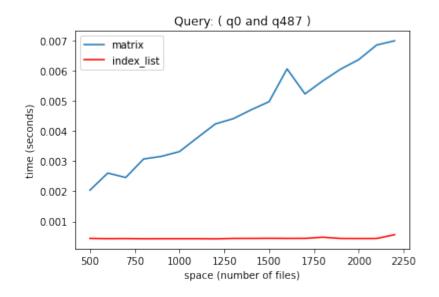
```
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
          = pd.read csv('time data I.csv')
df matrix = pd.read csv('time data M.csv')
         = df inv.to numpy()
arr_matrix = df_matrix.to_numpy()
first query time I = arr inv[0::4]
second_query_time_I = arr_inv[1::4]
third query time I = arr inv[2::4]
fourth query time I = arr inv[3::4]
first query time M = arr matrix[0::4]
second query time M = arr matrix[1::4]
third query time M = arr matrix[2::4]
fourth_query_time_M = arr_matrix[3::4]
def plot_for_query(query, time_inv, time_matrix):
    x inv = np.arange(500, 2300, 100)
    x \text{ matrix} = \text{np.arange}(500, 2300, 100)
    plt.title('Query: ' + query)
    plt.xlabel("space (number of files)")
    plt.ylabel("time (seconds)")
    plt.plot(x matrix, time matrix, label = 'matrix')
                      time inv, label = 'index list', color='red')
    plt.plot(x inv,
    plt.legend()
    plt.show()
plot_for_query(
    '( ( g17 and ( g333 and g179 ) ) and ( g3 and g459 ) )',
    first query time I,
    first query time M
)
```

```
Query: ((q17 and (q333 and q179)) and (q3 and q459))
                 matrix
     0.030
                 index_list
     0.025
   time (seconds)
     0.020
     0.015
     0.010
     0.005
     0.000
            500
                   750
                          1000
                                 1250
                                         1500
                                                1750
                                                       2000
                                                               2250
                             space (number of files)
plot_for_query(
      \overline{\phantom{a}} ( \overline{\phantom{a}} q8 and q150 ) or not ( q99 ) )',
     second_query_time_I,
     second_query_time_M
)
                  Query: ( ( q8 and q150 ) or not ( q99 ) )
     0.30
                matrix
                index_list
     0.25
     0.20
   time (seconds)
     0.15
     0.10
     0.05
     0.00
           500
                  750
                         1000
                                1250
                                        1500
                                               1750
                                                      2000
                                                              2250
                            space (number of files)
plot_for_query(
      '( not ( q55 ) and bobobo ) \n [note: bobobo is intentionally not
present in any documents]',
     third_query_time_I,
     third_query_time_M
)
```

Query: (not (q55) and bobobo) [note: bobobo is intentionally not present in any documents] 0.00070 matrix index_list 0.00065 time (seconds) 0.00060 0.00055 0.00050 500 1000 1250 1500 1750 2000 2250 space (number of files)

```
plot_for_query(
    '( q0 and q487 )',
    fourth_query_time_I,
    fourth_query_time_M
)
```



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