Python_task_1

Question 1: Car Matrix Generation

```
id_2
        801
               802
                       803
                               804
                                      805
                                              806
                                                     807
                                                             808
                                                                    809
                                                                            821 \
id_1
801
       0.00
              2.80
                      6.00
                             7.70
                                    11.70
                                           13.40
                                                   16.90
                                                          19.60
                                                                  21.00
                                                                          20.92
802
       2.80
              0.00
                      3.40
                             5.20
                                     9.20
                                           10.90
                                                   14.30
                                                          17.10
                                                                  18.50
803
       6.00
              3.40
                      0.00
                             2.00
                                     6.00
                                             7.70
                                                   11.10
                                                          13.90
                                                                  15.30
804
       7.70
              5.20
                      2.00
                             0.00
                                             6.10
                                                          12.30
                                                                  13.70
                                     4.40
                                                    9.50
                                                                          16.12
805
      11.70
              9.20
                      6.00
                             4.40
                                     0.00
                                             2.00
                                                    5.40
                                                           8.20
                                                                   9.60
                                                                          12.02
806
      13.40
             10.90
                      7.70
                             6.10
                                     2.00
                                             0.00
                                                    3.80
                                                           6.60
                                                                   8.00
807
      16.90
             14.30
                     11.10
                             9.50
                                     5.40
                                             3.80
                                                    0.00
                                                           2.90
                                                                   4.30
                                                                           6.82
808
      19.60
             17.10
                     13.90
                            12.30
                                     8.20
                                             6.60
                                                    2.90
                                                           0.00
                                                                   1.70
                                                                           4.12
809
      21.00
             18.50
                     15.30
                            13.70
                                     9.60
                                             8.00
                                                    4.30
                                                           1.70
                                                                   0.00
821
      23.52
             20.92
                     17.72
                            16.12
                                    12.02
                                           10.42
                                                    6.82
                                                           4.12
                                                                   2.92
      24.67
             22.07
                     18.87
                            17.27
                                    13.17
                                           11.57
                                                    7.97
                                                           5.27
                                                                   4.07
      26.53
                                                    9.83
             23.93
                     20.73
                            19.13
                                    15.03
                                           13.43
                                                            7.13
                                                                   5.93
824
      27.92
             25.32
                            20.52
                                            7.80
                                                   11.22
                                                                   7.32
                     22.12
                                    16.42
                                                           8.52
                                                                           5.06
825
      29.08
             26.48
                     23.28
                            21.68
                                    17.58
                                           15.98
                                                   12.38
                                                           9.68
                                                                   8.48
                                                                           6.22
826
             28.27
                                           17.77
                                                                  10.27
      30.87
                     25.07
                            23.47
                                    19.37
                                                   14.17
                                                          11.47
                                                                           8.01
827
      32.53
             29.93
                     26.73
                            25.13
                                    21.03
                                           19.43
                                                   15.83
                                                          13.13
                                                                  11.93
                                                                           9.43
829
      36.32
             33.72
                     30.52
                            28.92
                                    24.82
                                           23.22
                                                   19.62
                                                          16.92
                                                                  15.72
                                                                          13.26
830
      38.27
             35.67
                     32.47
                            30.87
                                    26.77
                                           25.17
                                                   21.57
                                                          18.87
                                                                  17.67
                                                                         15.17
831
      39.24
             36.64
                     33.44
                            31.84
                                    27.74
                                           26.14
                                                   22.54
                                                          19.84
                                                                  18.64
id_2
        822
               823
                       824
                               825
                                      826
                                              827
                                                     829
                                                             830
id 1
801
      24.67
             26.53
                     27.92
                            29.08
                                    30.87
                                           32.53
                                                   36.32
                                                          38.27
                                                                  39.24
802
      22.07
             23.93
                     25.32
                            26.48
                                    28.27
                                           29.93
                                                   33.72
                                                                  36.64
                                                          35.67
803
      18.87
             20.73
                     22.12
                            23.28
                                    25.07
                                           26.73
                                                   30.52
                                                          32.47
                                                                  33.44
804
      17.27
             19.13
                     20.52
                            21.68
                                    23.47
                                           25.13
                                                   28.92
                                                          30.87
                                                                  31.84
805
      13.17
             15.03
                     16.42
                            17.58
                                    19.37
                                           21.03
                                                   24.82
                                                          26.77
                                                                  27.74
806
      11.57
             13.43
                     14.82
                            15.98
                                    17.77
                                           19.43
                                                   23.22
                                                          25.17
                                                                  26.14
807
       7.97
              9.83
                     11.22
                            12.38
                                    14.17
                                           15.83
                                                   19.62
                                                          21.57
                                                                  22.54
808
       5.27
              7.13
                      8.52
                             9.68
                                    11.47
                                           13.13
                                                   16.92
                                                          18.87
                                                                  19.84
809
       4.07
               5.93
                      7.32
                             8.48
                                    10.27
                                           11.93
                                                   15.72
                                                          17.67
821
       1.80
              3.67
                      5.06
                             6.22
                                     8.01
                                            9.43
                                                   13.26
822
       0.00
              2.21
                      3.60
                             4.76
                                     6.55
                                             8.00
                                                   11.81
                                                          13.74
                                                                  14.68
823
       2.21
              0.00
                      1.79
                             2.94
                                     4.74
                                                   10.00
                                             6.15
                                                          11.89
                                                                  12.87
824
       3.60
              1.79
                      0.00
                             1.71
                                     3.50
                                             4.92
                                                    8.77
                                                          10.66
                                                                  11.64
825
       4.76
              2.94
                      1.71
                             0.00
                                     2.20
                                             3.65
                                                           9.35
                                                                  10.33
                                                    7.46
826
              4.74
                      3.50
                             2.20
                                     0.00
                                             2.05
                                                           7.71
                                                                   8.69
       6.55
                                                    5.81
827
       8.00
              6.15
                      4.92
                             3.65
                                     2.05
                                             0.00
                                                    4.14
                                                           6.06
                                                                   7.04
829
      11.81
             10.00
                     21.40
                             7.46
                                     5.81
                                             4.14
                                                    0.00
                                                           2.38
                                                                   3.36
830
      13.74
             11.89
                     10.66
                             0.00
                                     7.71
                                             6.06
                                                    2.38
                                                           0.00
                                                                   1.39
      14.68
             12.87
                     11.64
                            10.33
                                     8.69
                                             7.04
                                                    3.36
                                                                   0.00
```

Question 2: Car Type Count Calculation

```
id_2
                  route
                           moto
     id_1
                                                       truck car_type
0
      829
            827
                           2.05
                                  4.14
                                          4.14
                                                 10.1
                                                        15.2
                                 13.26
      829
                           6.63
                                         13.26
                                                 32.4
             804
                          14.41
                                 28.92
                                                        97.0
                                                                  high
                                 11.81
3
      829
                           5.90
                                         11.81
                                                 28.8
                                                        43.2
                                                                   low
4
      829
             826
                      9
                           2.87
                                          5.81
                                                        21.2
                                  5.81
                                                 14.2
                                                                   low
                                                 6.9
336
      803
             802
                      3
                           1.70
                                   3.40
                                          3.40
                                                        10.3
                                                                   low
337
      803
             805
                      4
                           3.00
                                  6.00
                                          6.00
                                                 12.0
                                                        17.9
                                                                   1 ow
338
      803
             825
                      3
                         11.59
                                 23.28
                                         23.28
                                                 50.1
                                                        75.2
                                                                medium
339
      803
             806
                      9
                           3.80
                                  7.70
                                          7.70
                                                 15.3
                                                        23.0
                                                                   low
340
      803
            830
                      1
                         16.18
                                32.47
                                         32.47
                                                 72.6
                                                       108.8
                                                                  high
[341 rows x 9 columns]
{'high': 56, 'low': 196, 'medium': 89}
```

Question 3: Bus Count Index Retrieval

Question 4: Route Filtering

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Question 5: Matrix Value Modification

```
id_2
       801
             802
                   803
                         804
                              805
                                     806
                                           807
                                                 808
                                                       809
                                                             821
                                                                   822
                                                                         823 \
id 1
801
       0.0
                                    16.8
                                                24.5
                                                      15.8 17.6
                                                                  18.5
                                                                        19.9
             3.5
                   7.5
                         9.6
                             14.6
                                          21.1
                                          17.9
                                                21.4
                                                                        17.9
802
       3.5
             0.0
                   4.2
                         6.5
                             11.5
                                    13.6
                                                      23.1
                                                            15.7
                                                                  16.6
803
       7.5
             4.2
                   0.0
                         2.5
                              7.5
                                     9.6
                                          13.9
                                                17.4
                                                      19.1
                                                            22.2
                                                                  23.6
804
      9.6
             6.5
                   2.5
                         0.0
                               5.5
                                     7.6
                                          11.9
                                                15.4
                                                      17.1
                                                            20.2
                                                                  21.6
805
     14.6
            11.5
                   7.5
                         5.5
                               0.0
                                     2.5
                                           6.8
                                                10.2
                                                      12.0
                                                            15.0
806
     16.8
            13.6
                   9.6
                         7.6
                               2.5
                                     0.0
                                           4.8
                                                 8.2
                                                      10.0
                                                            13.0
                                                                  14.5
     21.1
            17.9
                 13.9
                        11.9
                              6.8
                                     4.8
                                           0.0
                                                 3.6
                                                       5.4
                                                             8.5
                                                                  10.0
     24.5
            21.4
                 17.4
                        15.4
                              10.2
                                     8.2
                                           3.6
                                                 0.0
                                                       2.1
                                                             5.2
                                                                   6.6
809
     15.8
            23.1
                 19.1
                        17.1
                              12.0
                                    10.0
                                           5.4
                                                 2.1
                                                       0.0
                                                             3.6
                                                                   5.1
821
            15.7
                 22.2
                        20.2
                              15.0
                                           8.5
                                                                         4.6
     17.6
                                    13.0
                                                 5.2
                                                       3.6
                                                             0.0
                                                                   2.2
822
     18.5
            16.6
                 23.6
                        21.6
                             16.5
                                    14.5
                                          10.0
                                                 6.6
                                                             2.2
                                                                   0.0
                                                                         2.8
                                                       5.1
823
     19.9
            17.9
                 15.5
                        23.9
                              18.8
                                    16.8
                                          12.3
                                                 8.9
                                                       7.4
                                                             4.6
                                                                   2.8
                                                                         0.0
            19.0
                              20.5
                                                       9.2
824
     20.9
                 16.6
                        15.4
                                     9.8
                                          14.0
                                                10.6
                                                             6.3
                                                                   4.5
                                                                         2.2
825
     21.8
            19.9
                 17.5
                        16.3
                              22.0
                                    20.0
                                          15.5
                                                12.1
                                                      10.6
                                                             7 8
                                                                   5.9
                                                                         3.7
826
     23.2
            21.2
                 18.8
                        17.6
                              24.2
                                    22.2
                                          17.7
                                                14.3
                                                      12.8
                                                            10.0
                                                                   8.2
                                                                         5.9
827
     24.4
            22.4
                 20.0
                        18.8
                             15.8
                                    24.3 19.8
                                               16.4 14.9
                                                            11.8
                                                                  10.0
                                                                         7.7
829
     27.2
            25.3
                 22.9
                        21.7
                              18.6
                                    17.4
                                          24.5
                                                21.2
                                                      19.7
                                                            16.6
                                                                  14.8
                                                                        12.5
     28.7
            26.8
                 24.4
                        23.2
                              20.1
                                    18.9 16.2
                                                23.6
                                                      22.1 19.0
                                                                  17.2
831
      29.4
            27.5 25.1
                        23.9
                              20.8
                                    19.6 16.9
                                                24.8 23.3 20.2 18.4
id_2
      824
            825
                  826
                         827
                               829
                                     830
id 1
801
     20.9
            21.8 23.2
                        24.4
                             27.2
                                    28.7
                                          29.4
802
     19.0 19.9
                 21.2
                        22.4
                             25.3
                                    26.8
                                          27.5
803
     16.6
            17.5
                 18.8
                        20.0
                             22.9
                                    24.4
                                          25.1
804
     15.4
            16.3
                 17.6
                        18.8
                             21.7
                                    23.2
                                          23.9
805
     20.5
            22.0
                 24.2
                        15.8
                             18.6
                                    20.1
                                          20.8
806
     18.5
            20.0
                 22.2
                        24.3
                              17.4
                                    18.9
            15.5
                 17.7
                        19.8
                             24.5
808
            12.1
                 14.3
                        16.4
                              21.2
                                    23.6
     10.6
      9.2
            10.6
                 12.8
                        14.9
                             19.7
                                    22.1
821
             7.8
      6.3
                 10.0
                        11.8
                             16.6
                                    19.0
                                          20.2
822
                  8.2
                        10.0
                             14.8
                                    17.2
                                          18.4
       4.5
             5.9
823
       2.2
             3.7
                   5.9
                         7.7
                              12.5
                                    14.9
                                          16.1
824
       0.0
             2.1
                   4.4
                         6.2
                              11.0
                                    13.3
                                          14.6
825
       2.1
             0.0
                   2.8
                         4.6
                              9.3
                                    11.7
                                          12.9
826
       4.4
             2.8
                   0.0
                         2.6
                               7.3
                                     9.6
                                          10.9
827
      6.2
             4.6
                  2.6
                         0.0
                              5.2
                                     7.6
                                           8.8
829
             9.3
                   7.3
                         5.2
                               0.0
                                     3.0
                                           4.2
     16.0
             0.0
                  9.6
     13.3
                         7.6
                               3.0
            12.9
                  10.9
                         8.8
```

Question 6: Time Check

```
<ipython-input-6-a1722196477c>:15: FutureWarning: Indexing with multiple keys (implicitly converted to a tuple of keys) will be depr
   result_series = df.groupby(['id', 'id_2'])['start_timestamp', 'end_timestamp'].apply(lambda x: any(mask.loc[x.indexj))
                   id_2
       1014000
                     -1
 0
                         True
       1014002
                     -1
                         True
       1014003
                     -1
                         True
 3
      1030000
                     -1
                         True
       1030000
                1030002
                         True
 9249 1330016
                1330006
 9250
      1330016
                1330008
 9251 1330016
               1330010
                         True
 9252
      1330016
               1330012
 9253 1330016 1330014
 [9254 rows x 3 columns]
```