30  341430.45
      1          Blue Collar    06.Jan.15    36919.73    73839.46  110759.19
      2         White Collar    07.Jan.15   101536.83   203073.66  304610.49
      3         White Collar    08.Jan.15     1421.52     2843.04    4264.56
      4          Blue Collar    09.Jan.15    35639.79    71279.58  106919.37
      ...                ...          ...         ...         ...        ...
      4009             Other    30.Dec.15    19711.66    39423.32   59134.98
      4010       Blue Collar    30.Dec.15    56069.72   112139.44  168209.16
      4011             Other    30.Dec.15    59477.82   118955.64  178433.46
      4012       Blue Collar    30.Dec.15      239.45      478.90     718.35
      4013       Blue Collar    30.Dec.15    30293.19    60586.38   90879.57

      [4014 rows x 11 columns]
```

```
[55]: stats=stats.drop('Balance*3',1)
```

```
[56]: stats
```

```
[56]:       Customer_ID      Name   Surname  Gender  Age              Region  \
      0       100000001     Simon     Walsh    Male   21             England
      1       400000002   Jasmine    Miller  Female   34   Northern Ireland
      2       100000003      Liam     Brown    Male   46             England
      3       300000004    Trevor      Parr    Male   32               Wales
      4       100000005   Deirdre   Pullman  Female   38             England
      ...           ...       ...       ...     ...  ...                 ...
      4009    200004010       Sam     Lewis    Male   64            Scotland
      4010    200004011     Keith    Hughes    Male   52            Scotland
      4011    200004012    Hannah  Springer  Female   50            Scotland
      4012    200004013 Christian      Reid    Male   51            Scotland
      4013    300004014   Stephen       May    Male   33               Wales
```

```
      Job_Classification Date_Joined      Balance   Balance*2
0           White Collar    05.Jan.15   113810.15   227620.30
1            Blue Collar    06.Jan.15    36919.73    73839.46
2           White Collar    07.Jan.15   101536.83   203073.66
3           White Collar    08.Jan.15     1421.52     2843.04
4            Blue Collar    09.Jan.15    35639.79    71279.58
...                  ...          ...          ...         ...
4009               Other    30.Dec.15    19711.66    39423.32
4010         Blue Collar    30.Dec.15    56069.72   112139.44
4011               Other    30.Dec.15    59477.82   118955.64
4012         Blue Collar    30.Dec.15      239.45      478.90
4013         Blue Collar    30.Dec.15    30293.19    60586.38

[4014 rows x 10 columns]
```

[57]: `stats=stats.drop('Balance*2',1)`

[58]: `stats`

[58]:
```
      Customer_ID       Name   Surname  Gender  Age            Region  \
0       100000001      Simon     Walsh    Male   21           England
1       400000002    Jasmine    Miller  Female   34  Northern Ireland
2       100000003       Liam     Brown    Male   46           England
3       300000004     Trevor      Parr    Male   32             Wales
4       100000005    Deirdre   Pullman  Female   38           England
...           ...        ...       ...     ...  ...               ...
4009    200004010        Sam     Lewis    Male   64          Scotland
4010    200004011      Keith    Hughes    Male   52          Scotland
4011    200004012     Hannah  Springer  Female   50          Scotland
4012    200004013  Christian      Reid    Male   51          Scotland
4013    300004014    Stephen       May    Male   33             Wales

      Job_Classification Date_Joined      Balance
0           White Collar    05.Jan.15   113810.15
1            Blue Collar    06.Jan.15    36919.73
2           White Collar    07.Jan.15   101536.83
3           White Collar    08.Jan.15     1421.52
4            Blue Collar    09.Jan.15    35639.79
...                  ...          ...          ...
4009               Other    30.Dec.15    19711.66
4010         Blue Collar    30.Dec.15    56069.72
4011               Other    30.Dec.15    59477.82
4012         Blue Collar    30.Dec.15      239.45
4013         Blue Collar    30.Dec.15    30293.19

[4014 rows x 9 columns]
```

```
[59]: stats
```

```
[59]:       Customer_ID       Name   Surname  Gender  Age              Region  \
      0       100000001      Simon     Walsh    Male   21             England
      1       400000002    Jasmine    Miller  Female   34    Northern Ireland
      2       100000003       Liam     Brown    Male   46             England
      3       300000004     Trevor      Parr    Male   32               Wales
      4       100000005    Deirdre   Pullman  Female   38             England
      ...           ...        ...       ...     ...  ...                 ...
      4009    200004010        Sam     Lewis    Male   64            Scotland
      4010    200004011      Keith    Hughes    Male   52            Scotland
      4011    200004012     Hannah  Springer  Female   50            Scotland
      4012    200004013  Christian      Reid    Male   51            Scotland
      4013    300004014    Stephen       May    Male   33               Wales

           Job_Classification Date_Joined     Balance
      0          White Collar   05.Jan.15   113810.15
      1           Blue Collar   06.Jan.15    36919.73
      2          White Collar   07.Jan.15   101536.83
      3          White Collar   08.Jan.15     1421.52
      4           Blue Collar   09.Jan.15    35639.79
      ...                 ...         ...         ...
      4009              Other   30.Dec.15    19711.66
      4010        Blue Collar   30.Dec.15    56069.72
      4011              Other   30.Dec.15    59477.82
      4012        Blue Collar   30.Dec.15      239.45
      4013        Blue Collar   30.Dec.15    30293.19

      [4014 rows x 9 columns]
```

```
[60]: filter=stats.Age>63
```

```
[61]: filter
```

```
[61]: 0       False
      1       False
      2       False
      3       False
      4       False
              ...
      4009     True
      4010    False
      4011    False
      4012    False
      4013    False
      Name: Age, Length: 4014, dtype: bool
```

```
[62]: stats[filter]
```

```
[62]:       Customer_ID         Name     Surname  Gender  Age     Region  \
      631     200000632      Nicholas       Allan    Male   64   Scotland
      841     200000842         Matt     Manning    Male   64   Scotland
      1498    200001499      Cameron     Ellison    Male   64   Scotland
      1586    200001587         Jake     Ellison    Male   64   Scotland
      1608    200001609       Yvonne     Dickens  Female   64   Scotland
      1639    200001640  Christopher   Underwood    Male   64   Scotland
      2040    200002041      Abigail      Fraser  Female   64   Scotland
      2055    200002056       Joshua        Carr    Male   64   Scotland
      2310    200002311        Kevin      Howard    Male   64   Scotland
      2352    200002353      Leonard       Lyman    Male   64   Scotland
      2752    200002753          Ian      Hunter    Male   64   Scotland
      2772    200002773         Alan      Watson    Male   64   Scotland
      3676    200003677      Anthony       Lewis    Male   64   Scotland
      4008    200004009       Alison       Quinn  Female   64   Scotland
      4009    200004010          Sam       Lewis    Male   64   Scotland

           Job_Classification Date_Joined    Balance
      631           Blue Collar   22.May.15   15909.96
      841           Blue Collar   10.Jun.15    3775.44
      1498          Blue Collar   03.Aug.15   71106.33
      1586                Other   11.Aug.15   14242.57
      1608                Other   13.Aug.15   23522.36
      1639          Blue Collar   16.Aug.15   47115.07
      2040          Blue Collar   13.Sep.15   24729.53
      2055                Other   14.Sep.15   14558.13
      2310          Blue Collar   26.Sep.15   10325.52
      2352          Blue Collar   28.Sep.15  139415.88
      2752          Blue Collar   23.Oct.15   92921.99
      2772          Blue Collar   24.Oct.15   24994.57
      3676          Blue Collar   12.Dec.15   48456.48
      4008                Other   30.Dec.15   73503.90
      4009                Other   30.Dec.15   19711.66
```

```
[63]: filter2=stats.Balance>5000
```

```
[64]: filter
```

```
[64]: 0       False
      1       False
      2       False
      3       False
      4       False
              …
      4009     True
```

```
4010    False
4011    False
4012    False
4013    False
Name: Age, Length: 4014, dtype: bool
```

[65]: `stats[filter2]`

[65]:

	Customer_ID	Name	Surname	Gender	Age	Region
0	100000001	Simon	Walsh	Male	21	England
1	400000002	Jasmine	Miller	Female	34	Northern Ireland
2	100000003	Liam	Brown	Male	46	England
4	100000005	Deirdre	Pullman	Female	38	England
5	300000006	Ava	Coleman	Female	30	Wales
...	...	...	...	...	...	...
4008	200004009	Alison	Quinn	Female	64	Scotland
4009	200004010	Sam	Lewis	Male	64	Scotland
4010	200004011	Keith	Hughes	Male	52	Scotland
4011	200004012	Hannah	Springer	Female	50	Scotland
4013	300004014	Stephen	May	Male	33	Wales

	Job_Classification	Date_Joined	Balance
0	White Collar	05.Jan.15	113810.15
1	Blue Collar	06.Jan.15	36919.73
2	White Collar	07.Jan.15	101536.83
4	Blue Collar	09.Jan.15	35639.79
5	Blue Collar	09.Jan.15	122443.77
...	...	...	...
4008	Other	30.Dec.15	73503.90
4009	Other	30.Dec.15	19711.66
4010	Blue Collar	30.Dec.15	56069.72
4011	Other	30.Dec.15	59477.82
4013	Blue Collar	30.Dec.15	30293.19

[3690 rows x 9 columns]

[66]: `stats[stats.Balance<100]`

[66]:

	Customer_ID	Name	Surname	Gender	Age	Region
74	400000075	Olivia	Dowd	Female	30	Northern Ireland
774	200000775	Warren	Roberts	Male	37	Scotland
1319	100001320	Jane	King	Female	38	England
2045	400002046	Megan	Hart	Female	19	Northern Ireland
3467	300003468	Stewart	Johnston	Male	41	Wales
3496	300003497	Rebecca	Howard	Female	30	Wales
3884	100003885	Abigail	Mills	Female	29	England

```
        Job_Classification Date_Joined  Balance
74            White Collar    12.Feb.15    21.03
774            Blue Collar    01.Jun.15    69.01
1319          White Collar    22.Jul.15    11.52
2045           Blue Collar    13.Sep.15    69.78
3467           Blue Collar    30.Nov.15    77.46
3496           Blue Collar    02.Dec.15    96.26
3884          White Collar    23.Dec.15    98.68
```

[67]: `stats[filter & filter2]`

[67]:
```
        Customer_ID         Name      Surname  Gender  Age    Region  \
631       200000632     Nicholas        Allan    Male   64  Scotland
1498      200001499      Cameron      Ellison    Male   64  Scotland
1586      200001587         Jake      Ellison    Male   64  Scotland
1608      200001609       Yvonne      Dickens  Female   64  Scotland
1639      200001640  Christopher    Underwood    Male   64  Scotland
2040      200002041      Abigail       Fraser  Female   64  Scotland
2055      200002056       Joshua         Carr    Male   64  Scotland
2310      200002311        Kevin       Howard    Male   64  Scotland
2352      200002353      Leonard        Lyman    Male   64  Scotland
2752      200002753          Ian       Hunter    Male   64  Scotland
2772      200002773         Alan       Watson    Male   64  Scotland
3676      200003677      Anthony        Lewis    Male   64  Scotland
4008      200004009       Alison        Quinn  Female   64  Scotland
4009      200004010          Sam        Lewis    Male   64  Scotland

        Job_Classification Date_Joined     Balance
631            Blue Collar    22.May.15    15909.96
1498           Blue Collar    03.Aug.15    71106.33
1586                 Other    11.Aug.15    14242.57
1608                 Other    13.Aug.15    23522.36
1639           Blue Collar    16.Aug.15    47115.07
2040           Blue Collar    13.Sep.15    24729.53
2055                 Other    14.Sep.15    14558.13
2310           Blue Collar    26.Sep.15    10325.52
2352           Blue Collar    28.Sep.15   139415.88
2752           Blue Collar    23.Oct.15    92921.99
2772           Blue Collar    24.Oct.15    24994.57
3676           Blue Collar    12.Dec.15    48456.48
4008                 Other    30.Dec.15    73503.90
4009                 Other    30.Dec.15    19711.66
```

[68]: `stats[(stats.Age>63)&(stats.Balance>5000)]`

[68]:
```
        Customer_ID         Name     Surname  Gender  Age    Region  \
631       200000632     Nicholas       Allan    Male   64  Scotland
```

```
1498    200001499      Cameron     Ellison      Male   64   Scotland
1586    200001587         Jake     Ellison      Male   64   Scotland
1608    200001609       Yvonne     Dickens    Female   64   Scotland
1639    200001640  Christopher   Underwood      Male   64   Scotland
2040    200002041      Abigail      Fraser    Female   64   Scotland
2055    200002056       Joshua        Carr      Male   64   Scotland
2310    200002311        Kevin      Howard      Male   64   Scotland
2352    200002353      Leonard       Lyman      Male   64   Scotland
2752    200002753          Ian      Hunter      Male   64   Scotland
2772    200002773         Alan      Watson      Male   64   Scotland
3676    200003677      Anthony       Lewis      Male   64   Scotland
4008    200004009       Alison       Quinn    Female   64   Scotland
4009    200004010          Sam       Lewis      Male   64   Scotland


      Job_Classification Date_Joined     Balance
631           Blue Collar   22.May.15    15909.96
1498          Blue Collar   03.Aug.15    71106.33
1586                Other   11.Aug.15    14242.57
1608                Other   13.Aug.15    23522.36
1639          Blue Collar   16.Aug.15    47115.07
2040          Blue Collar   13.Sep.15    24729.53
2055                Other   14.Sep.15    14558.13
2310          Blue Collar   26.Sep.15    10325.52
2352          Blue Collar   28.Sep.15   139415.88
2752          Blue Collar   23.Oct.15    92921.99
2772          Blue Collar   24.Oct.15    24994.57
3676          Blue Collar   12.Dec.15    48456.48
4008                Other   30.Dec.15    73503.90
4009                Other   30.Dec.15    19711.66
```

[69]: `stats[stats.Region=='England']`

[69]:
```
      Customer_ID      Name    Surname   Gender   Age    Region  \
0       100000001     Simon      Walsh     Male    21   England
2       100000003      Liam      Brown     Male    46   England
4       100000005   Deirdre    Pullman   Female    38   England
6       100000007   Dorothy    Thomson   Female    34   England
9       100000010   Dominic       Parr     Male    42   England
...           ...       ...        ...      ...   ...       ...
4003    100004004      Jane   Hemmings   Female    28   England
4004    100004005      John   Hamilton     Male    45   England
4005    100004006   Kimberly      Gray   Female    44   England
4006    100004007    Rachel     Davies   Female    34   England
4007    100004008       Sam  Sanderson     Male    28   England


      Job_Classification Date_Joined     Balance
0           White Collar   05.Jan.15   113810.15
```

```
2           White Collar   07.Jan.15   101536.83
4            Blue Collar   09.Jan.15    35639.79
6            Blue Collar   11.Jan.15    42879.84
9           White Collar   12.Jan.15    10912.45
...                  ...         ...         ...
4003         Blue Collar   30.Dec.15    68518.55
4004        White Collar   30.Dec.15     8435.91
4005               Other   30.Dec.15    64470.77
4006         Blue Collar   30.Dec.15     4561.22
4007         Blue Collar   30.Dec.15    42128.29

[2159 rows x 9 columns]
```

[70]: `stats.Region.unique()`

[70]: `array(['England', 'Northern Ireland', 'Wales', 'Scotland'], dtype=object)`

[71]: `stats.Job_Classification.unique()`

[71]: `array(['White Collar', 'Blue Collar', 'Other'], dtype=object)`

[72]: `len(stats.Name.unique())`

[72]: 172

1   .at and .iat

[73]: `stats.head()`

[73]:
```
   Customer_ID     Name  Surname  Gender  Age            Region  \
0    100000001    Simon    Walsh    Male   21           England
1    400000002  Jasmine   Miller  Female   34  Northern Ireland
2    100000003     Liam    Brown    Male   46           England
3    300000004   Trevor     Parr    Male   32             Wales
4    100000005  Deirdre  Pullman  Female   38           England

  Job_Classification Date_Joined    Balance
0       White Collar   05.Jan.15  113810.15
1        Blue Collar   06.Jan.15   36919.73
2       White Collar   07.Jan.15  101536.83
3       White Collar   08.Jan.15    1421.52
4        Blue Collar   09.Jan.15   35639.79
```

[74]: `stats.index`

[74]: `RangeIndex(start=0, stop=4014, step=1)`
```

```
[75]: stats.iat[2,1]
```

```
[75]: 'Liam'
```

```
[76]: stats.at[2,'Name']
```

```
[76]: 'Liam'
```

2 why we need?

```
[77]: sub1000=stats[::1000]
```

```
[78]: sub1000
```

```
[78]:       Customer_ID         Name  Surname  Gender  Age           Region  \
      0       100000001        Simon    Walsh    Male   21          England
      1000    400001001        Grace   Duncan  Female   31  Northern Ireland
      2000    100002001   Bernadette     Ince  Female   43          England
      3000    100003001         Matt  Abraham    Male   47          England
      4000    300004001    Gabrielle   Duncan  Female   34            Wales

            Job_Classification Date_Joined      Balance
      0           White Collar   05.Jan.15   113810.15
      1000               Other   26.Jun.15    32162.34
      2000        White Collar   11.Sep.15    57739.46
      3000         Blue Collar   03.Nov.15     8576.46
      4000        White Collar   29.Dec.15    92083.79
```

```
[79]: sub1000.iat[1,1]
```

```
[79]: 'Grace'
```

```
[80]: sub1000.at[1000,'Name']
```

```
[80]: 'Grace'
```

```
[81]: import matplotlib.pyplot as plt
      import seaborn as sns

      import warnings
      warnings.filterwarnings("ignore")
      %matplotlib inline
      plt.rcParams['figure.figsize']=10,4
```

```
[82]: sns.distplot([stats.Balance])
      plt.show()
```

```
[83]: sns.distplot([stats.Balance],bins=20)
      plt.show()
```



```
[84]: vis1=sns.displot(stats["Balance"],bins=20)
      plt.rcParams['figure.figsize']=10,8
      plt.show()
```

```
[85]: sns.displot(stats["Balance"],bins=20,height=5,aspect=2,color='Red')
      plt.show()
```

```
[86]: sns.boxplot(data=stats,x="Region",y='Age')
      plt.show()
```



```
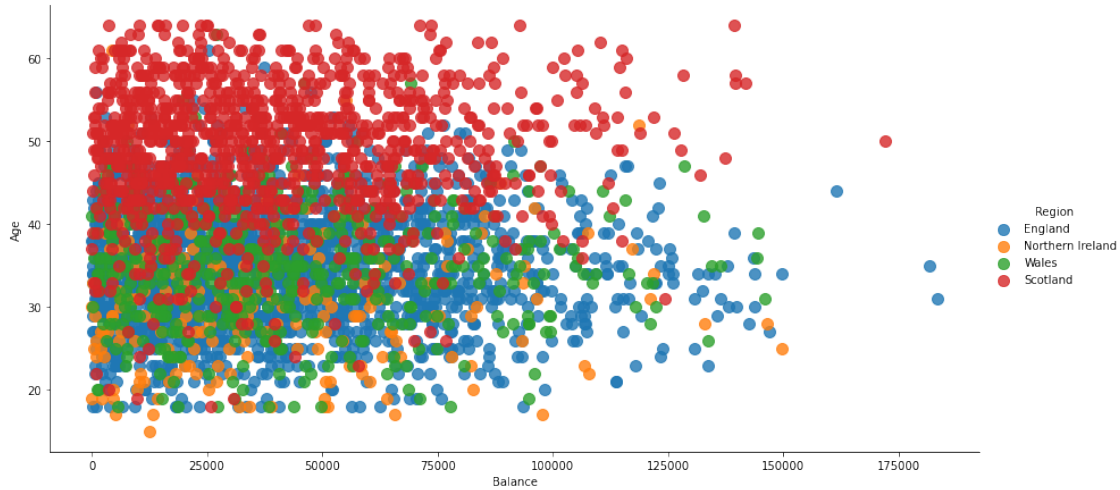[87]: sns.lmplot(data=stats,x='Balance',y="Age",hue='Region',aspect=2)
      plt.show()
```

```
[88]: sns.
      ↪lmplot(data=stats,x='Balance',y='Age',fit_reg=False,hue='Region',aspect=2,size=6)
      plt.show()
```



```
[89]: sns.lmplot(data=stats,x='Balance',y='Age',fit_reg=False,hue='Region',\
              size=6,scatter_kws={'s':100},aspect=2)
```

```
[89]: <seaborn.axisgrid.FacetGrid at 0x20ceb66a490>
```

```
[90]: sns.lmplot(x="Age",y="Balance",data=stats,hue='Region',scatter_kws={"s":
      ↪100},aspect=2,fit_reg=False)
      plt.show()
```



```
[91]: stats
```

```
[91]:      Customer_ID      Name    Surname  Gender  Age              Region  \
      0      100000001     Simon      Walsh    Male   21             England
      1      400000002   Jasmine     Miller  Female   34   Northern Ireland
      2      100000003      Liam      Brown    Male   46             England
      3      300000004    Trevor       Parr    Male   32               Wales
      4      100000005   Deirdre    Pullman  Female   38             England
      ...          ...       ...        ...     ...  ...                 ...
```

```
4009    200004010        Sam      Lewis     Male   64          Scotland
4010    200004011      Keith     Hughes     Male   52          Scotland
4011    200004012     Hannah   Springer   Female   50          Scotland
4012    200004013  Christian       Reid     Male   51          Scotland
4013    300004014    Stephen        May     Male   33             Wales
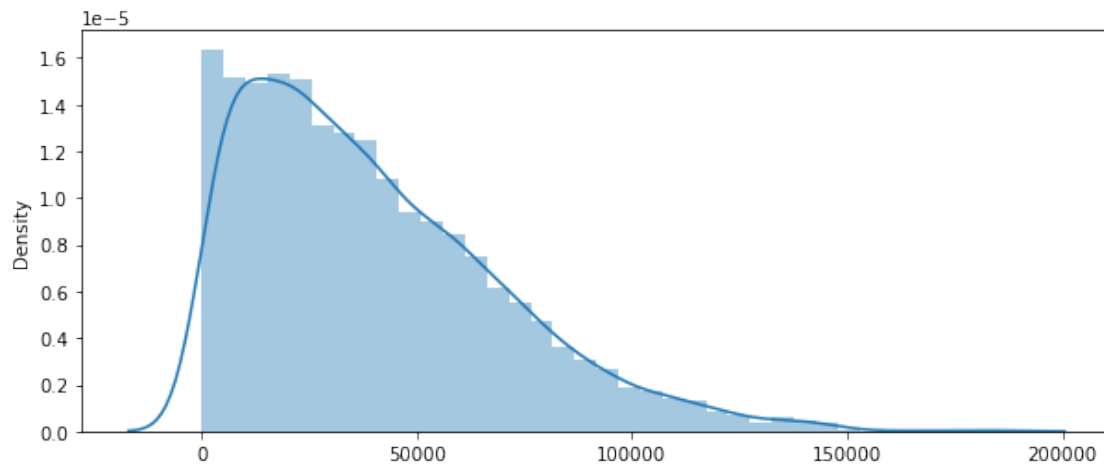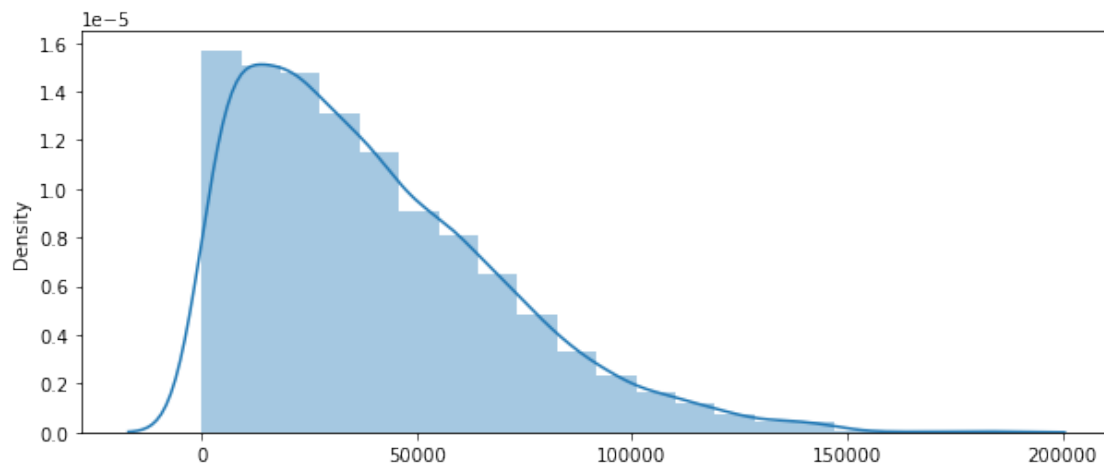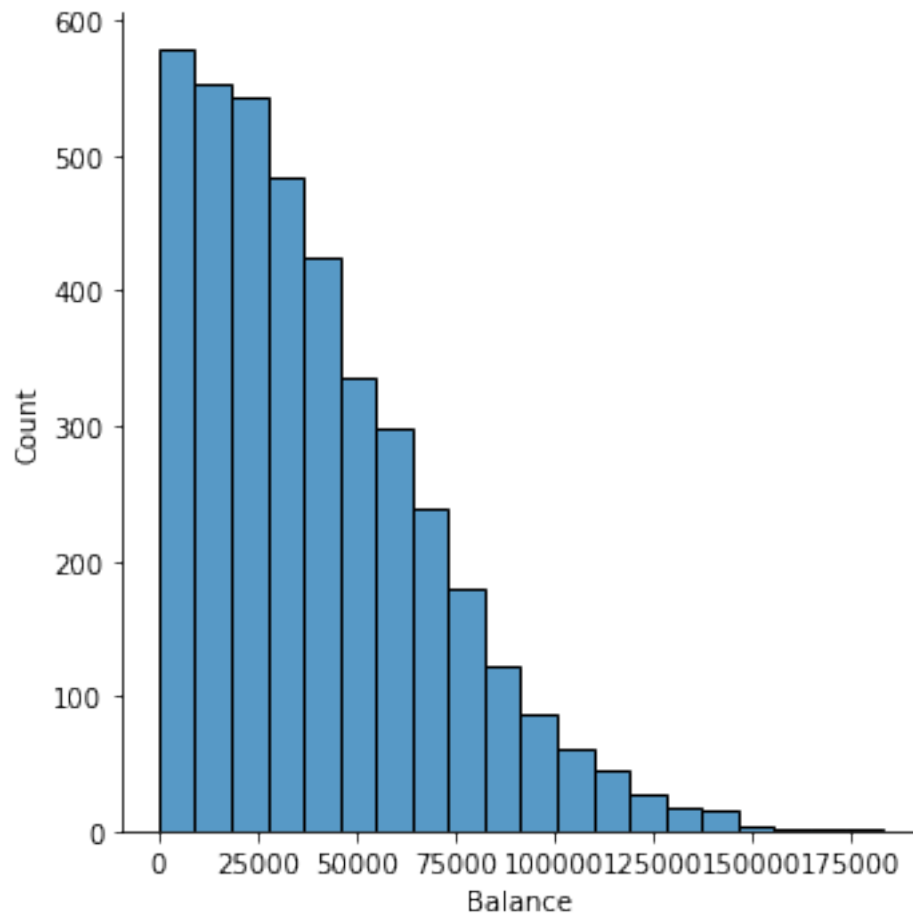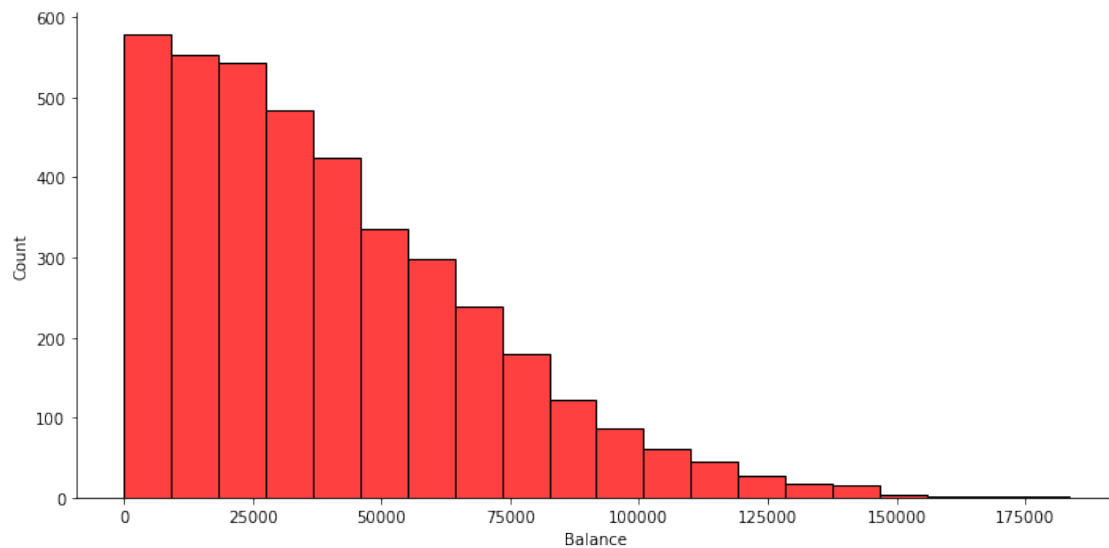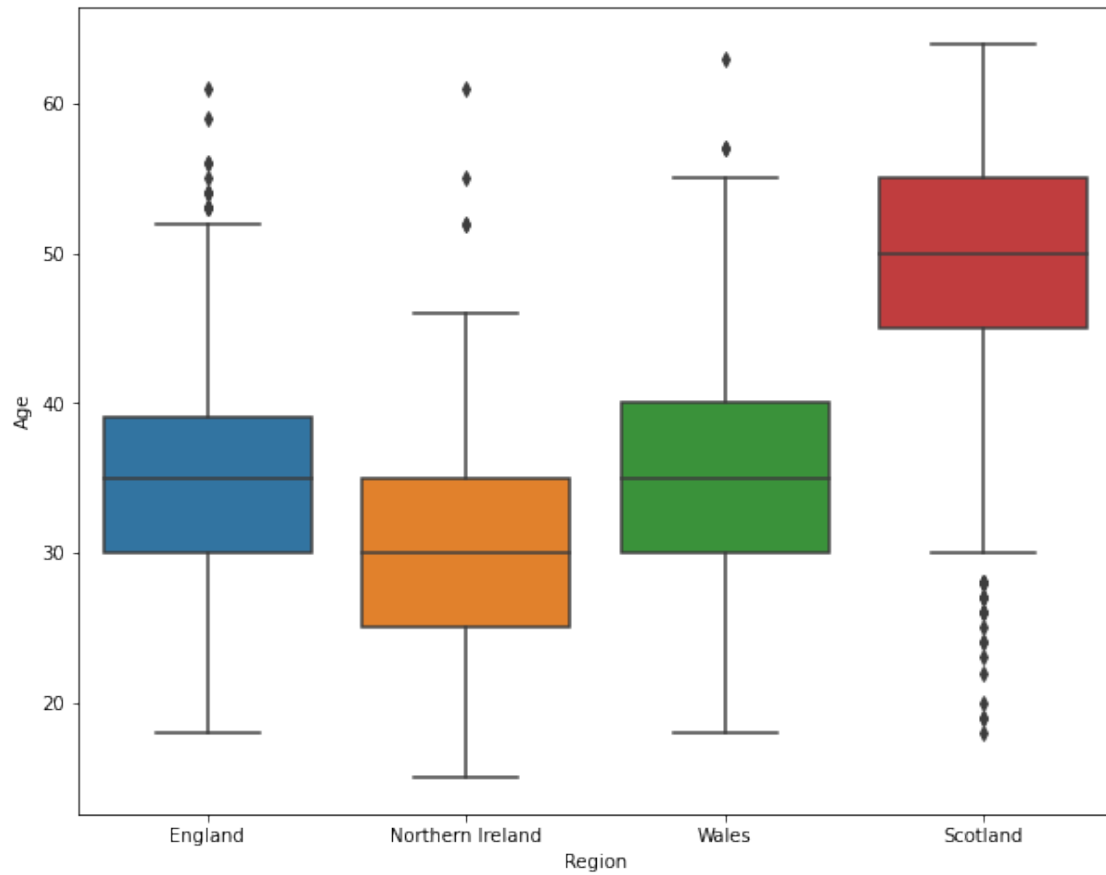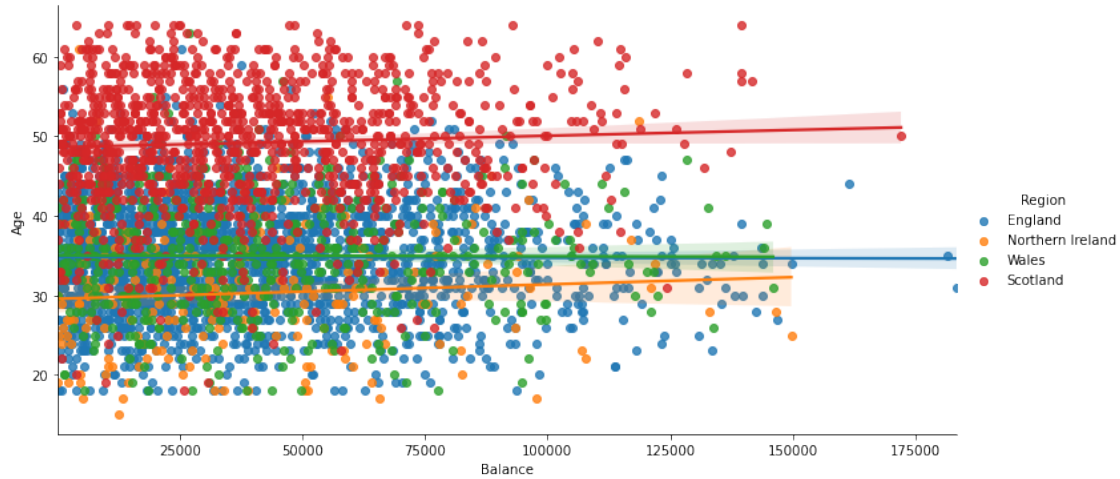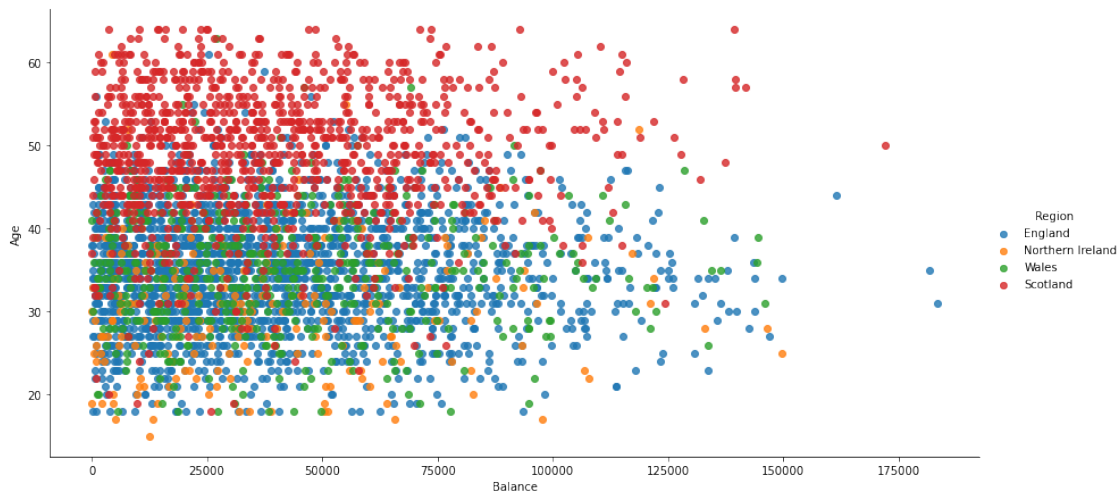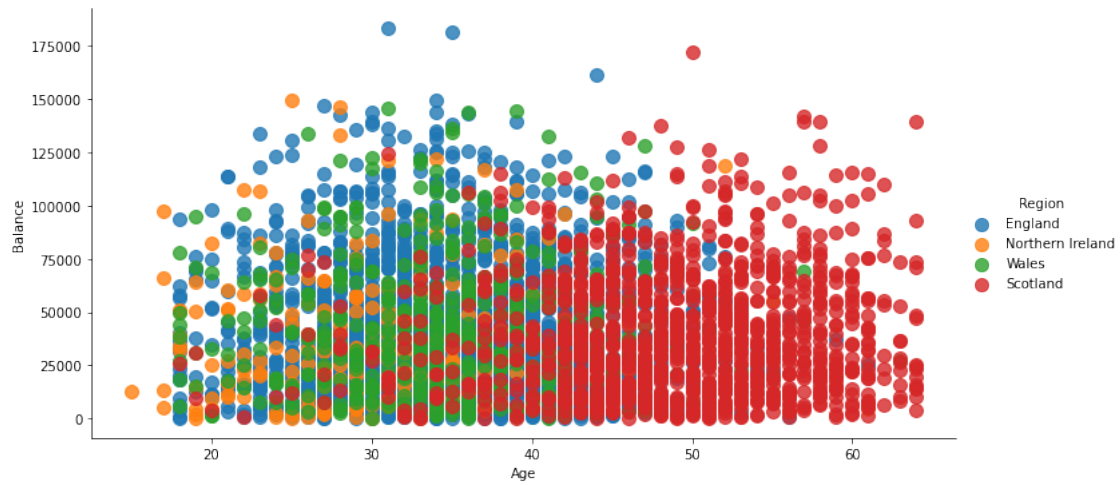
     Job_Classification Date_Joined     Balance
0           White Collar   05.Jan.15   113810.15
1            Blue Collar   06.Jan.15    36919.73
2           White Collar   07.Jan.15   101536.83
3           White Collar   08.Jan.15     1421.52
4            Blue Collar   09.Jan.15    35639.79
…                     …           …           …
4009               Other   30.Dec.15    19711.66
4010         Blue Collar   30.Dec.15    56069.72
4011               Other   30.Dec.15    59477.82
4012         Blue Collar   30.Dec.15      239.45
4013         Blue Collar   30.Dec.15    30293.19

[4014 rows x 9 columns]
```

```python
sns.set_theme(style="whitegrid") #ticks

sns.
 ↪lmplot(data=stats,x="Age",y="Balance",col="Region",hue="Region",col_wrap=2,ci=None,palette=
        scatter_kws={"s":50,"alpha":1})
plt.show()
```
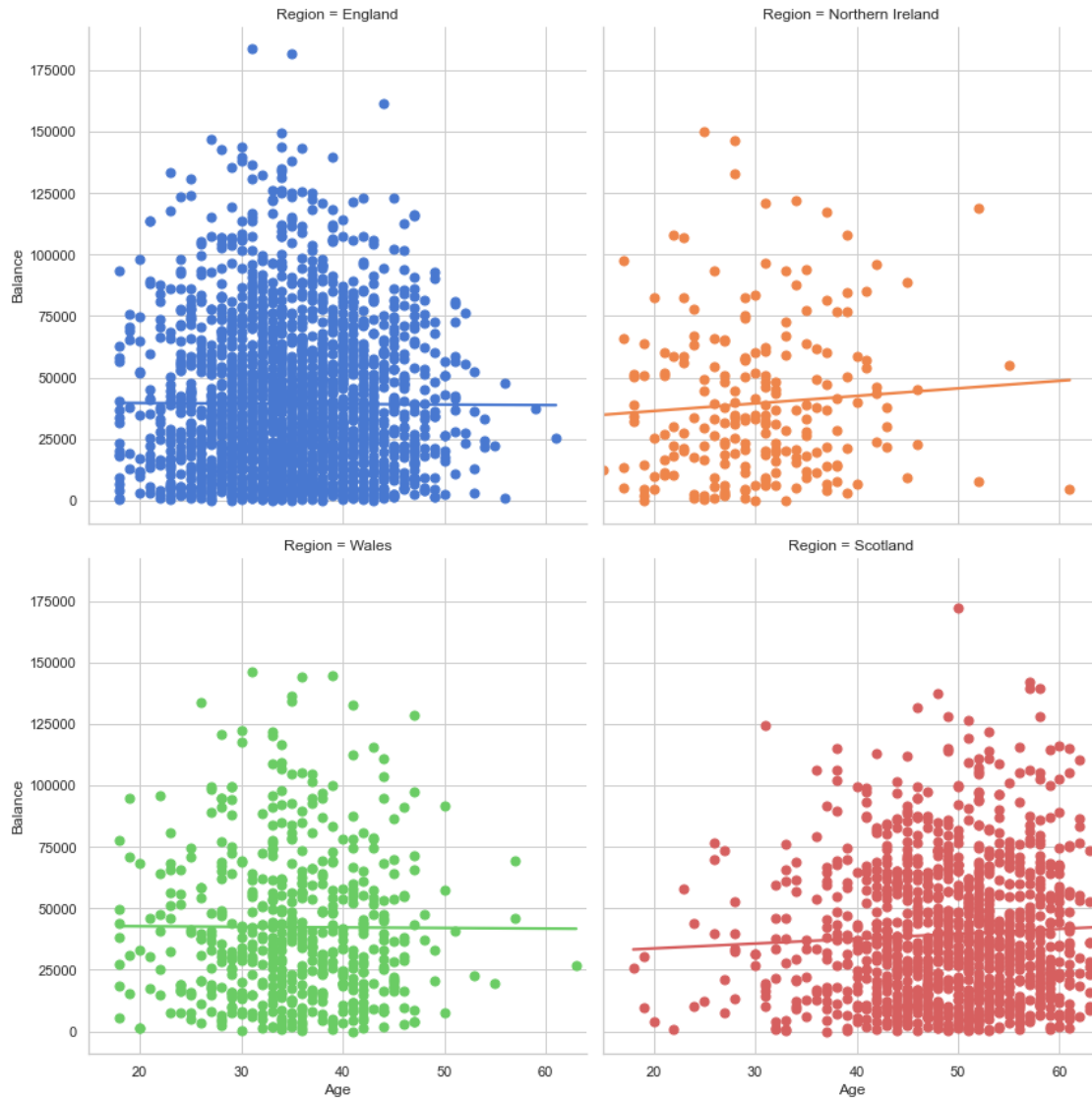
```
sns.set_theme(style="whitegrid")
sns.scatterplot(data=stats,x="Balance",y="Age",hue="Region",size="Gender",\
                palette="ch:r=-.2,d=.3_r",sizes=(1,8),linewidth=0)
plt.show()
```
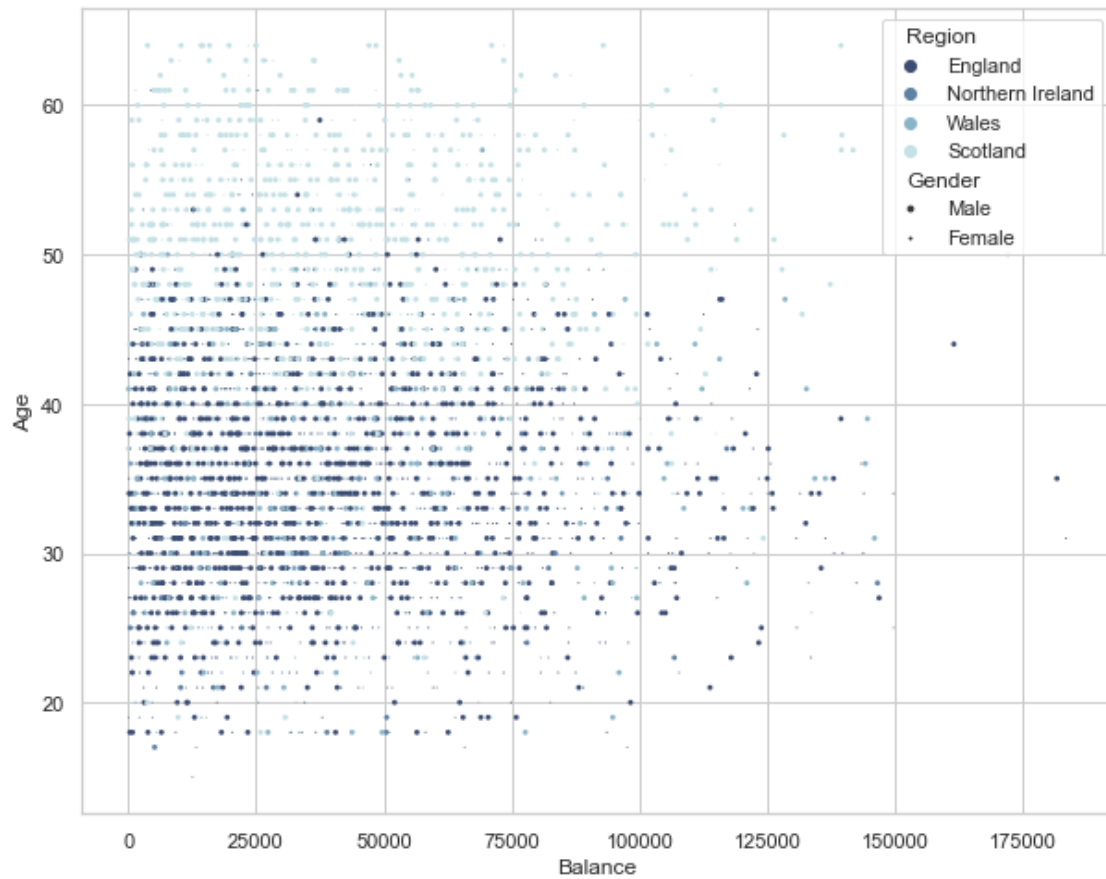
```
[94]: sns.set_theme(style="darkgrid")
      sns.
       →lineplot(data=stats,x="Region",y="Balance",hue="Job_Classification",style="Gender")
      plt.show()
```
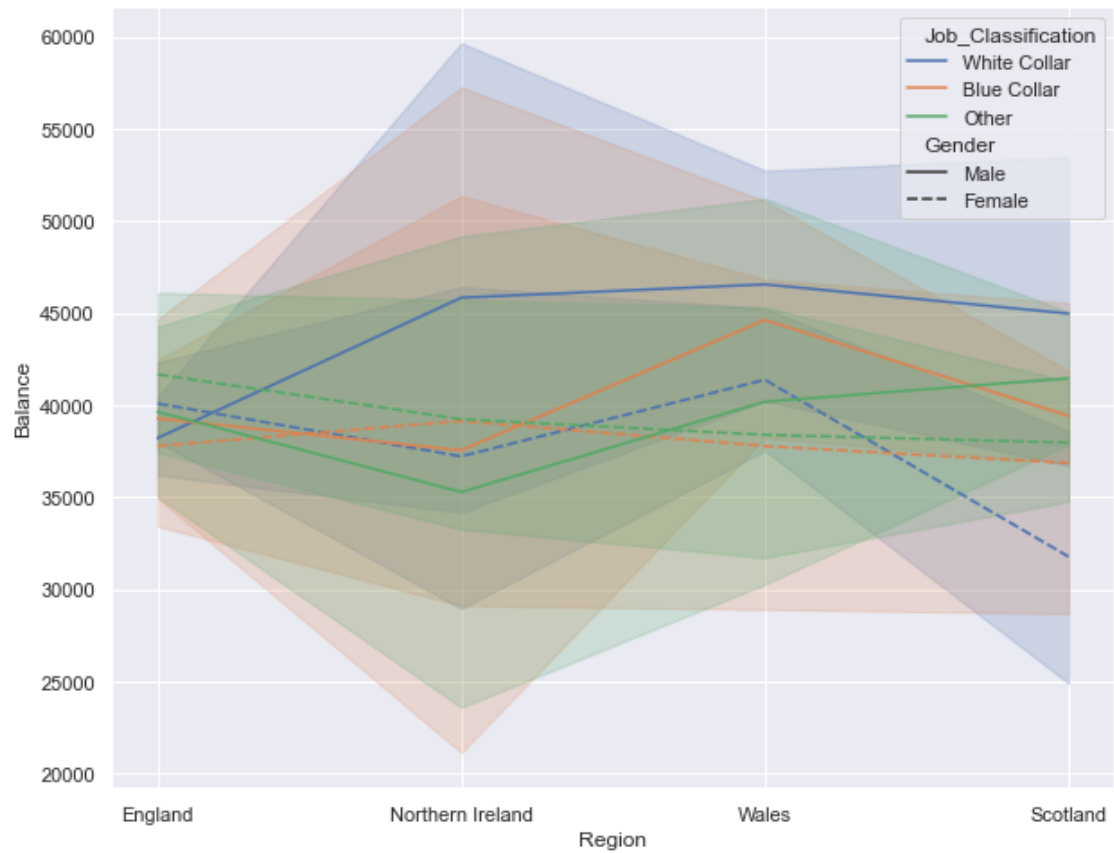
```
[95]: sns.
      ↪displot(data=stats,x="Region",col="Job_Classification",row="Gender",binwidth=3,␣
      ↪height=5,\
               facet_kws=dict(margin_titles=True),)
      plt.show()
```
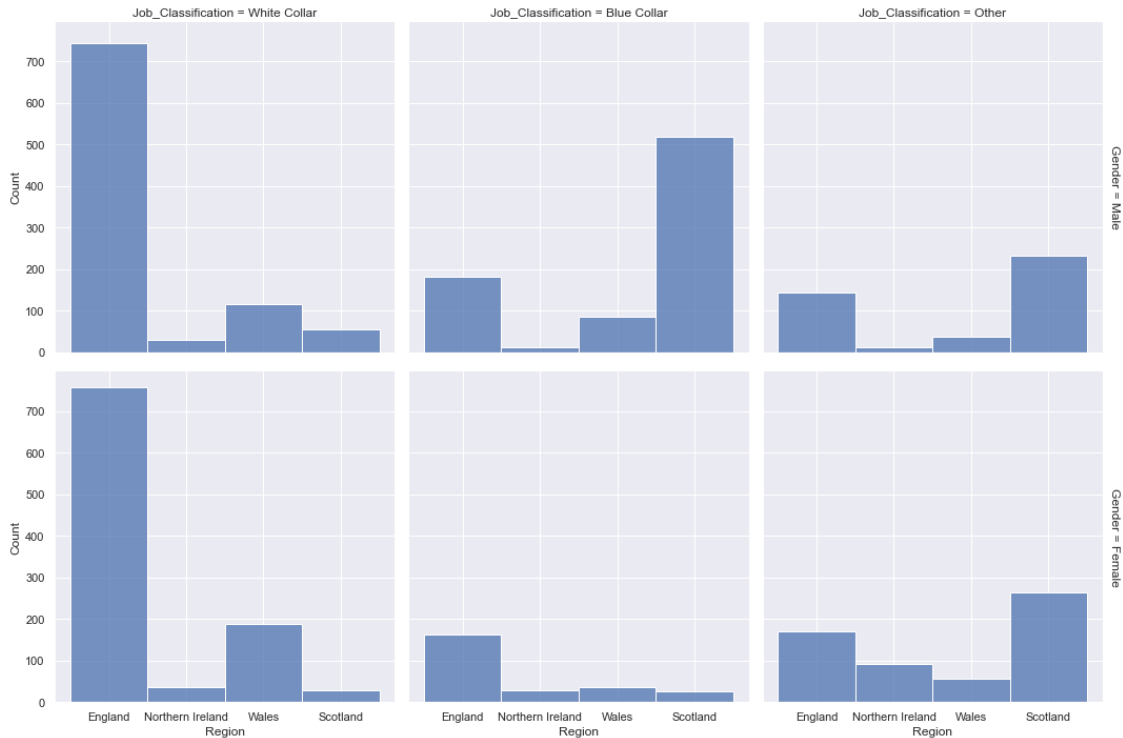
```
[96]: stats.columns
```

```
[96]: Index(['Customer_ID', 'Name', 'Surname', 'Gender', 'Age', 'Region',
             'Job_Classification', 'Date_Joined', 'Balance'],
            dtype='object')
```

```
[97]: stats.Job_Classification.unique()
```

```
[97]: array(['White Collar', 'Blue Collar', 'Other'], dtype=object)
```

```
[100]: sns.set_theme(style="ticks")

       legend="Gender"
       sns.relplot(data=stats,x="Age",y="Balance",hue="Region",col="Gender",\
                ⊔
        →size_order=["T1","T2"],height=5,aspect=1,facet_kws=dict(sharex=False))
       plt.show()
```
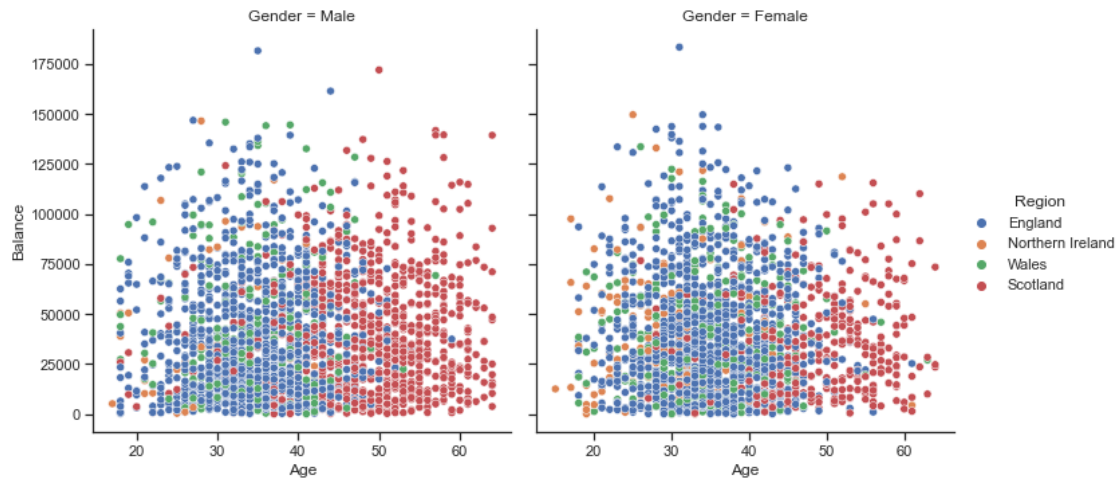
[102]:
```
w=range(20),5
```

[103]:
```
w
```

[103]: (range(0, 20), 5)

[109]:
```
l=range(0,20,4)
```

[111]:
```
print(l)
```

range(0, 20, 4)

[112]:
```
import numpy as np
np.arange(0,20,4)
```

[112]: array([0, 4, 8, 12, 16])

[ ]: