Analyzing Wikipedia Articles

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Be advised: A lot of assumptions about the data were made to simplify these queries.

Question 1 Result

Which English wikipedia article got the most traffic on October 20?

- Most traffic/popular page is Main_Page with 5,961,008 count of views.
- It took about 5 mins to complete the job, even though, the log says 10.

```
2020-10-31 00:16:08,045 Stage-2 map = 0%,  reduce = 0%
2020-10-31 00:16:13,162 Stage-2 map = 50%,  reduce = 0%, Cumulative CPU 3.35 sec
2020-10-31 00:16:20,281 Stage-2 map = 100%,  reduce = 0%, Cumulative CPU 14.27 sec
2020-10-31 00:16:21,297 Stage-2 map = 100%,  reduce = 100%, Cumulative CPU 15.58 sec
MapReduce Total cumulative CPU time: 15 seconds 580 msec
Ended Job = job_1604125540383_0005
MapReduce Jobs Launched:
Stage-Stage-1: Map: 18  Reduce: 19   Cumulative CPU: 594.0 sec   HDFS Read: 4616038853 HDFS Write: 270377994 SUCCESS
Stage-Stage-2: Map: 2  Reduce: 1   Cumulative CPU: 15.58 sec   HDFS Read: 270393618 HDFS Write: 414 SUCCESS
Total MapReduce CPU Time Spent: 10 minutes 9 seconds 580 msec
OK
+---------------------------+--------------+
|    newtable.page_title    | total_views  |
+---------------------------+--------------+
| Main_Page                 | 5961008      |
| Special:Search            | 1476831      |
| -                         | 544714       |
| Jeffrey_Toobin            | 321459       |
| C._Rajagopalachari        | 210558       |
| The_Haunting_of_Bly_Manor | 185139       |
| Robert_Redford            | 178779       |
| Jeff_Bridges              | 159163       |
| Bible                     | 151484       |
| Chicago_Seven             | 149966       |
+---------------------------+--------------+
10 rows selected (158.252 seconds)
0: jdbc:hive2://>
```

Question 1

Assumptions:

- October 20, 2020
- English wikipedia articles have domain_codes en and en.m

Steps:

1. Combined 24 files of October 20, 2020 into one big one, then populate the table. (Push to HDFS)
2. One query with 1 nested query:
    a. Nested query that gets en and en.m elements and their sum of count_views (no duplicates)
    b. Outer query to combine similar article names from both en and en.m by summing count_views one more time.

Question 2 Result

What English wikipedia article has the largest fraction of its readers follow an internal link to another wikipedia article?

- The English Wikipedia article that has largest fraction is Lists_of_deaths_by_year (112,328/147,800)

```
2020-11-02 21:16:27,446 Stage-4 map = 0%,  reduce = 0%
2020-11-02 21:16:31,530 Stage-4 map = 100%,  reduce = 0%, Cumulative CPU 1.18 sec
2020-11-02 21:16:35,586 Stage-4 map = 100%,  reduce = 100%, Cumulative CPU 2.29 sec
MapReduce Total cumulative CPU time: 2 seconds 290 msec
Ended Job = job_1604346441296_0081
MapReduce Jobs Launched:
Stage-Stage-1: Map: 6  Reduce: 6   Cumulative CPU: 200.06 sec   HDFS Read: 1422448402 HDFS Write: 78930852 SUCCESS
Stage-Stage-5: Map: 6  Reduce: 1   Cumulative CPU: 68.27 sec   HDFS Read: 1422406506 HDFS Write: 59015 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 8.62 sec   HDFS Read: 78939346 HDFS Write: 39646 SUCCESS
Stage-Stage-7: Map: 1   Cumulative CPU: 1.8 sec   HDFS Read: 66455 HDFS Write: 55510 SUCCESS
Stage-Stage-4: Map: 1  Reduce: 1   Cumulative CPU: 2.29 sec   HDFS Read: 63332 HDFS Write: 665 SUCCESS
Total MapReduce CPU Time Spent: 4 minutes 41 seconds 40 msec
OK
+--------------------------------+--------------------------------------+-----------+
|            referrer            |              requested               | fraction  |
+--------------------------------+--------------------------------------+-----------+
| Lists_of_deaths_by_year        | Deaths_in_2020                       | 0.76      |
| Elizabeth_Gillies              | Michael_Corcoran_(musician)          | 0.74      |
| Mr._Miyagi                     | Pat_Morita                           | 0.72      |
| Payback_(2020)                 | Clash_of_Champions_(2020)            | 0.71      |
| I'm_Thinking_of_Ending_Things  | I'm_Thinking_of_Ending_Things_(film) | 0.65      |
| Jane_C._Ginsburg               | James_Steven_Ginsburg                | 0.63      |
| Annie_Murphy                   | Menno_Versteeg                       | 0.62      |
| UEFA_Nations_League            | 2020-21_UEFA_Nations_League          | 0.6       |
| Carole_Baskin                  | Disappearance_of_Don_Lewis           | 0.58      |
| Christina_El_Moussa            | Flip_or_Flop                         | 0.58      |
+--------------------------------+--------------------------------------+-----------+
10 rows selected (130.906 seconds)
0: jdbc:hive2://>
```

Question 2

Assumptions:

- Largest fraction means the highest number of clicks for an internal link inside an article divided by the total number of clicks of all internal links in that same article.
- Both original and its internal links are English wikipedia articles.
- Clickstream of September 2020.
- Capping number of popular referrers to 1000.

Steps:

1. Populate table with tabs separated elements (using clickstream data file in HDFS).
2. One query with 2 nested queries:
    a. First nested to get the total clicks of the referrer. Second nested to get the clicks of the most popular referrer-requested pair.
    b. Outer query to do the fraction.

Question 3 Result

What series of wikipedia articles, starting with Hotel California, keeps the largest fraction of its readers clicking on internal links?

- The series of English wikipedia articles: Hotel California->Eagles Album->The Long Run Album. (15%)

```
2020-11-02 22:10:33,247 Stage-2 map = 0%,  reduce = 0%
2020-11-02 22:10:37,318 Stage-2 map = 100%,  reduce = 0%, Cumulative CPU 1.12 sec
2020-11-02 22:10:41,381 Stage-2 map = 100%,  reduce = 100%, Cumulative CPU 2.3 sec
MapReduce Total cumulative CPU time: 2 seconds 300 msec
Ended Job = job_1604346441296_0108
MapReduce Jobs Launched:
Stage-Stage-3: Map: 6  Reduce: 1   Cumulative CPU: 45.35 sec   HDFS Read: 1422407188 HDFS Write: 3043 SUCCESS
Stage-Stage-6: Map: 6  Reduce: 6   Cumulative CPU: 55.81 sec   HDFS Read: 1422452644 HDFS Write: 596 SUCCESS
Stage-Stage-7: Map: 1  Reduce: 1   Cumulative CPU: 2.02 sec   HDFS Read: 8125 HDFS Write: 116 SUCCESS
Stage-Stage-11: Map: 1   Cumulative CPU: 1.32 sec   HDFS Read: 10100 HDFS Write: 3821 SUCCESS
Stage-Stage-5: Map: 1  Reduce: 1   Cumulative CPU: 3.03 sec   HDFS Read: 11291 HDFS Write: 148 SUCCESS
Stage-Stage-8: Map: 6   Cumulative CPU: 46.63 sec   HDFS Read: 1422424390 HDFS Write: 4743 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.3 sec   HDFS Read: 14372 HDFS Write: 933 SUCCESS
Total MapReduce CPU Time Spent: 2 minutes 36 seconds 460 msec
OK
+-------------------+---------------------------------+---------------------------------+-----------------+
|     referrer      |            requested1           |            requested2           | final_fraction  |
+-------------------+---------------------------------+---------------------------------+-----------------+
| Hotel_California  | Hotel_California_(Eagles_album) | Hotel_California                | 0.15            |
| Hotel_California  | Hotel_California_(Eagles_album) | The_Long_Run_(album)            | 0.15            |
| Hotel_California  | Hotel_California_(Eagles_album) | Their_Greatest_Hits_(1971-1975) | 0.07            |
| Hotel_California  | Hotel_California_(Eagles_album) | Eagles_(band)                   | 0.06            |
| Hotel_California  | Hotel_California_(Eagles_album) | The_Beverly_Hills_Hotel         | 0.04            |
| Hotel_California  | Hotel_California_(Eagles_album) | Randy_Meisner                   | 0.03            |
| Hotel_California  | Hotel_California_(Eagles_album) | Life_in_the_Fast_Lane           | 0.03            |
| Hotel_California  | Hotel_California_(Eagles_album) | Joe_Walsh                       | 0.03            |
| Hotel_California  | Hotel_California_(Eagles_album) | New_Kid_in_Town                 | 0.03            |
| Hotel_California  | Hotel_California_(Eagles_album) | Don_Felder                      | 0.03            |
+-------------------+---------------------------------+---------------------------------+-----------------+
10 rows selected (141.801 seconds)
0: jdbc:hive2://>
```

Question 3

Assumptions:

- Similar assumptions from question 2.
- Assume that the fraction number represents clicks of series starting from Hotel California.

Steps:

1. Using the same clickstream table and one query (with 3 nested queries).
    a. First two nested queries are similar to question 2 (gives highest fraction).
    b. Outer query (still nested) gets the highest clicks of the referrer-requested pair.
    c. Outermost query does the fraction.
2. Caveat of using nested queries -- accessing the same file multiple times where Hive is acyclic.

Question 4 Results

Find an example of an English wikipedia article that is relatively more popular in the UK, US, AU.

```
Total MapReduce CPU Time Spent: 1 minutes 25 seconds 610 msec
OK
+-----------------------------------------------+--------------+
|                us_page_title                  | total_views  |
+-----------------------------------------------+--------------+
| Main_Page                                     | 879962       |
| Special:Search                                | 191985       |
| -                                             | 73362        |
| Jeffrey_Toobin                                | 72949        |
| Kyler_Murray                                  | 61041        |
| Dancing_with_the_Stars_(American_season_29)   | 52381        |
| Jeff_Bridges                                  | 49390        |
| The_Haunting_of_Bly_Manor                     | 43637        |
| Sisters_at_Heart                              | 43306        |
| Robert_Redford                                | 41019        |
+-----------------------------------------------+--------------+
10 rows selected (59.352 seconds)
0: jdbc:hive2://>
```

```
Total MapReduce CPU Time Spent: 1 minutes 57 seconds 980 msec
OK
+----------------------------+--------------+
|       uk_page_title        | total_views  |
+----------------------------+--------------+
| Main_Page                  | 1106769      |
| Special:Search             | 293458       |
| -                          | 106036       |
| Jeffrey_Toobin             | 53631        |
| Petr_Čech                  | 41539        |
| The_Haunting_of_Bly_Manor  | 38822        |
| Three_Red_Banners          | 32563        |
| Axel_Tuanzebe              | 30805        |
| Chicago_Seven              | 29130        |
| Gillian_Taylforth          | 27182        |
+----------------------------+--------------+
10 rows selected (63.664 seconds)
0: jdbc:hive2://>
```

```
Total MapReduce CPU Time Spent: 1 minutes 49 seconds 280 msec
OK
+----------------------------+--------------+
|        au_page_title       | total_views  |
+----------------------------+--------------+
| Main_Page                  | 1016271      |
| Special:Search             | 260006       |
| -                          | 95976        |
| Jeffrey_Toobin             | 42548        |
| F5_Networks                | 42427        |
| Robert_Redford             | 34416        |
| Jeff_Bridges               | 30253        |
| Bible                      | 26585        |
| Murder_of_Robert_McCartney | 22348        |
| The_Haunting_of_Bly_Manor  | 21676        |
+----------------------------+--------------+
10 rows selected (57.544 seconds)
0: jdbc:hive2://>
```

Question 4

Assumptions:

- Using Internet Rush Hours (7-11 PM UTC):
  - **UK** -- same time, **US (West-Daylight**) -- 2-6 AM UTC, **AU (West)** -- 11 AM-3PM UTC
- October 20, 2020 page views data.
- Number of views is a combination of all countries over the world so our total views aren't accurate.

Steps:

- Created 3 different tables to contain Internet rush hour for en/en.m articles for US, UK, AU.
  - Data loaded into tables are based on UTC time.
- Using the same query as question 1 on all 3 tables.

Question 5 Result

Analyze how many users will see the average vandalized wikipedia page before the offending edit is reversed.

- Average vandalized wikipedia page for October 20, 2020: Enrique Iglesias

```
2020-11-05 12:35:58,413 Stage-2 map = 0%,  reduce = 0%
2020-11-05 12:36:01,466 Stage-2 map = 100%,  reduce = 0%, Cumulative CPU 1.01 sec
2020-11-05 12:36:05,533 Stage-2 map = 100%,  reduce = 100%, Cumulative CPU 2.25 sec
MapReduce Total cumulative CPU time: 2 seconds 250 msec
Ended Job = job_1604596945021_0026
MapReduce Jobs Launched:
Stage-Stage-1: Map: 4  Reduce: 4   Cumulative CPU: 39.0 sec   HDFS Read: 880804709 HDFS Write: 457 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 2.25 sec   HDFS Read: 9222 HDFS Write: 120 SUCCESS
Total MapReduce CPU Time Spent: 41 seconds 250 msec
OK
+-------------------+--------+
|    page_title     | users  |
+-------------------+--------+
| Enrique_Iglesias  | 791    |
+-------------------+--------+
1 row selected (40.278 seconds)
0: jdbc:hive2://>
```

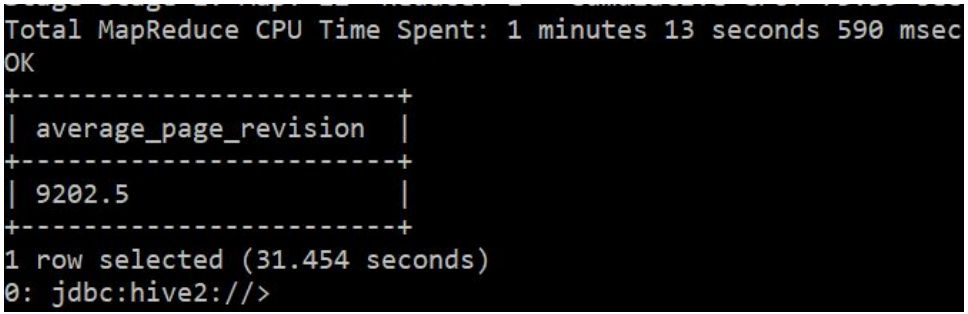
Question 5

Assumptions:

- Assuming an En wikipedia page got vandalized when a revision was reverted.
- Down size the data searching to just average vandalized page on October 20, 2020.
- The number of users is a rough estimated number.

Steps:

1. Create a revision table of 70 fields
2. A query to calculate the average revision counts for a page in October 20, 2020



Question 5

3. A query to find the page title that has the matching revision count to the average count that we found.

```
Total MapReduce CPU Time Spent: 1 minutes 2 seconds 360 msec
OK
+--------------------+----------------------+
|     page_title     | page_revision_count  |
+--------------------+----------------------+
| DMacks             | 9203                 |
| Enrique_Iglesias   | 9203                 |
+--------------------+----------------------+
2 rows selected (25.337 seconds)
0: jdbc:hive2://>
```

4. A query to find all the revisions created for the page and pick the creation timestamp to match page view cutoff. (14076 seconds ~ 4 hours)

```
Total MapReduce CPU Time Spent: 1 minutes 10 seconds 160 msec
OK
+--------------------+----------------------+-------------------------------------+
|     page_title     |    event_timestamp   | revision_seconds_to_identity_revert |
+--------------------+----------------------+-------------------------------------+
| Enrique_Iglesias   | 2020-10-20 10:24:16.0 | 15188                              |
| Enrique_Iglesias   | 2020-10-20 10:35:00.0 | 14544                              |
| Enrique_Iglesias   | 2020-10-20 10:42:48.0 | 14076                              |
| Enrique_Iglesias   | 2020-10-20 10:53:09.0 | 13455                              |
| Enrique_Iglesias   | 2020-10-20 10:53:46.0 | 13418                              |
+--------------------+----------------------+-------------------------------------+
5 rows selected (31.688 seconds)
0: jdbc:hive2://>
```

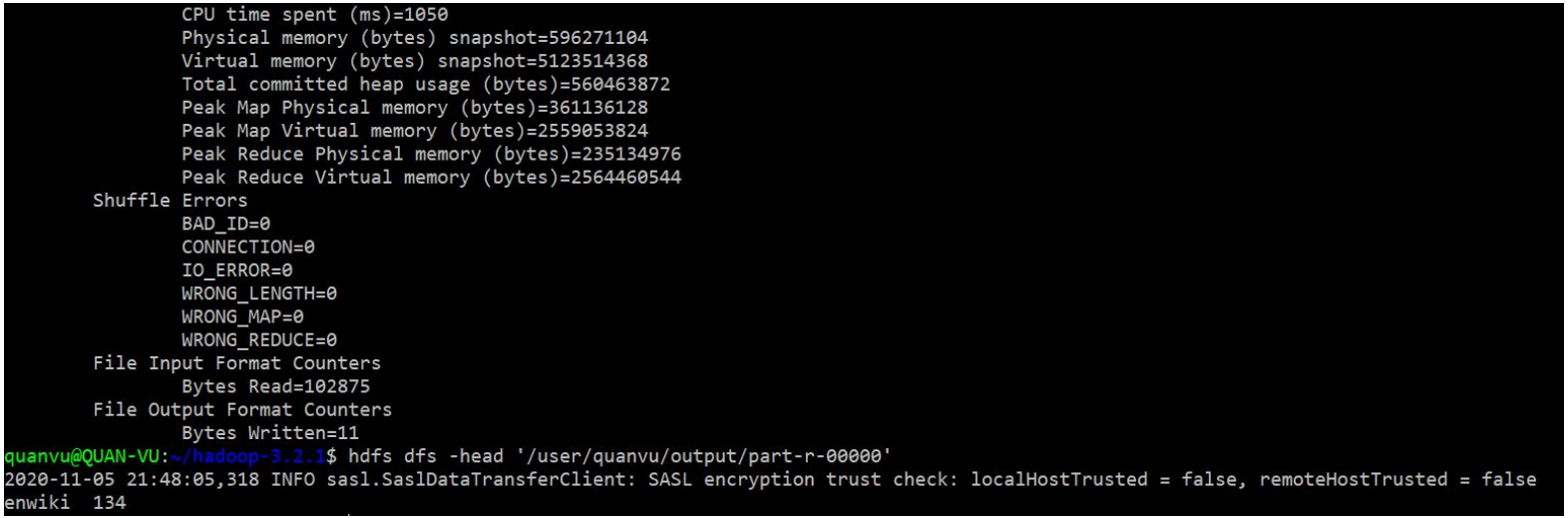
pageviews-20201020-100000.gz	20-Oct-2020 10:51
pageviews-20201020-110000.gz	20-Oct-2020 11:58
pageviews-20201020-120000.gz	20-Oct-2020 12:50
pageviews-20201020-130000.gz	20-Oct-2020 13:55
pageviews-20201020-140000.gz	20-Oct-2020 14:56

5. Final query (similar to question 1 & 4) to look for the article and its total users/views

Question 6 Result (MapReduce)

How many countries edited the enwiki articles in October 2020?

- 134/195 countries with editors for enwiki
- Geoeditor monthly data of October 2020



GitHub Link

https://github.com/QuanAVu/Big-Data-Projects