Spark Assignment 22.1

This assignment is about **Census data analysis**

This assignment is done in the spark shell of Acadgild VM.

Used the dataset from the below link to solve the problem statements given below.

https://drive.google.com/open?id=0ByJLBTmJojjzWllGZFJFaXFVbU0

Due to the limitation of 22 elements for a map function, we are taking only 22 columns from the data set.
Here is the total dataset description

State String,District String,Persons String,Males int,Females int,Growth_1991_2001 int,Rural int,Urban int,Scheduled_Caste_population int,Percentage_SC_to_total int,Number_of_households int,Household_size_per_household int,Sex_ratio_females_per_1000_males int ,Sex_ratio_0_6_years int,Scheduled_Tribe_population int,Percentage_to_total_population_ST int,Persons_literate int,Males_Literate int,Females_Literate int,Persons_literacy_rate int,Males_Literatacy_Rate int,Females_Literacy_Rate int,Total_Educated int,Data_without_level int,Below_Primary int,Primary int,Middle int,Matric_Higher_Secondary_Diploma int,Graduate_and_Above int,X0_4_years int,X5_14_years int,X15_59_years int,X60_years_and_above_Incl_ANS int,Total_workers int,Main_workers int,Marginal_workers int,Non_workers int,SC_1_Name String,SC_1_Population int,SC_2_Name String,SC_2_Population int,SC_3_Name String,SC_3_Population int,Religeon_1_Name String,Religeon_1_Population int,Religeon_2_Name String,Religeon_2_Population int,Religeon_3_Name String,Religeon_3_Population int,ST_1_Name String,ST_1_Population int,ST_2_Name String,ST_2_Population int,ST_3_Name String,ST_3_Population int,Imp_Town_1_Name String,Imp_Town_1_Population int,Imp_Town_2_Name String,Imp_Town_2_Population int,Imp_Town_3_Name String,Imp_Town_3_Population int,Total_Inhabited_Villages int,Drinking_water_facilities int,Safe_Drinking_water int,Electricity_Power_Supply int,Electricity_domestic int,Electricity_Agriculture int,Primary_school int,Middle_schools int,Secondary_Sr_Secondary_schools int,College int,Medical_facility int,Primary_Health_Centre int,Primary_Health_Sub_Centre int,Post_telegraph_and_telephone_facility int,Bus_services int,Paved_approach_road int,Mud_approach_road int,Permanent_House int,Semi_permanent_House int,Temporary_House int

Here is what we are taking

"State" ,"Persons","Males" ,"Females" ,"Growth_1991_2001" ,"Rural" ,"Urban" ,"Scheduled_Caste_population" ,"Percentage_SC_to_total" ,"Number_of_households"

,"Household_size_per_household" ,"Sex_ratio_females_per_1000_males "
,"Sex_ratio_0_6_years" ,"Scheduled_Tribe_population" ,"Percentage_to_total_population_ST"
,"Persons_literate" ,"Males_Literate" ,"Females_Literate" ,"Persons_literacy_rate"
,"Males_Literatacy_Rate" ,"Females_Literacy_Rate" ,"Total_Educated"

Steps Followed:

Copied the dataset file in the path /home/acadgild/spark/22_1.census.csv. Then read the text file by using sc.textfile as below.

```
val census_data = sc.textFile("/home/acadgild/spark/22_1.census.csv").map(x =>
x.split(",")).map(x =>
(x(0),x(2),x(3),x(4),x(5),x(6),x(7),x(8),x(9),x(10),x(11),x(12),x(13),x(14),x(15),x(16),x(17),x(18
),x(19),x(20),x(21),x(22))).toDF("State" ,"Persons","Males" ,"Females" ,"Growth_1991_2001"
,"Rural" ,"Urban" ,"Scheduled_Caste_population" ,"Percentage_SC_to_total"
,"Number_of_households" ,"Household_size_per_household"
,"Sex_ratio_females_per_1000_males " ,"Sex_ratio_0_6_years" ,"Scheduled_Tribe_population"
,"Percentage_to_total_population_ST" ,"Persons_literate" ,"Males_Literate" ,"Females_Literate"
,"Persons_literacy_rate" ,"Males_Literatacy_Rate" ,"Females_Literacy_Rate"
,"Total_Educated").registerTempTable("census")
```

1. Find out the state wise population and order by state

To find the statewise total population, we are selecting the state and sum(person) from census and grouping the population over each state, which will give state and total population for each state. Finally ordering in a way that state in terms of ascending order of state.

```
val population = spark.sql("select state,sum(persons) as total_population from census group by
state order by state").show
```

Output:

```
+----------------+----------------+
|           state|total_population|
+----------------+----------------+
|              AN|        356152.0|
|          Andhra|     7.1308587E7|
|ArunachalPradesh|       1097968.0|
|           Assam|     2.6655528E7|
|           Bihar|     8.2998509E7|
|              CG|     2.0833803E7|
|      Chandigarh|        900635.0|
|             D_D|        158204.0|
|           D_N_H|        220490.0|
|           Delhi|     1.3850507E7|
|             Goa|       1347668.0|
|         Gujarat|     5.0671017E7|
|              HP|       6077900.0|
|         Haryana|     2.1144564E7|
|              JK|       1.01437E7|
|       Jharkhand|     2.6945829E7|
```

```
|        Karnataka|     5.2850562E7|
|           Kerala|     3.1841374E7|
|       Lakshdweep|         60650.0|
|               MP|     6.0348023E7|
+-----------------+-----------------+
```

Spark Shell Output:

```
scala> val population = spark.sql("select state,sum(persons) as total_population from census group by state order by state").show
+---------------+----------------+
|          state|total_population|
+---------------+----------------+
|             AN|        356152.0|
|          Andhra|    7.1308587E7|
|ArunachalPradesh|       1097968.0|
|           Assam|    2.6655528E7|
|           Bihar|    8.2998509E7|
|              CG|    2.0833803E7|
|      Chandigarh|        900635.0|
|             D_D|        158204.0|
|           D_N_H|        220490.0|
|           Delhi|    1.3850507E7|
|             Goa|       1347668.0|
|         Gujarat|    5.0671017E7|
|               HP|       6077900.0|
|         Haryana|    2.1144564E7|
|               JK|        1.01437E7|
|       Jharkhand|    2.6945829E7|
|       Karnataka|    5.2850562E7|
|          Kerala|    3.1841374E7|
|      Lakshdweep|         60650.0|
|               MP|    6.0348023E7|
+---------------+----------------+
only showing top 20 rows

population: Unit = ()
```

2. *Find out the Growth Rate of Each State Between 1991-2001*

To find the growth rate of each state between 1991-2001, we are selecting the state and avg(Growth_1991_2001) from census and grouping the growth over each state, which will give state and growth rate population as output.

```
val growth_rate = spark.sql("select state,avg(Growth_1991_2001) as total_growth from census group by state").show
```

Output:

```
+----------------+------------------+
|           state|      total_growth|
+----------------+------------------+
|        Nagaland|           64.92375|
|       Karnataka|15.506666666666668|
|           D_N_H|              59.2|
|          Kerala| 9.354999999999999|
|          Punjab| 18.87705882352941|
|              CG|17.506249999999998|
|         Manipur|29.240000000000002|
|              HP| 17.53083333333333|
```

```
|              Goa|             15.045|
|          Mizoram| 30.64428571428571|
|           Orrisa|15.551379310344826|
|ArunachalPradesh| 25.46999999999999|
|         Meghalya| 32.81428571428571|
|               WB|18.424999999999997|
|          Haryana|27.816842105263152|
|         Jharkhand| 23.79666666666667|
|           Gujarat|            20.8248|
|                TN|10.127666666666668|
|            Andhra|14.571818181818184|
|                UP| 25.70228571428572|
+-----------------+------------------+
```

Spark Shell Output:

```
scala> val growth_rate = spark.sql("select state,avg(Growth_1991_2001) as total_growth from census group by state").show
+---------------+-----------------+
|          state|      total_growth|
+---------------+-----------------+
|        Nagaland|          64.92375|
|       Karnataka|15.506666666666668|
|           D_N_H|             59.2|
|          Kerala| 9.354999999999999|
|          Punjab| 18.87705882352941|
|              CG|17.506249999999998|
|         Manipur|29.240000000000002|
|               HP| 17.53083333333333|
|              Goa|            15.045|
|          Mizoram| 30.64428571428571|
|           Orrisa|15.551379310344826|
|ArunachalPradesh| 25.46999999999999|
|         Meghalya| 32.81428571428571|
|               WB|18.424999999999997|
|          Haryana|27.816842105263152|
|         Jharkhand| 23.79666666666667|
|           Gujarat|            20.8248|
|                TN|10.127666666666668|
|            Andhra|14.571818181818184|
|                UP| 25.70228571428572|
+---------------+-----------------+
only showing top 20 rows

growth_rate: Unit = ()
```

3. Find the literacy rate of each state

To find the literacy rate of each state, we are selecting the state and avg(Persons_literacy_rate) from census and grouping the literacy over each state, which will give state and literacy rate population as output.

```
val literacy = spark.sql("select state,avg(Persons_literacy_rate) from census group by state").show
```

Output:

```
+---------------+-----------------------------------------+
|          state|avg(CAST(Persons_literacy_rate AS DOUBLE))|
+---------------+-----------------------------------------+
|        Nagaland|                                  68.52875|
|       Karnataka|                       65.72666666666666|
|           D_N_H|                                    57.63|
|          Kerala|                       90.52285714285713|
|          Punjab|                       68.61176470588235|
```

```
|               CG|                          63.02312499999999|
|          Manipur|                                    68.6125|
|               HP|                          75.50833333333333|
|              Goa|                          81.78999999999999|
|          Mizoram|                          85.55375000000001|
|           Orrisa|                          59.97965517241381|
|ArunachalPradesh|                         53.166923076923084|
|         Meghalya|                         60.722857142857144|
|               WB|                                       66.07|
|          Haryana|                          68.24473684210527|
|        Jharkhand|                          50.51166666666667|
|          Gujarat|                          67.07480000000001|
|               TN|                          72.94266666666665|
|           Andhra|                          59.29363636363637|
|               UP|                          56.01057142857144|
+-----------------+-------------------------------------------+
```

Spark Shell Output:

```
scala> val literacy = spark.sql("select state,avg(Persons_literacy_rate) from census group by state").show
+----------------+-------------------------------------------+
|           state|avg(CAST(Persons_literacy_rate AS DOUBLE))|
+----------------+-------------------------------------------+
|        Nagaland|                                    68.52875|
|       Karnataka|                          65.72666666666666|
|           D_N_H|                                      57.63|
|          Kerala|                          90.52285714285713|
|          Punjab|                          68.61176470588235|
|              CG|                          63.02312499999999|
|          Manipur|                                    68.6125|
|               HP|                          75.50833333333333|
|              Goa|                          81.78999999999999|
|          Mizoram|                          85.55375000000001|
|           Orrisa|                          59.97965517241381|
|ArunachalPradesh|                         53.166923076923084|
|         Meghalya|                         60.722857142857144|
|               WB|                                       66.07|
|          Haryana|                          68.24473684210527|
|        Jharkhand|                          50.51166666666667|
|          Gujarat|                          67.07480000000001|
|               TN|                          72.94266666666665|
|           Andhra|                          59.29363636363637|
|               UP|                          56.01057142857144|
+----------------+-------------------------------------------+
only showing top 20 rows

literacy: Unit = ()
```

4. Find out the States with More Female Population

To find the state with more female population, we are selecting the state, sum(male), sum(female) from census and finding sum(females) > sum(males) as more_female and grouping over each state, then register as a temporary table.

Then selecting state and filtering where more_female is true and calling show fuction to display the result.

```
val female_pop = spark.sql("select state,  (sum(Females)> sum(Males)) as more_female  from census group by state").registerTempTable("female_pop ")
```

```
val female_pop_res= spark.sql("select state,  more_female  from female_pop  where more_female =true").show
```

Output:

```
+-----------+-----------+
|      state|more_female|
+-----------+-----------+
|     Kerala|       true|
|Pondicherry|       true|
+-----------+-----------+
```

Spark Shell Output:

```
scala> val female_pop = spark.sql("select state,  (sum(Females)> sum(Males)) as more_female  from census group by state").registerTe
mpTable("female_pop ")
warning: there was one deprecation warning; re-run with -deprecation for details
female_pop: Unit = ()

scala> val female_pop_res= spark.sql("select state,  more_female  from female_pop  where more_female =true").show
+-----------+-----------+
|      state|more_female|
+-----------+-----------+
|     Kerala|       true|
|Pondicherry|       true|
+-----------+-----------+

female_pop_res: Unit = ()
```

5. Find out the Percentage of Population in Every State

To find the percentage of population in every state, we are selecting the state and sum(person)/SUM(sum(persons) * 100, which will return the percentage of population and finally grouping over each state and displaying the result using show function

```
val percenet_pop = spark.sql("select state, (sum(persons) * 100.0) / SUM(sum(persons)) over() as percent_pop_by_state from census group by state").show
```

Output:

```
+----------------+--------------------+
|           state|percent_pop_by_state|
+----------------+--------------------+
|        Nagaland| 0.19464122457545488|
|       Karnataka|   5.169202018044398|
|           D_N_H| 0.02156566193106157|
|          Kerala|  3.1143376439044568|
|          Punjab|  2.3825023239741796|
|              CG|  2.0377103371415317|
|         Manipur| 0.19662075848548596|
|              HP|  0.5944665819347776|
|             Goa| 0.13181256512000492|
|         Mizoram| 0.08690945130876308|
|          Orrisa|   3.488284891601744|
|ArunachalPradesh| 0.10738993468694186|
|        Meghalya| 0.22679908989209513|
```

```
|               WB|   7.841864753141607|
|          Haryana|  2.0681052152192616|
|        Jharkhand|  2.6355147111714583|
|          Gujarat|   4.956025317815201|
|               TN|   6.103767861999858|
|           Andhra|   6.974542519042551|
|               UP|   16.25546817511578|
+-----------------+--------------------+
```

Spark Shell Output:

```
scala> val percenet_pop = spark.sql("select state, (sum(persons) * 100.0) / SUM(sum(persons)) over() as percent_pop_by_state from ce
nsus group by state").show
+---------------+--------------------+
|          state|percent_pop_by_state|
+---------------+--------------------+
|       Nagaland| 0.19464122457545488|
|      Karnataka|   5.169202018044398|
|           D_N_H| 0.02156566193106157|
|         Kerala|  3.1143376439044568|
|         Punjab|  2.3825023239741796|
|             CG|  2.0377103371415317|
|        Manipur| 0.19662075848548596|
|             HP|  0.5944665819347776|
|            Goa| 0.13181256512000492|
|        Mizoram| 0.08690945130876308|
|         Orrisa|   3.488284891601744|
|ArunachalPradesh| 0.10738993468694186|
|       Meghalya| 0.22679908989209513|
|             WB|   7.841864753141607|
|        Haryana|  2.0681052152192616|
|      Jharkhand|  2.6355147111714583|
|        Gujarat|   4.956025317815201|
|             TN|   6.103767861999858|
|         Andhra|   6.974542519042551|
|             UP|   16.25546817511578|
+---------------+--------------------+
only showing top 20 rows

percenet_pop: Unit = ()
```