In [0]:

```
# Load Libraries
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
from pyspark.sql.types import IntegerType
from pyspark.sql.functions import col
```

In [0]:

```
#load dataset
athlete = spark.read.csv('dbfs:/FileStore/PortfolioProject/athlete_events.csv',header=Tr
region = spark.read.csv('dbfs:/FileStore/PortfolioProject/noc_regions.csv',header=True,i
```

In [0]:

```
athlete.show()
```

```
+---+--------------------+---+---+------+------+--------------+---+-------
----+----+------+-----------+--------------------+--------------------+---
--+
| ID|                Name|Sex|Age|Height|Weight|          Team|NOC|      G
ames|Year|Season|       City|               Sport|               Event|Med
al|
+---+--------------------+---+---+------+------+--------------+---+-------
----+----+------+-----------+--------------------+--------------------+---
--+
|  1|           A Dijiang|  M| 24|   180|    80|         China|CHN|1992 Su
mmer|1992|Summer|  Barcelona|          Basketball|Basketball Men's ...|
NA|
|  2|            A Lamusi|  M| 23|   170|    60|         China|CHN|2012 Su
mmer|2012|Summer|     London|                Judo|Judo Men's Extra-...|
NA|
|  3| Gunnar Nielsen Aaby|  M| 24|    NA|    NA|       Denmark|DEN|1920 Su
mmer|1920|Summer|  Antwerpen|            Football|Football Men's Fo...|
NA|
|  4|Edgar Lindenau Aabye|  M| 34|    NA|    NA|Denmark/Sweden|DEN|1900 Su
mmer|1900|Summer|      Paris|          Tug-Of-War|Tug-Of-War Men's ...| Go
ld|
|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|NED|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|
NA|
|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|NED|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|
NA|
|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|NED|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|
NA|
|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|NED|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|
NA|
|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|NED|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|
NA|
|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|NED|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|
NA|
|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|USA|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|USA|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|USA|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|
|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|USA|1994 Wi
```

```
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|
|  7|        John Aalberg|  M| 31|   183|    72| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
|  7|        John Aalberg|  M| 31|   183|    72| United States|USA|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|
+---+--------------------+---+---+------+------+--------------+---+-------
----+----+------+-----------+--------------------+--------------------+---
--+
only showing top 20 rows
```

In [0]:

```
region.show()
```

```
+---+--------------+--------------------+
|NOC|        region|               notes|
+---+--------------+--------------------+
|AFG|   Afghanistan|                null|
|AHO|       Curacao|Netherlands Antilles|
|ALB|       Albania|                null|
|ALG|       Algeria|                null|
|AND|       Andorra|                null|
|ANG|        Angola|                null|
|ANT|       Antigua| Antigua and Barbuda|
|ANZ|     Australia|         Australasia|
|ARG|     Argentina|                null|
|ARM|       Armenia|                null|
|ARU|         Aruba|                null|
|ASA|American Samoa|                null|
|AUS|     Australia|                null|
|AUT|       Austria|                null|
|AZE|    Azerbaijan|                null|
|BAH|       Bahamas|                null|
|BAN|    Bangladesh|                null|
|BAR|      Barbados|                null|
|BDI|       Burundi|                null|
|BEL|       Belgium|                null|
+---+--------------+--------------------+
only showing top 20 rows
```

In [0]:

```
#Join Dataframes
df = athlete.join(region,on=['noc'],how='left')
df.show()
```

```
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+-----------+--------------------+--------------------+---
--+-----------+-----+
|NOC| ID|                Name|Sex|Age|Height|Weight|          Team|      G
ames|Year|Season|       City|               Sport|               Event|Med
al|     region|notes|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+-----------+--------------------+--------------------+---
--+-----------+-----+
|CHN|  1|           A Dijiang|  M| 24|   180|    80|         China|1992 Su
mmer|1992|Summer|  Barcelona|          Basketball|Basketball Men's ...|   
NA|      China| null|
|CHN|  2|            A Lamusi|  M| 23|   170|    60|         China|2012 Su
mmer|2012|Summer|     London|                Judo|Judo Men's Extra-...|   
NA|      China| null|
|DEN|  3| Gunnar Nielsen Aaby|  M| 24|    NA|    NA|       Denmark|1920 Su
mmer|1920|Summer|  Antwerpen|            Football|Football Men's Fo...|   
NA|    Denmark| null|
|DEN|  4|Edgar Lindenau Aabye|  M| 34|    NA|    NA|Denmark/Sweden|1900 Su
mmer|1900|Summer|      Paris|          Tug-Of-War|Tug-Of-War Men's ...| Go
ld|    Denmark| null|
|NED|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|   
NA|Netherlands| null|
|USA|  6|      Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|   
NA|        USA| null|
|USA|  6|      Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
```

```
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  7|        John Aalberg|  M| 31|   183|    72| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  7|        John Aalberg|  M| 31|   183|    72| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+-----------+--------------------+--------------------+---
--+-----------+-----+
only showing top 20 rows
```

In [0]:

```
#Rename_Coulmns
df = df.withColumnRenamed('region','Region')
df = df.withColumnRenamed('notes','Notes')
df = df.filter((df['Sex'] == 'M') | (df['Sex'] == 'F'))
df.show()
```

```
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+-----------+--------------------+--------------------+---
--+-----------+-----+
|NOC| ID|                Name|Sex|Age|Height|Weight|          Team|      G
ames|Year|Season|       City|               Sport|               Event|Med
al|     Region|Notes|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+-----------+--------------------+--------------------+---
--+-----------+-----+
|CHN|  1|           A Dijiang|  M| 24|   180|    80|         China|1992 Su
mmer|1992|Summer|  Barcelona|          Basketball|Basketball Men's ...|
NA|      China| null|
|CHN|  2|            A Lamusi|  M| 23|   170|    60|         China|2012 Su
mmer|2012|Summer|     London|                Judo|Judo Men's Extra-...|
NA|      China| null|
|DEN|  3| Gunnar Nielsen Aaby|  M| 24|    NA|    NA|       Denmark|1920 Su
mmer|1920|Summer|  Antwerpen|            Football|Football Men's Fo...|
NA|    Denmark| null|
|DEN|  4|Edgar Lindenau Aabye|  M| 34|    NA|    NA|Denmark/Sweden|1900 Su
mmer|1900|Summer|      Paris|          Tug-Of-War|Tug-Of-War Men's ...| Go
ld|    Denmark| null|
|NED|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 21|   185|    82|   Netherlands|1988 Wi
nter|1988|Winter|    Calgary|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 25|   185|    82|   Netherlands|1992 Wi
nter|1992|Winter|Albertville|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|NED|  5|Christine Jacoba ...|  F| 27|   185|    82|   Netherlands|1994 Wi
nter|1994|Winter|Lillehammer|       Speed Skating|Speed Skating Wom...|
NA|Netherlands| null|
|USA|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 31|   188|    75| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  6|     Per Knut Aaland|  M| 33|   188|    75| United States|1994 Wi
```

```
nter|1994|Winter|Lillehammer|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  7|        John Aalberg|  M| 31|   183|    72| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
|USA|  7|        John Aalberg|  M| 31|   183|    72| United States|1992 Wi
nter|1992|Winter|Albertville|Cross Country Skiing|Cross Country Ski...|
NA|        USA| null|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+------------+--------------------+--------------------+---
--+-----------+-----+
only showing top 20 rows
```

In [0]:

```
df.printSchema()
```

```
root
 |-- NOC: string (nullable = true)
 |-- ID: integer (nullable = true)
 |-- Name: string (nullable = true)
 |-- Sex: string (nullable = true)
 |-- Age: string (nullable = true)
 |-- Height: string (nullable = true)
 |-- Weight: string (nullable = true)
 |-- Team: string (nullable = true)
 |-- Games: string (nullable = true)
 |-- Year: string (nullable = true)
 |-- Season: string (nullable = true)
 |-- City: string (nullable = true)
 |-- Sport: string (nullable = true)
 |-- Event: string (nullable = true)
 |-- Medal: string (nullable = true)
 |-- Region: string (nullable = true)
 |-- Notes: string (nullable = true)
```

In [0]:

```

df = df.withColumn('Age', col('Age').cast(IntegerType()))
df = df.withColumn('Height', col('Height').cast(IntegerType()))
df = df.withColumn('Weight', col('Weight').cast(IntegerType()))
df = df.withColumn('Year', col('Year').cast(IntegerType()))
```

In [0]:

```
df.describe().show()
```

```
+-------+------+-----------------+--------------------+------+------------
-----+------------------+------------------+--------------------+---------
--+------------------+------+-----------+-----------+--------------------+
------+-----------+-------------------+
|summary|   NOC|               ID|                Name|   Sex|
Age|            Height|            Weight|                Team|      Games
|              Year|Season|       City|      Sport|               Event| M
edal|     Region|              Notes|
+-------+------+-----------------+--------------------+------+------------
-----+------------------+------------------+--------------------+---------
--+------------------+------+-----------+-----------+--------------------+
------+-----------+-------------------+
|  count|270443|           270443|              270443|270443|           2
60971|            210446|            207759|              270443|     2704
43|            270443|270443|     270443|     270443|              270443|
270443|     270094|               5036|
|   mean|  null|68249.21995762509|                null|  null|25.559663717
42454| 175.3324938464024| 70.69210479449747|                null|       nu
ll|1978.4196078286368|  null|       null|       null|                null|
null|       null|               null|
| stddev|  null|39025.44442499486|                null|  null|6.3948172761
32696|10.516999052744717|14.343075205449736|                null|       nu
ll|29.877750074318254|  null|       null|       null|                null|
null|       null|               null|
|    min|   AFG|                1| Eleonora Margari...|     F|
10|               127|                25|"Large boat, Cent...|1896 Summer|
1896|Summer|Albertville|Aeronautics|Aeronautics Mixed...|Bronze|Afghanista
n|Antigua and Barbuda|
|    max|   ZIM|           135571|            zzet nce|     M|
97|               226|               214|                rn-2|2016 Summer|
2016|Winter|  Vancouver|  Wrestling|Wrestling Women's...|Silver|   Zimbabw
e|         Yugoslavia|
+-------+------+-----------------+--------------------+------+------------
-----+------------------+------------------+--------------------+---------
--+------------------+------+-----------+-----------+--------------------+
------+-----------+-------------------+
```

In [0]:

```
Dict_Null = {col:df.filter(df[col].isNull()).count() for col in df.columns}
Dict_Null
```

```
Out[176]: {'NOC': 0,
 'ID': 0,
 'Name': 0,
 'Sex': 0,
 'Age': 9472,
 'Height': 59997,
 'Weight': 62684,
 'Team': 0,
 'Games': 0,
 'Year': 0,
 'Season': 0,
 'City': 0,
 'Sport': 0,
 'Event': 0,
 'Medal': 0,
 'Region': 349,
 'Notes': 265407}
```

In [0]:

```
#India_Details
df.filter("Team == 'India'").show()
```

```
+---+----+--------------------+---+----+------+------+-----+-----------+--
--+------+--------------+-------------+--------------------+-----+------+-
----+
|NOC|  ID|                Name|Sex| Age|Height|Weight| Team|      Games|Ye
ar|Season|          City|        Sport|               Event|Medal|Region|N
otes|
+---+----+--------------------+---+----+------+------+-----+-----------+--
--+------+--------------+-------------+--------------------+-----+------+-
----+
|IND| 281|      S. Abdul Hamid|  M|null|  null|  null|India|1928 Summer|19
28|Summer|     Amsterdam|    Athletics|Athletics Men's 1...|   NA| India|
null|
|IND| 281|      S. Abdul Hamid|  M|null|  null|  null|India|1928 Summer|19
28|Summer|     Amsterdam|    Athletics|Athletics Men's 4...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  19|   167|    53|India|1984 Summer|19
84|Summer|   Los Angeles|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  19|   167|    53|India|1984 Summer|19
84|Summer|   Los Angeles|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  23|   167|    53|India|1988 Summer|19
88|Summer|         Seoul|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  23|   167|    53|India|1988 Summer|19
88|Summer|         Seoul|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  27|   167|    53|India|1992 Summer|19
92|Summer|     Barcelona|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 512|Shiny Kurisingal ...|  F|  31|   167|    53|India|1996 Summer|19
96|Summer|       Atlanta|    Athletics|Athletics Women's...|   NA| India|
null|
|IND| 663|Sharath Kamal Ach...|  M|  22|   186|    85|India|2004 Summer|20
04|Summer|        Athina| Table Tennis|Table Tennis Men'...|   NA| India|
null|
|IND| 663|Sharath Kamal Ach...|  M|  26|   186|    85|India|2008 Summer|20
08|Summer|       Beijing| Table Tennis|Table Tennis Men'...|   NA| India|
null|
|IND| 663|Sharath Kamal Ach...|  M|  34|   186|    85|India|2016 Summer|20
16|Summer|Rio de Janeiro| Table Tennis|Table Tennis Men'...|   NA| India|
null|
|IND| 952| Badathala Adisekhar|  M|  28|  null|    53|India|1992 Summer|19
92|Summer|     Barcelona|Weightlifting|Weightlifting Men...|   NA| India|
null|
|IND| 952| Badathala Adisekhar|  M|  32|  null|    53|India|1996 Summer|19
96|Summer|       Atlanta|Weightlifting|Weightlifting Men...|   NA| India|
null|
|IND|1105|     Mirza Najib Aga|  M|  19|  null|  null|India|1996 Summer|19
96|Summer|       Atlanta|         Judo|Judo Men's Half-L...|   NA| India|
null|
|IND|1149|       Neha Aggarwal|  F|  18|   170|    67|India|2008 Summer|20
08|Summer|       Beijing| Table Tennis|Table Tennis Wome...|   NA| India|
null|
|IND|1331|          Jahan Ahir|  M|null|  null|  null|India|1948 Summer|19
48|Summer|        London|   Water Polo|Water Polo Men's ...|   NA| India|
null|
|IND|1366|Jitendarjit Singh...|  M|  25|   179|    69|India|1980 Summer|19
80|Summer|        Moskva|Equestrianism|Equestrianism Mix...|   NA| India|
null|
|IND|1366|Jitendarjit Singh...|  M|  25|   179|    69|India|1980 Summer|19
```

```
80|Summer|        Moskva|Equestrianism|Equestrianism Mix...|   NA| India|
null|
|IND|1399|    A. Hussain Ahmed|  M|null|  null|  null|India|1956 Summer|19
56|Summer|     Melbourne|     Football|Football Men's Fo...|   NA| India|
null|
|IND|1415|       Shakeel Ahmed|  M|  21|  null|  null|India|1992 Summer|19
92|Summer|     Barcelona|       Hockey| Hockey Men's Hockey|   NA| India|
null|
+---+----+--------------------+---+----+------+------+-----+-----------+--
--+------+--------------+-------------+--------------------+-----+------+-
----+
only showing top 20 rows
```

In [0]:

```
#Top Country Participating
from pyspark.sql.functions import col
top_20_countries = df.groupBy("Team").count().sort(col("count").desc()).limit(20)
top_20_countries.show()
```

```
+-------------+-----+
|         Team|count|
+-------------+-----+
|United States|17372|
|       France|11983|
|Great Britain|11389|
|        Italy|10260|
|      Germany| 9303|
|       Canada| 9246|
|        Japan| 8289|
|       Sweden| 8045|
|    Australia| 7504|
|      Hungary| 6547|
|       Poland| 6143|
|  Switzerland| 5844|
|  Netherlands| 5705|
| Soviet Union| 5535|
|      Finland| 5379|
|        Spain| 5222|
|        China| 4975|
|       Russia| 4921|
|      Austria| 4860|
|       Norway| 4708|
+-------------+-----+
```

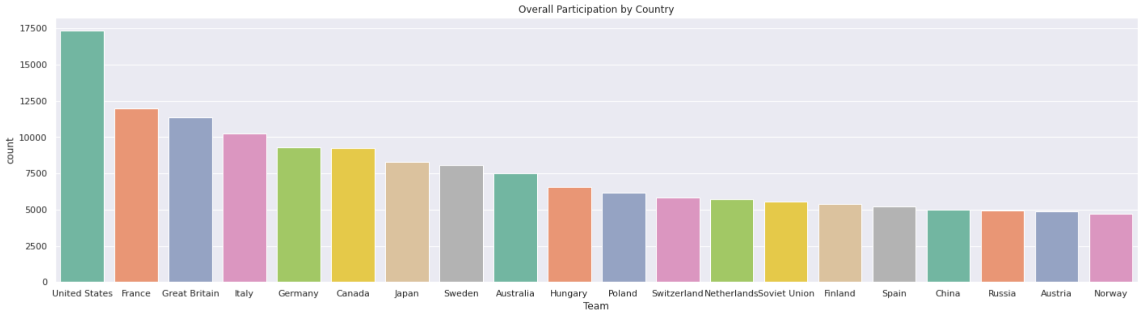
In [0]:

```
pandas_top_20 = top_20_countries.toPandas()
```

In [0]:

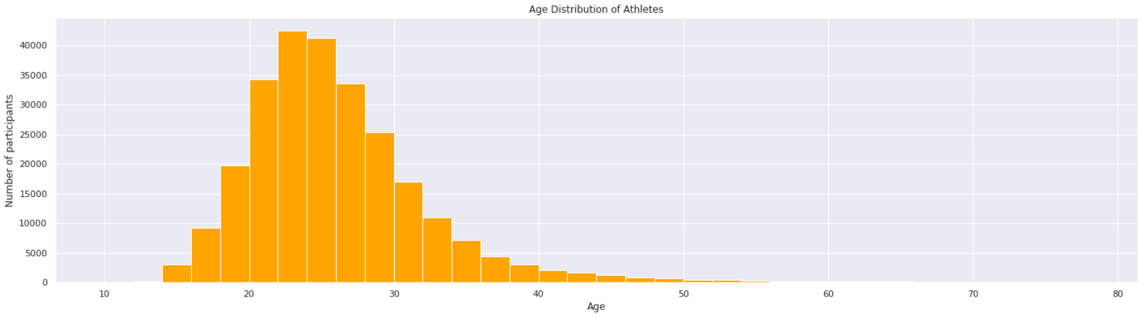
```
#plot_for_top_20_countries

plt.figure(figsize=(24,6))
plt.title('Overall Participation by Country')
sns.barplot(x = pandas_top_20['Team'],y = pandas_top_20['count'],palette = 'Set2')
```

```
Out[180]: <AxesSubplot:title={'center':'Overall Participation by Countr
y'}, xlabel='Team', ylabel='count'>
```



In [0]:

```
df1 = spark.read.option('header',True).option('mode','dropmalformed').csv('dbfs:/FileSto

df1 = df1.withColumn('Age', df1['Age'].cast(IntegerType()))   #converting age(string) in

av = df1.groupBy('Age').mean()
df1 = df1.replace('NA','av')   #Replacing NA value by mean of age

pandas_df = df1.toPandas()     # matplot to work in pyspark notebook, convert sparkDataF
# Create the age distribution histogram
plt.figure(figsize=(24, 6))
plt.title('Age Distribution of Athletes')
plt.xlabel('Age')
plt.ylabel('Number of participants')
plt.hist(pandas_df['Age'], bins= np.arange(10, 80, 2),color='orange',edgecolor='white')
plt.show()
```



In [0]:

```
#Winter Olympic Sports

winter_sports = athlete.filter(athlete['Season']=='Winter').select(athlete['Sport']).dis
winter_sports.show()
```

```
+--------------------+
|               Sport|
+--------------------+
|          Ice Hockey|
|       Alpine Skiing|
|            Biathlon|
|            Alpinism|
|      Figure Skating|
|            Skeleton|
|         Ski Jumping|
|     Nordic Combined|
|       Speed Skating|
|        Snowboarding|
|           Bobsleigh|
|Cross Country Skiing|
|Short Track Speed...|
|             Curling|
| Military Ski Patrol|
|    Freestyle Skiing|
|                Luge|
+--------------------+
```

In [0]:

```
#Winter Olympic Sports

summer_sports = athlete.filter(athlete['Season']=='Summer').select(athlete['Sport']).dis
summer_sports.show()
```

```
+-------------+
|        Sport|
+-------------+
|   Gymnastics|
|       Boxing|
|       Rowing|
|         Judo|
|      Sailing|
|     Swimming|
|   Basketball|
|     Handball|
|Equestrianism|
|    Badminton|
|    Athletics|
|     Shooting|
|    Wrestling|
|    Taekwondo|
|   Water Polo|
|Weightlifting|
|   Tug-Of-War|
|      Fencing|
|       Hockey|
|     Football|
+-------------+
only showing top 20 rows
```

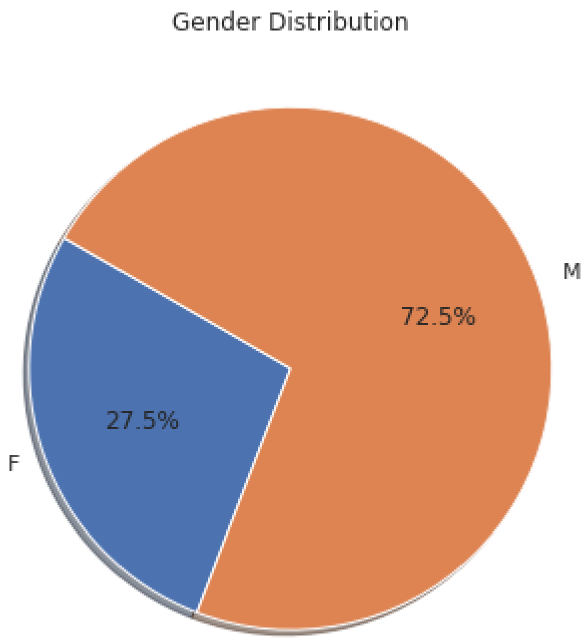
In [0]:

```
#Male and Female Participants
filtered_df = df.filter((df['Sex'] == 'M') | (df['Sex'] == 'F'))
gender_count = filtered_df.groupBy(filtered_df['Sex']).count()
gender_count.show()
```

```
+---+------+
|Sex| count|
+---+------+
|  F| 74357|
|  M|196086|
+---+------+
```

In [0]:

```
#Pie plot for male and female athletes

gender_count = gender_count.withColumn('count', gender_count['count'].cast('int'))

# Convert the PySpark DataFrame to a Pandas DataFrame for plotting
pandas_df = gender_count.toPandas()

plt.figure(figsize=(24, 6))
plt.title('Gender Distribution')
plt.pie(pandas_df['count'], labels=pandas_df['Sex'], autopct='%1.1f%%', startangle=150,
plt.show()
```



In [0]:

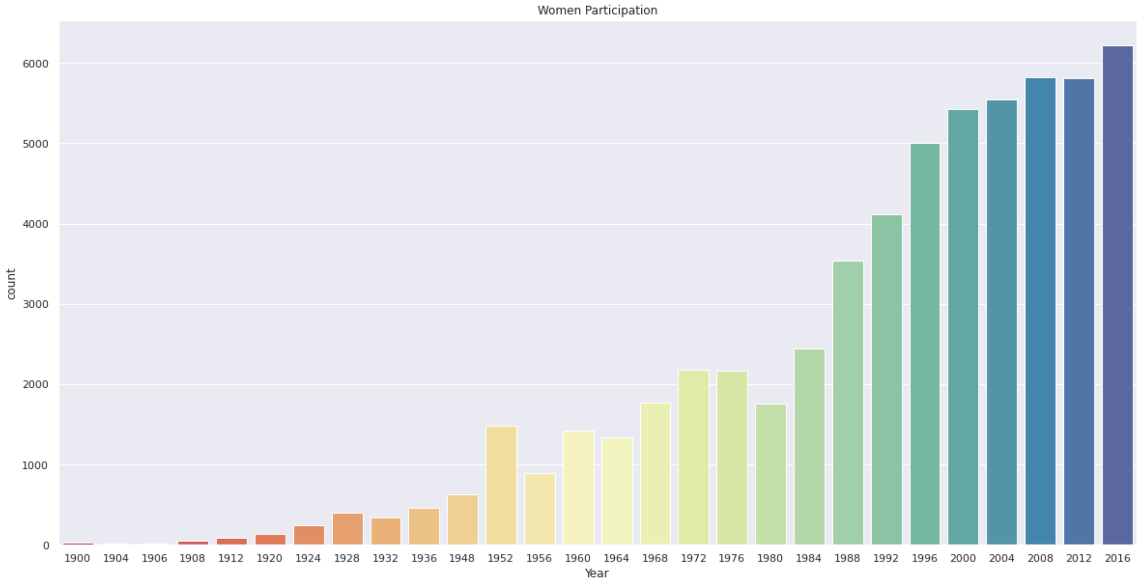
```
# Total number of female athletes in each olympics

e_part = df.filter((df['Sex'] == 'F') & (df['Season'] == 'Summer'))
e_part = e_part.groupBy(e_part['Year']).count().orderBy(col('Year'))
e_part.show()
```

```
+----+-----+
|Year|count|
+----+-----+
|1900|   32|
|1904|   16|
|1906|   11|
|1908|   47|
|1912|   87|
|1920|  133|
|1924|  243|
|1928|  401|
|1932|  337|
|1936|  459|
|1948|  624|
|1952| 1484|
|1956|  891|
|1960| 1422|
|1964| 1336|
|1968| 1767|
|1972| 2179|
|1976| 2164|
|1980| 1755|
|1984| 2442|
+----+-----+
only showing top 20 rows
```

In [0]:

```
women_oly =  df.filter((df['Sex'] == 'F') & (df['Season'] == 'Summer')).orderBy(df['Year

sns.set(style='darkgrid')
plt.figure(figsize=(20,10))
sns.countplot(x='Year',data=women_oly.toPandas(), palette='Spectral')
plt.title('Women Participation')
```

```
Out[187]: Text(0.5, 1.0, 'Women Participation')
```



In [0]:

```
# Gold medal athletes
gold_medal = df.filter(df['Medal']=="Gold")
gold_medal.show()
```

```
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+--------------+-------------+--------------------+-----+-
-------+-----+
|NOC| ID|                Name|Sex|Age|Height|Weight|          Team|      G
ames|Year|Season|          City|        Sport|               Event|Medal| 
Region|Notes|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+--------------+-------------+--------------------+-----+-
-------+-----+
|DEN|  4|Edgar Lindenau Aabye|  M| 34|  null|  null|Denmark/Sweden|1900 Su
mmer|1900|Summer|         Paris|   Tug-Of-War|Tug-Of-War Men's ...| Gold| 
Denmark| null|
|FIN| 17|Paavo Johannes Aa...|  M| 28|   175|    64|       Finland|1948 Su
mmer|1948|Summer|        London|   Gymnastics|Gymnastics Men's ...| Gold| 
Finland| null|
|FIN| 17|Paavo Johannes Aa...|  M| 28|   175|    64|       Finland|1948 Su
mmer|1948|Summer|        London|   Gymnastics|Gymnastics Men's ...| Gold| 
Finland| null|
|FIN| 17|Paavo Johannes Aa...|  M| 28|   175|    64|       Finland|1948 Su
mmer|1948|Summer|        London|   Gymnastics|Gymnastics Men's ...| Gold| 
Finland| null|
|NOR| 20|  Kjetil Andr Aamodt|  M| 20|   176|    85|        Norway|1992 Wi
nter|1992|Winter|   Albertville|Alpine Skiing|Alpine Skiing Men...| Gold| 
Norway| null|
|NOR| 20|  Kjetil Andr Aamodt|  M| 30|   176|    85|        Norway|2002 Wi
nter|2002|Winter|Salt Lake City|Alpine Skiing|Alpine Skiing Men...| Gold| 
Norway| null|
|NOR| 20|  Kjetil Andr Aamodt|  M| 30|   176|    85|        Norway|2002 Wi
nter|2002|Winter|Salt Lake City|Alpine Skiing|Alpine Skiing Men...| Gold| 
Norway| null|
|NOR| 20|  Kjetil Andr Aamodt|  M| 34|   176|    85|        Norway|2006 Wi
nter|2006|Winter|        Torino|Alpine Skiing|Alpine Skiing Men...| Gold| 
Norway| null|
|NOR| 21|Ragnhild Margreth...|  F| 27|   163|  null|        Norway|2008 Su
mmer|2008|Summer|       Beijing|     Handball|Handball Women's ...| Gold| 
Norway| null|
|NOR| 40|     Roald Edgar Aas|  M| 31|  null|  null|        Norway|1960 Wi
nter|1960|Winter|  Squaw Valley|Speed Skating|Speed Skating Men...| Gold| 
Norway| null|
|NOR| 42| Thomas Valentin Aas|  M| 25|  null|  null|        Taifun|1912 Su
mmer|1912|Summer|     Stockholm|      Sailing|Sailing Mixed 8 m...| Gold| 
Norway| null|
|FRA| 56|          Ren Abadie|  M| 21|  null|  null|        France|1956 Su
mmer|1956|Summer|     Melbourne|      Cycling|Cycling Men's Roa...| Gold| 
France| null|
|BLR| 72|Aleksey Aleksandr...|  M| 28|   180|    83|       Belarus|2008 Su
mmer|2008|Summer|       Beijing|     Canoeing|Canoeing Men's Ka...| Gold| 
Belarus| null|
|FRA| 73|           Luc Abalo|  M| 23|   182|    86|        France|2008 Su
mmer|2008|Summer|       Beijing|     Handball|Handball Men's Ha...| Gold| 
France| null|
|FRA| 73|           Luc Abalo|  M| 27|   182|    86|        France|2012 Su
mmer|2012|Summer|        London|     Handball|Handball Men's Ha...| Gold| 
France| null|
|CMR| 76|Jouan Patrice Aba...|  M| 22|   185|    82|      Cameroon|2000 Su
mmer|2000|Summer|        Sydney|     Football|Football Men's Fo...| Gold|C
ameroon| null|
|ESP| 80|Jos Mara Abarca P...|  M| 22|   186|    83|         Spain|1996 Su
mmer|1996|Summer|       Atlanta|   Water Polo|Water Polo Men's ...| Gold| 
Spain| null|
|ESP| 85|Alejandro Abascal...|  M| 28|   181|    82|         Spain|1980 Su
```

```
mmer|1980|Summer|        Moskva|      Sailing|Sailing Mixed Two...| Gold|
Spain| null|
|FRA| 93|      Jol Marc Abati|  M| 38|   190|    85|        France|2008 Su
mmer|2008|Summer|       Beijing|     Handball|Handball Men's Ha...| Gold|
France| null|
|ITA|106|  Agostino Abbagnale|  M| 22|   188|    96|         Italy|1988 Su
mmer|1988|Summer|         Seoul|       Rowing|Rowing Men's Quad...| Gold|
Italy| null|
+---+---+--------------------+---+---+------+------+--------------+-------
----+----+------+--------------+-------------+--------------------+-----+-
------+-----+
only showing top 20 rows
```

In [0]:

```
df = df.withColumn('Age', col('Age').cast(IntegerType()))

# Filter for rows where the 'Medal' is 'Gold' or the 'Age' is greater than 60
gold_medal = df.filter((df['Medal'] == 'Gold') & (df['Age'] > 60) ).select(['ID','Sport'

gold_medal.show()
```

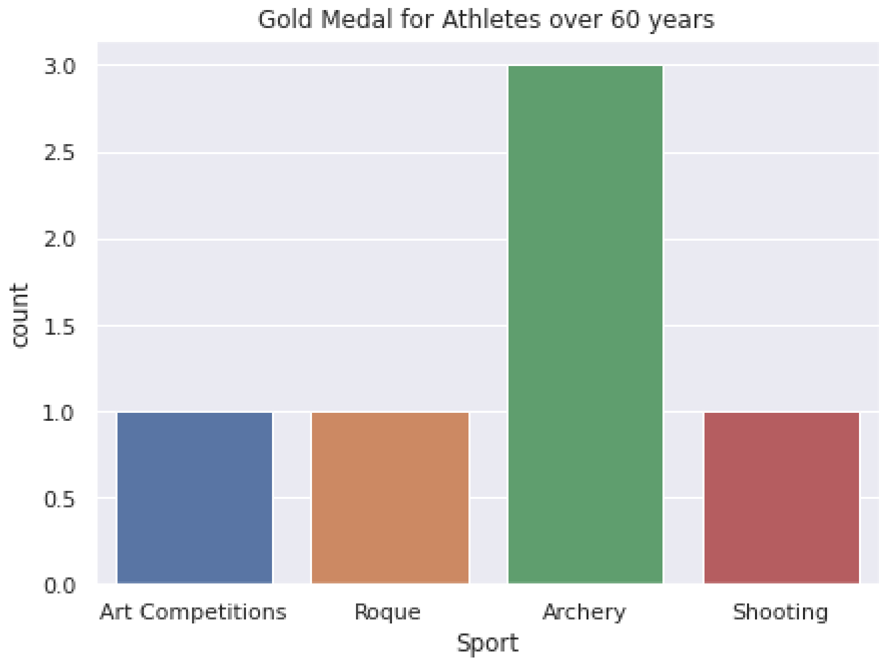
```
+------+----------------+
|    ID|           Sport|
+------+----------------+
| 52626|Art Competitions|
| 53238|           Roque|
| 95906|         Archery|
|113773|         Archery|
|117046|        Shooting|
|130662|         Archery|
+------+----------------+
```

In [0]:

In [0]:

```
#plot for Sport Event

plt.figure(figsize=(7,5))
plt.tight_layout
sns.countplot(x = 'Sport', data = gold_medal.toPandas())
plt.title('Gold Medal for Athletes over 60 years')
```

```
Out[190]: Text(0.5, 1.0, 'Gold Medal for Athletes over 60 years')
```



In [0]:

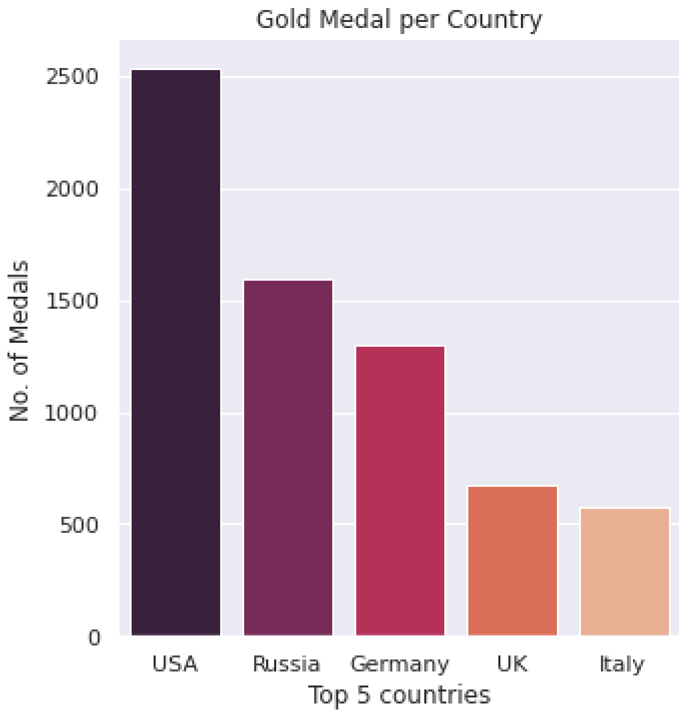
```
# Gold Medal for each country

gold_country = df.filter(df['Medal'] == 'Gold').groupBy('Region').count().orderBy(col('c
gold_country
```

	Region	count
0	USA	2535
1	Russia	1597
2	Germany	1300
3	UK	677
4	Italy	575

In [0]:

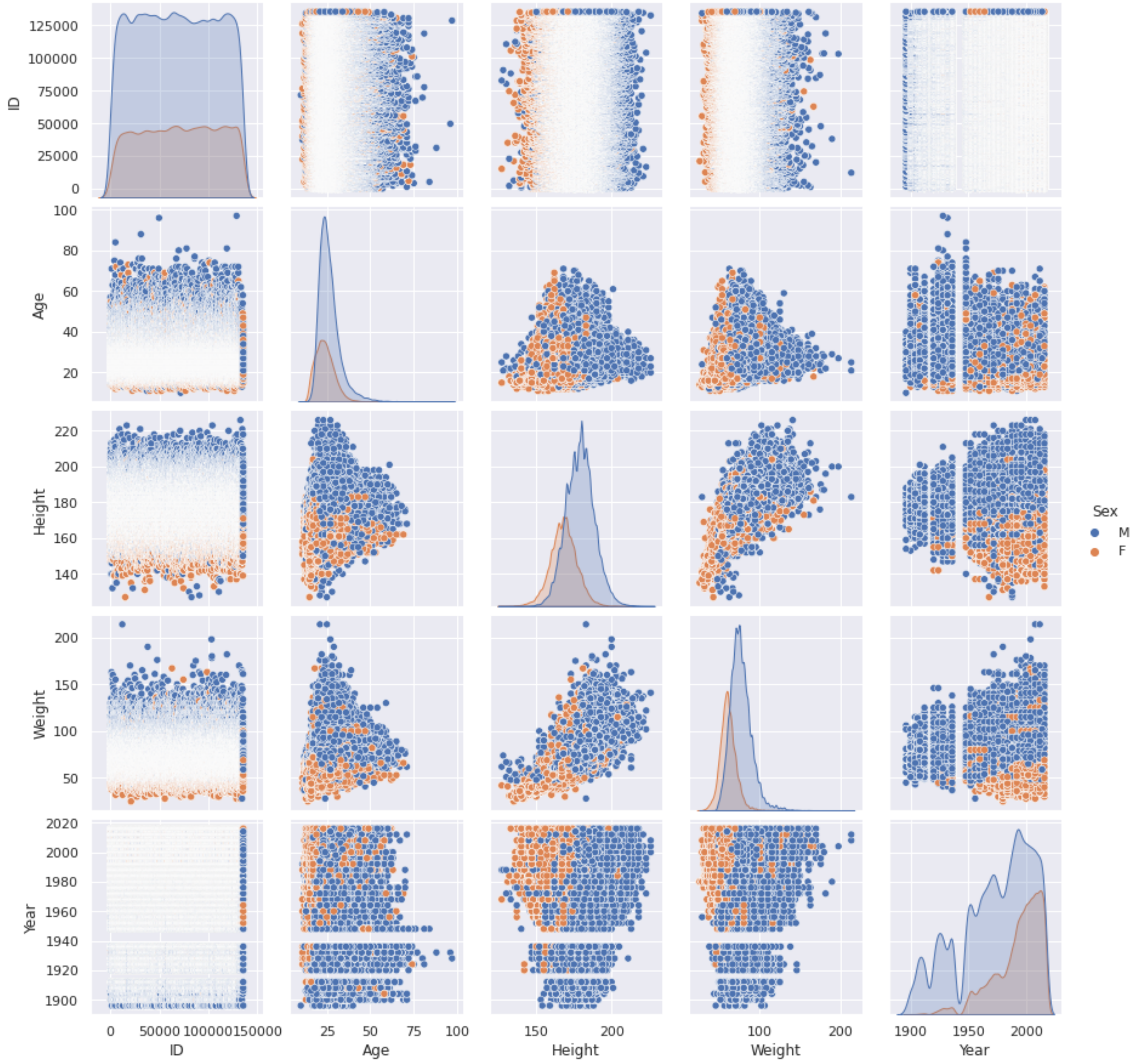
```
g = sns.catplot(x='Region', y='count', data=gold_country, height=5, kind='bar', palette=
g.despine(left=True)
g.set_xlabels('Top 5 countries')
g.set_ylabels('No. of Medals')
plt.title('Gold Medal per Country')
```

```
Out[192]: Text(0.5, 1.0, 'Gold Medal per Country')
```



In [0]:

```
sns.pairplot(data = df.toPandas(),hue='Sex')
plt.grid()
plt.show()
```


ID
Age
Height
Weight
Year
ID
Age
Height
Weight
Year
Sex
M
F