

MSC-BDT5002, Spring 2020
Knowledge Discovery and Data Mining

Assignment 1

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Q1. Hash Tree (40 marks)

Suppose we have 36 candidate item sets of length 3:

{1 2 3}, {1 3 9}, {1 4 5}, {1 4 6}, {1 5 7}, {1 5 9}, {1 6 8}, {1 6 9}, {1 8 9}
{2 3 9}, {2 5 6}, {2 5 7}, {2 5 9}, {2 6 7}, {2 6 8}, {2 6 9}, {2 7 8}, {2 7 9}, {2 8 9}
{3 4 6}, {3 4 8}, {3 7 8}
{4 5 6}, {4 5 8}, {4 5 9}, {4 7 8}, {4 7 9}, {4 8 9}
{5 6 7}, {5 6 8}, {5 7 8}, {5 7 9}, {5 8 9}
{6 7 9}, {6 8 9}
{7 8 9}

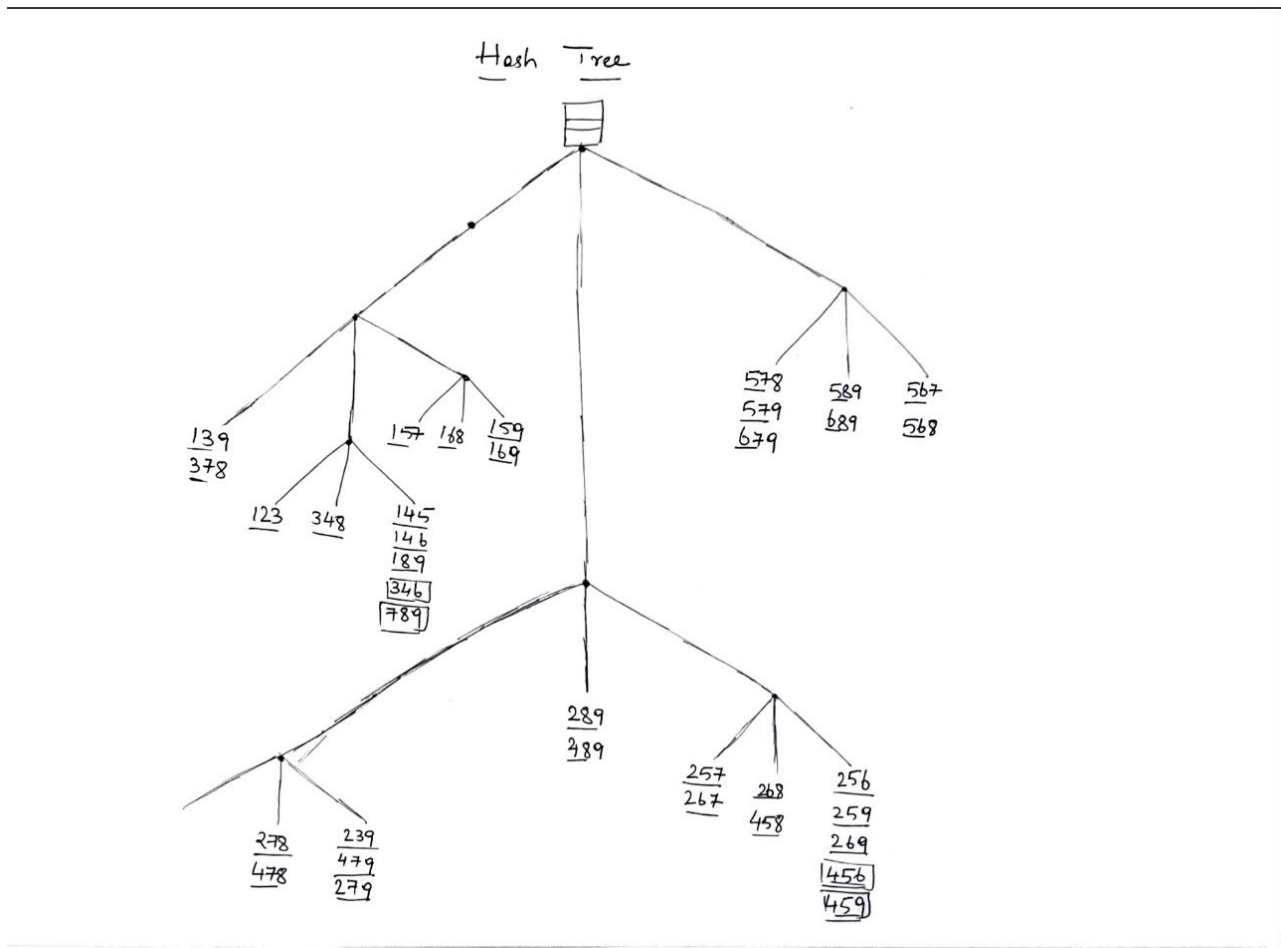
Answer:

Nested List is shown below in the screenshot:

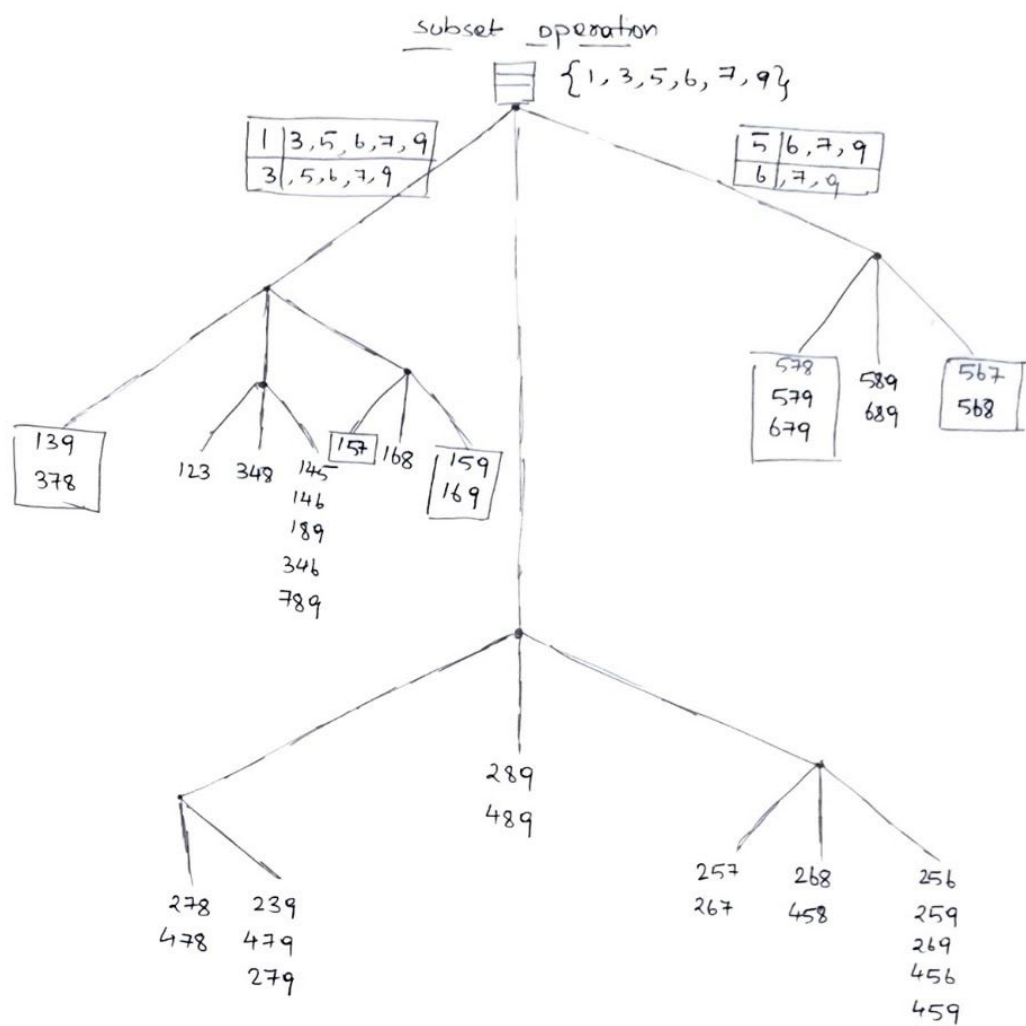
```
[[[[[1, 3, 9], [3, 7, 8]], [[1, 2, 3], [1, 4, 5], [1, 4, 6], [1, 8, 9],  
[3, 4, 6], [3, 4, 8], [7, 8, 9]], [[1, 5, 7], [1, 6, 8], [[1, 5, 9], [1,  
, 6, 9]]]], [[2, 3, 9], [2, 7, 8], [2, 7, 9], [4, 7, 8], [4, 7, 9]], [  
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, 9], [6, 7, 9]], [[5,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

The above nested list can be achieved through the jupyter notebook file.

The diagram of this Hash tree is shown below:



b) Given a transaction that contains items {1, 3, 5, 6, 7, 9}, how many comparisons are needed using the hash tree which you generate above? Please circle these candidates in the hash tree.



In this subset operation, the total matches we got is 10 and 5 nodes to match, with the given transaction={1,3,5,6,7,9}

Q2. FP-Tree (60 marks)

Suppose you are given some transactions and a vocabulary that map terms to indexes. Please use FP-Tree algorithm to discover the frequent itemsets.

- Data Description:

topi-i.txt:

Input file of frequent pattern mining algorithms. Each line represents a transaction with indices of terms.

format: term1_index term2_index term3_index ...

Columns are separated by a space.

vocab.txt

Dictionary that maps term index to term.

format: term_index term

Columns are separated by a space.

Pattern-i.txt

The file you need to submit, which contains your result for this frequent pattern mining task. Each line represents a transaction with frequent itemsets sorted in descending order of support count.

format: support_count term1 term2 ...

support_count and term1 are separated by a tab, while terms are separated by a space.

Here we give an example:

233 rule association

230 random

227 finding

203 mining pattern

- Questions:

(a) Please write a program to implement FP-growth algorithm and find all frequent itemsets with support ≥ 400 in the given dataset.

Answer:

All those frequent itemsets with $\text{min_sup} \geq 400$, have been written in the pattern-i.txt files.

b)Based on the result of (a), please print out those FP-conditional trees whose height is larger than 1.

Answer:

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