

Demonstration and Comparative Analysis of Apriori and FP Growth Algorithm

DOCUMENT FOR REFERENCE##

Files:

1. Apriori.py: python file containing code for Apriori algorithm.
2. FPGrowth.py: python file containing code for Frequent Pattern Growth algorithm.
3. graph.py: python file containing code for generating comparison graph between both the algorithms.
4. BMS1_spmf.txt: Input file one containing data set 1 in text form.
5. BMS2_spmf.txt: Input file two containing data set 2 in text form.
6. MSNBC.txt: Input file three containing data set in 3 text form.
7. output for Apriori.txt: Text file containing output of Apriori.py file.
8. output for FPGrowth.txt: Text file containing output of FPGrowth.py file.
9. Screenshot (223).png: Image containing output of graph.py file.
10. outputfile.txt: Text file containing comparison data between both algorithms for different minimum support values.

Screenshot of codes and output:

Apriori.py:

```
data mining-2 - Replit
replit.com/@vd0428/data-mining-2

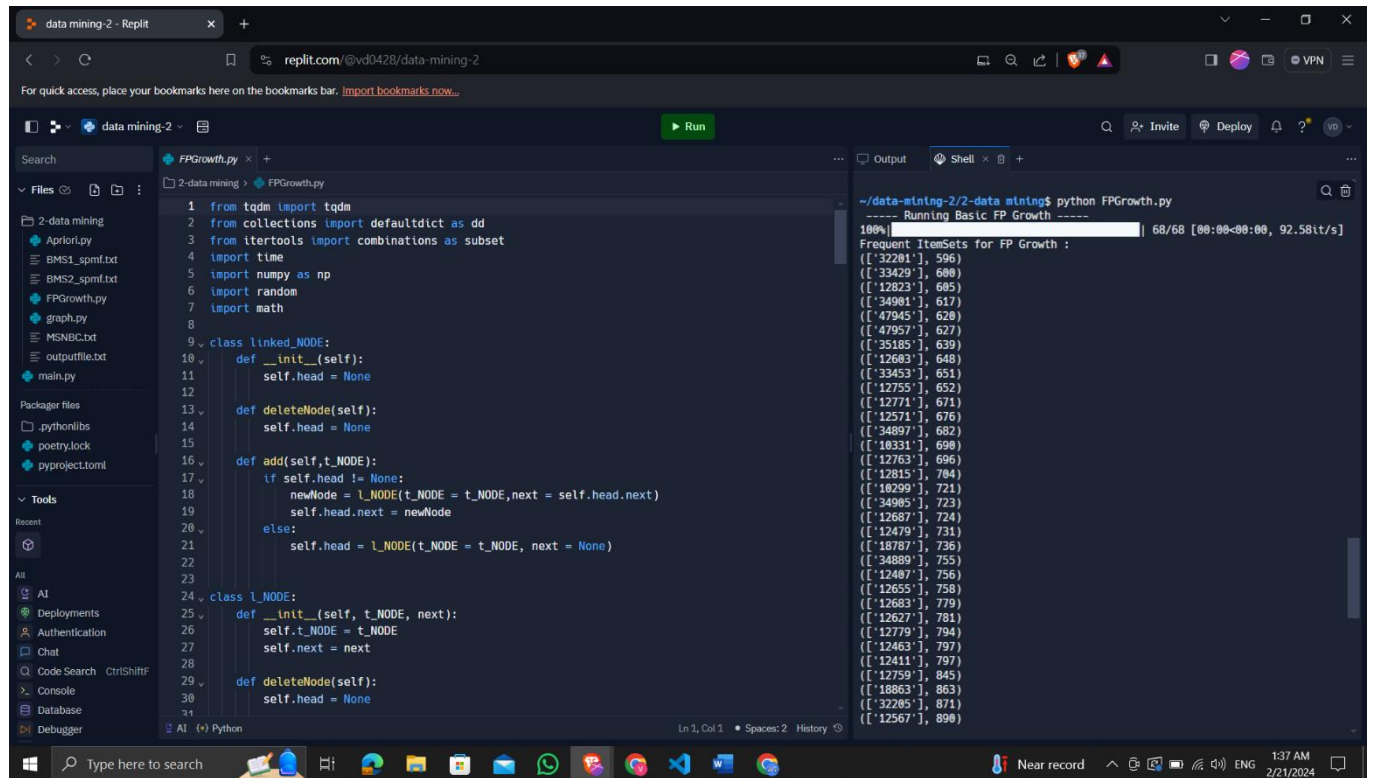
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data mining-2
Run

Files
2-data mining
  Apriori.py
  BMS1_spmf.txt
  BMS2_spmf.txt
  FPGrowth.py
  graph.py
  MSNBC.txt
  outputfile.txt
  main.py
Package files
  .pythonlibs
  poetry.lock
  pyproject.toml
Tools
  AI
  Deployments
  Authentication
  Chat
  Code Search Ctrl+Shift
  Console
  Database
  Debugger

Apriori.py
1 from itertools import combinations as subset
2 from collections import defaultdict
3 import time
4
5 def checkCond(x,y):
6     if set(x) <= y:
7         return True
8     return False
9
10 def find_frequent_1_itemsets_hash(dataset, MINSUP):
11     d = defaultdict(lambda: 0)
12     hash_function = defaultdict(lambda: 0)
13     L=[]
14     F=[]
15     hashset = []
16
17     for t in dataset:
18         ss = (subset(t, 2))
19         for s in ss:
20             hash_function[tuple(sorted(list(s)))]+=1
21         F=[]
22         for i in t:
23             d[i] = d[i] + 1
24
25     for i, v in d.items():
26         if v<MINSUP:
27             pass
28         else:
29             L.append([i])
30             F.append(tuple([i]))
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```

Frequent Pattern Growth Algorithm:

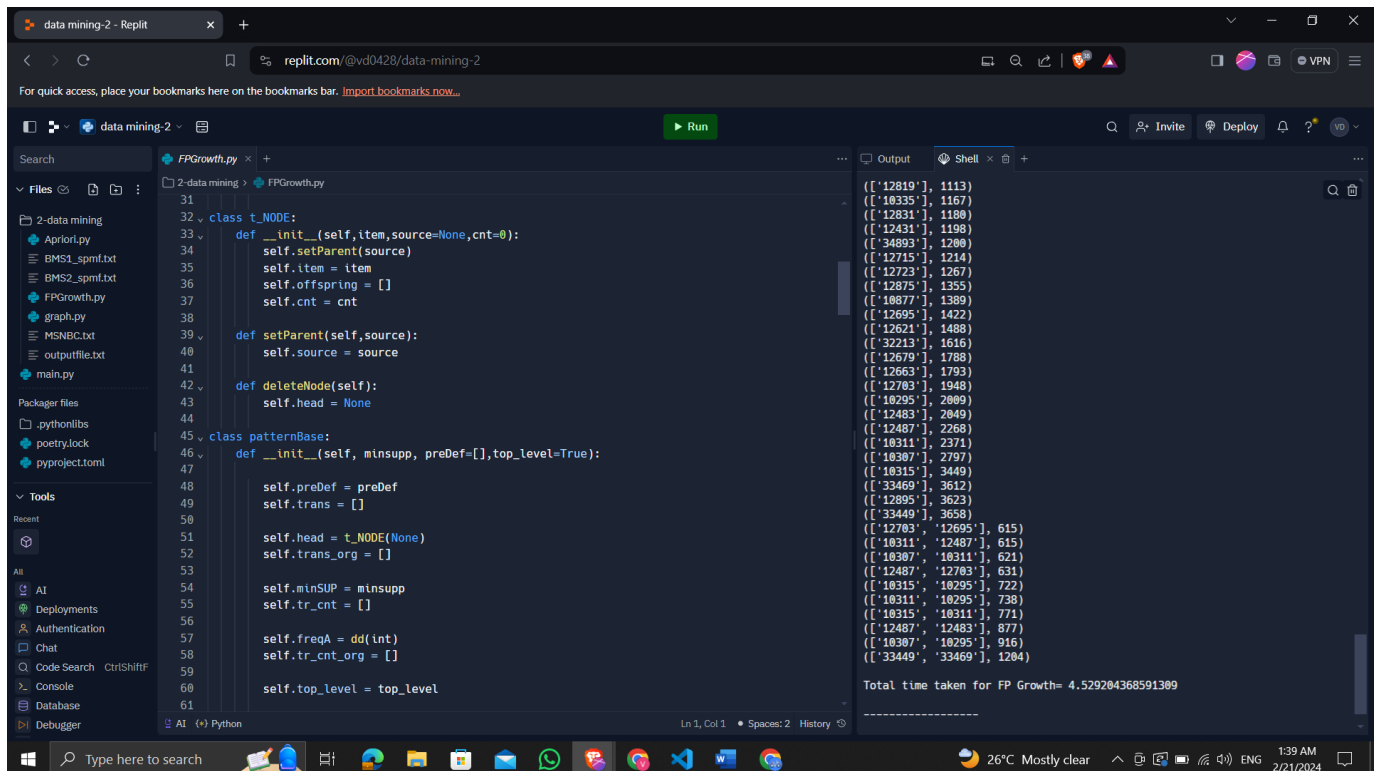


The screenshot shows a Replit environment with a file explorer on the left containing files like `Apriori.py`, `BMS1_spmf.txt`, `BMS2_spmf.txt`, `FPGrowth.py`, `graph.py`, `MSNBC.txt`, `outputfile.txt`, and `main.py`. The `FPGrowth.py` file is open in the editor, showing the following code:

```
1 from tqdm import tqdm
2 from collections import defaultdict as dd
3 from itertools import combinations as subset
4 import time
5 import numpy as np
6 import random
7 import math
8
9 class linked_NODE:
10     def __init__(self):
11         self.head = None
12
13     def deleteNode(self):
14         self.head = None
15
16     def add(self, t_NODE):
17         if self.head != None:
18             newNode = l_NODE(t_NODE = t_NODE, next = self.head.next)
19             self.head.next = newNode
20         else:
21             self.head = l_NODE(t_NODE = t_NODE, next = None)
22
23 class l_NODE:
24     def __init__(self, t_NODE, next):
25         self.t_NODE = t_NODE
26         self.next = next
27
28     def deleteNode(self):
29         self.head = None
```

The output window shows the execution of the script, displaying the progress of the algorithm and the resulting frequent itemsets:

```
~/data-mining-2/2-data mining$ python FPGrowth.py
---- Running Basic FP Growth ----
100% | 68/68 [00:00:00, 92.58it/s]
Frequent ItemSets for FP Growth :
[('32201', 596)]
[('33429', 600)]
[('12823', 605)]
[('34901', 617)]
[('47945', 620)]
[('47957', 627)]
[('35185', 639)]
[('12603', 648)]
[('33453', 651)]
[('42765', 652)]
[('12771', 671)]
[('12571', 676)]
[('34897', 682)]
[('10331', 690)]
[('12763', 696)]
[('12815', 704)]
[('10299', 721)]
[('34905', 723)]
[('12687', 724)]
[('12470', 731)]
[('18787', 736)]
[('34889', 755)]
[('12407', 756)]
[('12655', 758)]
[('12683', 779)]
[('12627', 781)]
[('12779', 794)]
[('12463', 797)]
[('12411', 797)]
[('12759', 845)]
[('18863', 863)]
[('32205', 871)]
[('12567', 890)]
```



The screenshot shows a Replit environment with a file explorer on the left containing files like `Apriori.py`, `BMS1_spmf.txt`, `BMS2_spmf.txt`, `FPGrowth.py`, `graph.py`, `MSNBC.txt`, `outputfile.txt`, and `main.py`. The `FPGrowth.py` file is open in the editor, showing the following code:

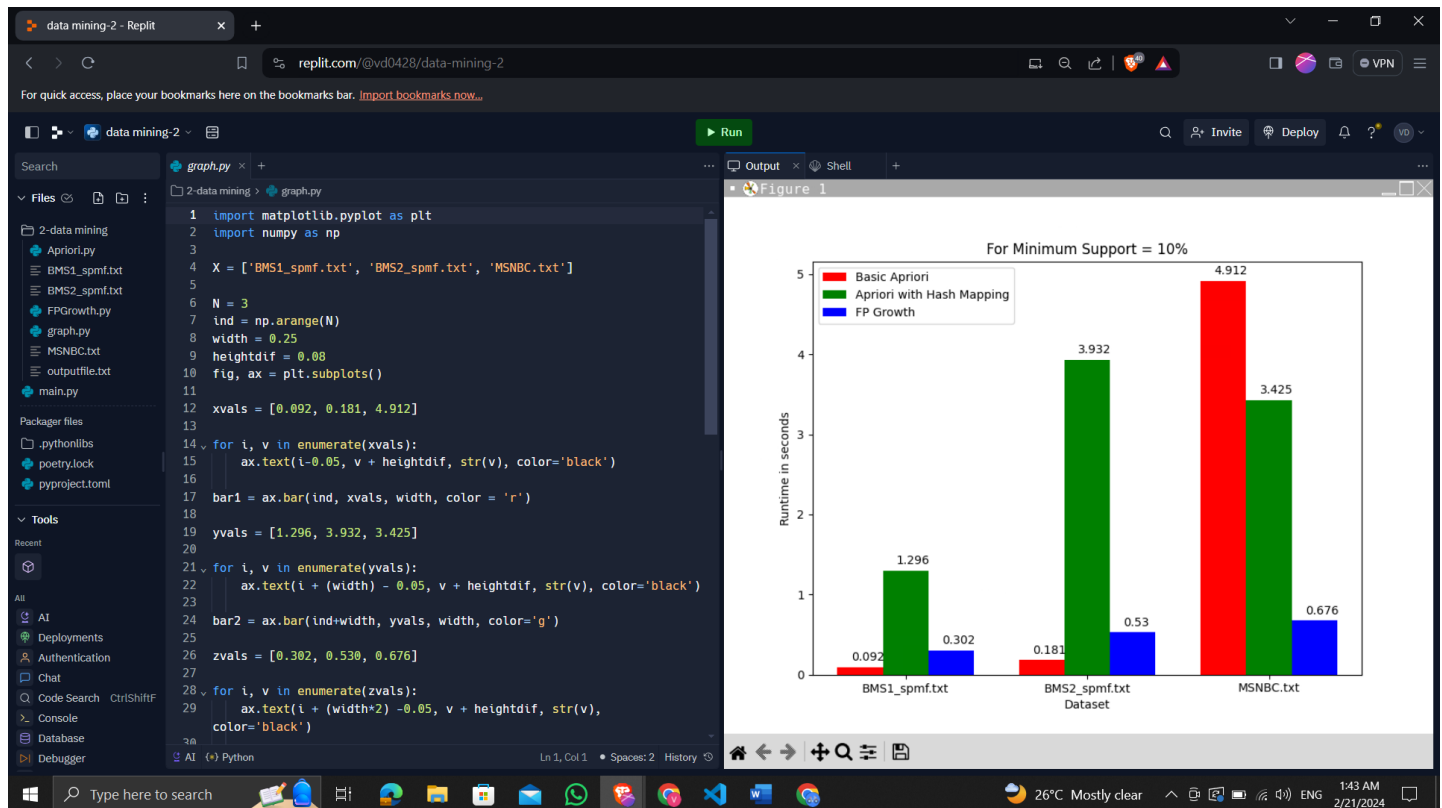
```
31
32 class t_NODE:
33     def __init__(self, item, source=None, cnt=0):
34         self.setParent(source)
35         self.item = item
36         self.offspring = []
37         self.cnt = cnt
38
39     def setParent(self, source):
40         self.source = source
41
42     def deleteNode(self):
43         self.head = None
44
45 class patternBase:
46     def __init__(self, minsupp, preDef=[], top_level=True):
47
48         self.preDef = preDef
49         self.trans = []
50
51         self.head = t_NODE(None)
52         self.trans_org = []
53
54         self.minSUP = minsupp
55         self.tr_cnt = []
56
57         self.freqA = dd(int)
58         self.tr_cnt_org = []
59
60         self.top_level = top_level
```

The output window shows the execution of the script, displaying the progress of the algorithm and the resulting frequent itemsets:

```
[('12819', 1113)]
[('10335', 1167)]
[('12831', 1180)]
[('12431', 1198)]
[('34893', 1200)]
[('12715', 1214)]
[('12723', 1267)]
[('12875', 1355)]
[('10877', 1389)]
[('12695', 1422)]
[('12621', 1488)]
[('32213', 1616)]
[('12679', 1788)]
[('12663', 1793)]
[('12703', 1948)]
[('10295', 2009)]
[('12483', 2049)]
[('12487', 2268)]
[('10311', 2371)]
[('10307', 2797)]
[('10315', 3449)]
[('33469', 3612)]
[('12895', 3623)]
[('33449', 3658)]
[('12703', '12695', 615)]
[('10311', '12487', 615)]
[('10307', '10311', 621)]
[('12487', '12703', 631)]
[('10315', '10295', 722)]
[('10311', '10295', 738)]
[('10315', '10311', 771)]
[('12487', '12483', 877)]
[('10307', '10295', 916)]
[('33449', '33469', 1204)]

Total time taken for FP Growth= 4.529204368591389
```

Graph.py:



Final result obtained:

For Minimum Support = 1%:

BMS1_spmf.txt:

Total time taken for Basic Apriori= 74.7482898235321 seconds

Total time taken for Apriori with Hash Mapping= 1.3318769931793213 seconds

Total time taken for FP Growth= 1.0110151767730713 seconds

BMS2_spmf.txt:

Total time taken for Basic Apriori= 66.2326180934906 seconds

Total time taken for Apriori with Hash Mapping= 5.244940757751465
seconds

Total time taken for FP Growth= 1.2578978538513184 seconds

MSNBC.txt:

Total time taken for Basic Apriori= 153.68514347076416 seconds

Total time taken for Apriori with Hash Mapping= 154.7875907421112
seconds

Total time taken for FP Growth= 1.497495412826538 seconds

For Minimum Support = 5%:

BMS1_spmf.txt:

Total time taken for Basic Apriori= 0.28157925605773926 seconds

Total time taken for Apriori with Hash Mapping= 1.2909183502197266
seconds

Total time taken for FP Growth= 0.3462948799133301 seconds

BMS2_spmf.txt

Total time taken for Basic Apriori= 0.18675875663757324 seconds

Total time taken for Apriori with Hash Mapping= 3.8645527362823486
seconds

Total time taken for FP Growth= 0.5378656387329102 seconds

MSNBC.txt

Total time taken for Basic Apriori= 12.381566762924194 seconds

Total time taken for Apriori with Hash Mapping= 10.221471309661865
seconds

Total time taken for FP Growth= 0.8272049427032471 seconds

For Minimum Support = 10%:

BMS1_spmf.txt

Total time taken for Basic Apriori= 0.09195780754089355 seconds

Total time taken for Apriori with Hash Mapping= 1.2956795692443848
seconds

Total time taken for FP Growth= 0.30190372467041016 seconds

BMS2_spmf.txt

Total time taken for Basic Apriori= 0.1815943717956543 seconds

Total time taken for Apriori with Hash Mapping= 3.9320201873779297
seconds

Total time taken for FP Growth= 0.5301475524902344 seconds

MSNBC.txt

Total time taken for Basic Apriori= 4.912920951843262 seconds

Total time taken for Apriori with Hash Mapping= 3.4259331226348877
seconds

Total time taken for FP Growth= 0.676424503326416 seconds

~VIKRANT KUMAR VERMA (RA2111003010522)