Report

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Code Repository: https://github.ccs.neu.edu/pdpmr-f17/a6-jashangeet-shreysa.git

Specifications of host execution Environment

Attribute	Value
Java Version	1.8.0_102
Java(TM) SE Runtime Environment	(build 1.8.0_102-b14)
Java HotSpot(TM) 64-Bit Server VM	(build 25.102-b14, mixed mode)
Model Identifier	MacBookPro11,2
Processor Name	Intel Core i7
Processor Speed	2.2 GHz
Number of Processors	1
Total Number of Cores	4
L2 Cache (per Core)	256 KB
L3 Cache	6 MB
Memory	16 GB
Driver Memory	2 GB
Executor Memory	2 GB

Summary of the design of evaluated program

The implementation involves reading the data and putting it in SparkContext. We have created a class CleanUp which does the clean up validuty checks on the provided data and returns the desired column value. We have written a simple CheckValidity method in CleanUp class where we have put all the validity checks as per our assumptions below. The SongAnalysis object is the entry point to the program that taken in song_info.csv and artist_terms.csv locations as arguments and calls the methods in the CleanUp class to get the desired output.

Data Analysis

Assumptions

For loudness of song, the closer the loudness score to 0 in negative, the louder the song. If value is 0, then it is an invalid entry. We have taken the Song Id, Song Name and Loudness score combination to represent the loudness score. This combination is unique. So if there is a song with same id and same name but different loudness score or any of the other combinations it would appear as a distinct entry in the list.

For longness of song, the duration should be greater than 0, the larger the value, longer is the song. We have taken the Song Id, Song Name and duration combination to represent the longest songs. This combination is unique.

For fastness of song, the larger the value of tempo, the faster is the song. We have taken the Song Id, Song Name and tempo score combination to represent the how fast the song is. This combination is unique.

For artist familiarity, the higher the value from 0, the more is the score. If value is 0 or less than 0, record is invalid We have taken artist name, artist id and artist familiarity score combination to represent the artist

familiarity. This combination is unique. So if there is an artist with same id but different name and different familiarity score or any of the other combinations it would appear as a distinct entry in the list.

For song hottness and artist hottness the values should be between 0 and 1. Any value less than 0 or greater than 1 is invalid. We have taken song id or artist id, song name or artist name and song hotness or artist hotness score combination to represent the song hotness and artist hotness respectively. This combination is unique. So if there is an artist or a song with same id but different name or different hotness score or any of the other combinations it would appear as a distinct entry in the list.

For the bigger dataset :

Number of distinct songs: 999056

Number of distinct artists: 44745

Number of distinct albums: 149275

Top 5 loudest songs:

(Assumption: the Song Id, Song Name and Loudness Score combination is unique)

Song Id	Song Name	Loudness Score
SOAKZAH12AB0187EA3	The Spectre's Sinister Commandment)	-0.003
SOCYUFX12AAF3B3952	Yff_ Lou Pappans	-0.048
SOBUICA12AB01810FC	High Holidays	-0.073
SOWAPWP12A58A76F49	Burning Wire	-0.086
SOLQHPP12AB0187EC7	I Know What You Want	-0.086

Top 5 longest songs:

(Assumption: the Song Id, Song Name and duration combination is unique)

Song Id	Song Name	Duration
SOOUBST12AC90977B6	Grounation	3034.90567
SOXUCQN12A6D4FC451	Raag - Shuddha KalyaN	3033.5995
SOOMVZJ12AB01878EB	Discussion 2	3033.44281
SOTNVEE12A8C13F470	Chapitre Un (a): Toutes Les Histoires	3032.76363
SOGFXNB12A8C137BE5	Der Geist des Llano Estacado Ein Spion	3032.58077

Top 5 fastest songs:

(Assumption: the Song Id, Song Name and Tempo Score combination is unique)

Song Id	Song Name	Tempo Score
SOVVTEZ12AB0184AAB	Beep Beep	302.3
SOMSJWX12AB017DB99	Late Nite Lounge: WVIP	296.469
SOUTBKH12A8C136286	A Place Called Hope	285.157
SOEVQJB12AC960DA2C	Bellas Lullaby - Perrier Citron	284.208
SOTUXOB12AB0188C3A	Troubled Times	282.573

Top 5 most familiar artists:

(Assumption: the Artist Name, Artist Id and Familiarity Score combination is unique)

Artist Name	Artist Id	Familiarity Score
Akon	ARCGJ6U1187FB4D01F	1.0
Akon_ San Quinn_ JT the Bigga Figga	ARCGJ6U1187FB4D01F	1.0
Akon / Eminem	ARCGJ6U1187FB4D01F	1.0
Akon / Styles P	ARCGJ6U1187FB4D01F	1.0
Akon / Wyclef Jean	ARCGJ6U1187FB4D01F	1.0

Top 5 Hot artists:

(Assumption: the Artist Name, Artist Id and Hotness Score combination is unique)

Artist Name	Artist Id	Hotness Score
Daft Punk	ARF8HTQ1187B9AE693	0.997066533839045
Daft Punk	ARF8HTQ1187B9AE693	0.997004803235357
Black Eyed Peas	ARTDQRC1187FB4EFD4	0.982623202516712
Kanye West	ARRH63Y1187FB47783	0.972399563931911
Kanye West / Jamie Foxx	ARRH63Y1187FB47783	0.972399563931911

Top 5 hottest songs:

(Assumption: the Song Id, Song Name and Hotness Score combination is unique)

Song Id	Song Name	Hotness Score
SONMVZB12AB01829BA	Der Maggot Tango	0.521321041187445
SOAGFNE12A8C134D82	Donde Caigo	0.454192988218022
SOIUPEW12A8C13BCB2	Willow Weep For Me (Live)	0.266955186275539
SOAYGMO12A6D4F69E8	I'd Have Never Found Somebody New	0.249065794853703
SOFJZNE12A8AE45C1F	The blind Walk Over The Edge	0.492398352817721

Top 5 hottest genres (mean artists hotness in artist_term)

Genres	Mean Hotness
christmas song	0.6084021138630802
kotekote	0.602220551426267
girl rockers	0.5737886278082237
alternative latin	0.573758864329941
bamboozle 09	0.570567389210622

Top 5 Prolific artists:

(Assumption: the Artist Id, Artist Name and Hotness Score combination is unique)

Artist Id	Artist Name	Number of songs by the artist
AR6681Y1187FB39B02	Ike & Tina Turner	208

Artist Id	Artist Name	Number of songs by the artist
ARXPPEY1187FB51DF4	Michael Jackson	204
ARH861H1187B9B799E	Johnny Cash	201
AR8L6W21187B9AD317	Diana Ross & The Supremes	196
ARLHO5Z1187FB4C861	Beastie Boys	194

Top 5 most popular keys (must have confidence > 0.7):

Key	Ocurrances
7	53144
9	46855
2	46431
4	35099
11	35078

Top 5 most common words in song titles (excluding articles, prepositions, conjunctions):

Word	Ocurrances
LOVE	9882
LIVE	6192
YOUR	5333
NO	4822
REMIX	4462

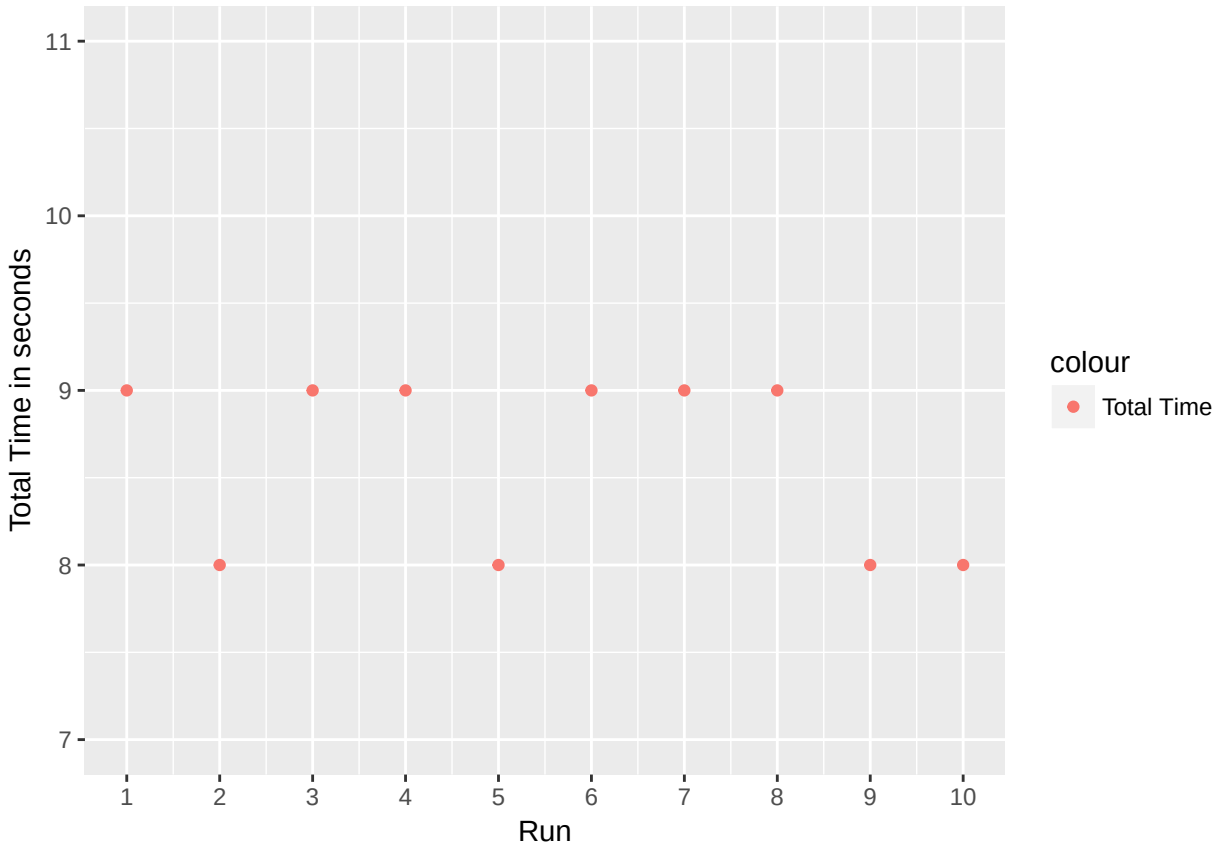
Performance Analysis

Table 1: Time taken for 10 runs on small dataset

Run	total_time	total_avg_time
1	9	8.6
2	8	8.6
3	9	8.6
4	9	8.6
5	8	8.6
6	9	8.6
7	9	8.6
8	9	8.6
9	8	8.6
10	8	8.6

The above table represents the total time taken and total average time of 10 runs of Scala job in seconds. Each run takes about 8.6 seconds to finish. These values are for the subset on the assignment page on the local machine.

Plot 1: Total time in seconds vs Run for the subset



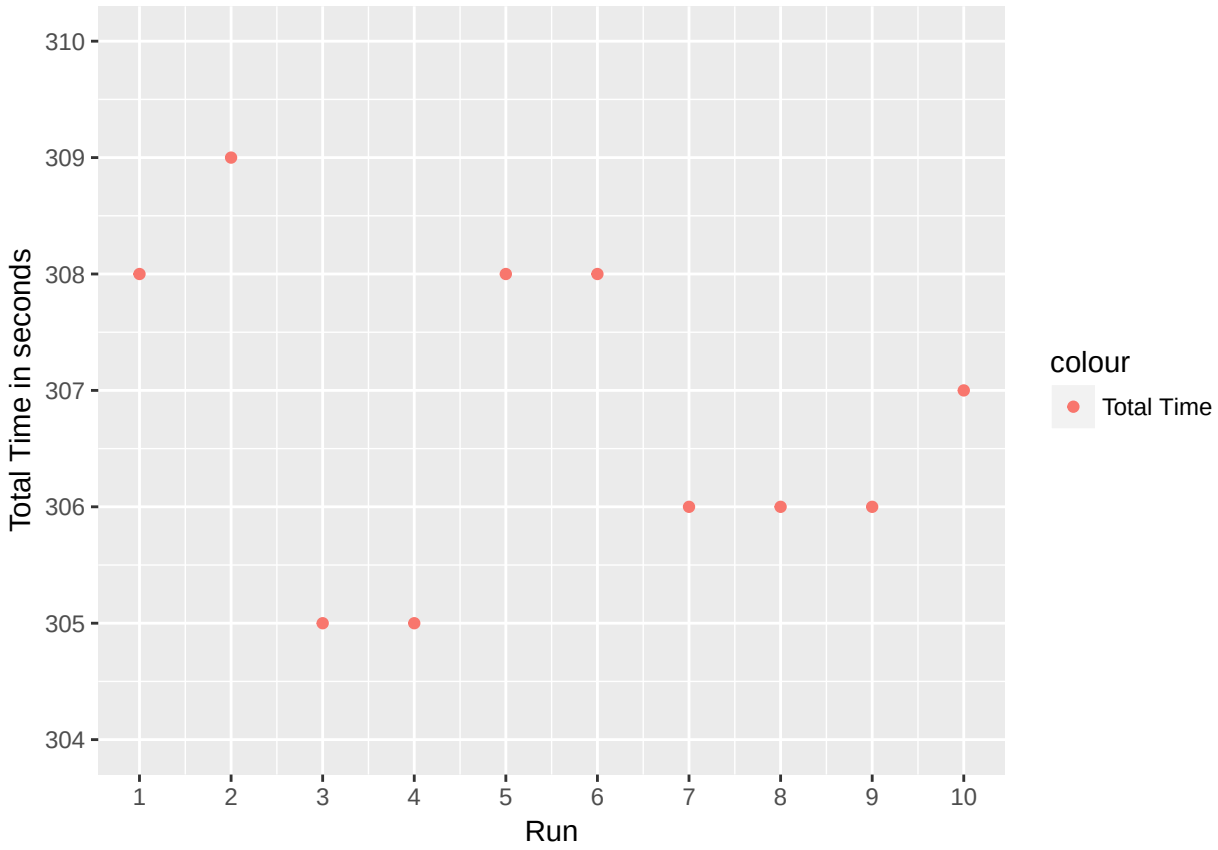
Plot 1 represents the graph for the data shown in table 1. This represents the total time taken by each run in seconds on the small dataset. It can be seen from the graph that the values range between 5 to 7 seconds averaging out to 5.9 seconds for 10 runs.

Table 2: Time taken for 10 runs on complete dataset

Run	total_time	total_avg_time
1	308	306.8
2	309	306.8
3	305	306.8
4	305	306.8
5	308	306.8
6	308	306.8
7	306	306.8
8	306	306.8
9	306	306.8
10	307	306.8

Table 2 represents the total time taken and total average time of 10 runs of Scala job in seconds for the complete dataset. Each run takes about 306.8 seconds to finish. It is noticed that all the requirements but "top 5 hottest genres (mean artists hotness in artist_term)" finish in about 80 seconds, however the query mentioned involves a join and hence takes the majority of the time.

Plot 2: Total time in seconds vs Run for the big dataset



Plot 2 represents the graph for the data shown in table 2. This represnts the total time taken by each run in seconds on the complete dataset. It can be seen from the graph that the values range between 305 to 308 seconds averaging out to 306.8 seconds for 10 runs.

Conclusion

The program analysis some features of the Million song dataset. It was observed that if scala is picking up features from the same file, it runs fairly fast however while joining data points from 2 seperate files makes the program run very very slow. All the requirements but "top 5 hottest genres (mean artists hotness in artist_term)" finish in about 70 seconds but the one mentioned takes about 236 seconds alone. Also, we cleaned up the data before doing any analysis, hence the number of records in each requirement appear to be less than it should have been. Instead we could have put individual cheacks on columns before we analysed them. That would have given greater counts.