Challenge:

Data consists of taxi trips including starting point, drop-off point, corresponding timestamps, and information related to the payment. Data are reported at the end of the trip, i.e., upon arrive in the order of the drop-off timestamps.

Attributes:

|  |  |
| --- | --- |
| **medallion** | an md5sum of the identifier of the taxi - vehicle bound |
| **hack\_license** | an md5sum of the identifier for the taxi license |
| **pickup\_datetime** | time when the passenger(s) were picked up |
| **dropoff\_datetime** | time when the passenger(s) were dropped off |
| **trip\_time\_in\_secs** | duration of the trip |
| **trip\_distance** | trip distance in miles |
| **pickup\_longitude** | longitude coordinate of the pickup location |
| **pickup\_latitude** | latitude coordinate of the pickup location |
| **dropoff\_longitude** | longitude coordinate of the drop-off location |
| **dropoff\_latitude** | latitude coordinate of the drop-off location |
| **payment\_type** | the payment method - credit card or cash |
| **fare\_amount** | fare amount in dollars |
| **surcharge** | surcharge in dollars |
| **mta\_tax** | tax in dollars |
| **tip\_amount** | tip in dollars |
| **tolls\_amount** | bridge and tunnel tolls in dollars |
| **total\_amount** | total paid amount in dollars |

The data is sorted chronologically according to the dropoff\_datetime. Events with the same dropoff\_datetime are in random order. Please note that the quality of the data is not perfect. Some events might miss information such as drop off and pickup coordinates or fare information. Moreover, some information, such as, e.g., the fare price might have been entered incorrectly by the taxi drivers thus introducing additional skew. Handle accordingly.

From the data, please answer the following query (assume the data is streaming):

Find the top 10 most frequent routes during the last 30 minutes. A route is represented by a starting grid cell and an ending grid cell. All routes completed within the last 30 minutes are considered for the query. The output results must be updated whenever any of the 10 most frequent routes changes. The output format for the result stream is:

***pickup\_datetime, dropoff\_datetime, start\_cell\_id\_1, end\_cell\_id\_1, ... , start\_cell\_id\_10, end\_cell\_id\_10, delay***

where pickup\_*datetime*, dropoff\_*datetime* are the timestamps of the trip report that resulted in an update of the result stream, start\_cell\_id\_X the starting cell of the Xth-most frequent route, end\_cell\_id\_X the ending cell of the Xth-most frequent route. If less than 10 routes can be identified within the last 30 min, then NULL is to be output for all routes that lack data.

The attribute ***delay*** captures the time delay between reading the input event that triggered the output and the time when the output is produced. Participants must determine the delay using the current system time right after reading the input and right before writing the output. This attribute will be used in the evaluation of the submission.

The cells for this query are squares of 500 m X 500 m. The cell grid starts with cell 1.1, located at 41.474937, -74.913585 (in Barryville). The coordinate 41.474937, -74.913585 marks the center of the first cell. Cell numbers increase towards the east and south, with the shift to east being the first and the shift to south the second component of the cell, i.e., cell 3.7 is 2 cells east and 6 cells south of cell 1.1. The overall grid expands 150km south and 150km east from cell 1.1 with the cell 300.300 being the last cell in the grid. All trips starting or ending outside this area are treated as outliers and must not be considered in the result computation.

*Your implementation will be run against a bigger dataset and time and correctness of the solution will be tested.*

Please download the data from:

<https://www.dropbox.com/s/o1wqgv713n2k1kn/sorted_data.csv.gz?dl=0>