Course name: Data Science (ITE4005)

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< Programming Assignment #1 >

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Due Date: 28 March 2022, 11:59 pm

1. Environment

- OS: Windows, Mac OS, or Linux
- Languages: C++, Java, or Python (any version is ok)

2. Goal: find association rules using the **Apriori** algorithm

3. Requirements

The program must meet the following requirements:

- Execution file name: apriori.exe
- Execute the program with three arguments: minimum support, input file name, output file name
  - Example:

```
C:₩>apriori.exe 5 input.txt output.txt
```

    - Minimum support = 5%, input file name = 'input.txt', output file name = 'output.txt'
    - If you python, you are allowed to use 'apriori.py' file instead of 'apripri.exe'
- Input file format (.txt)

  [*item_id*]\t[*item_id*]\n

  [*item_id*]\t[*item_id*]\t[*item_id*]\t[*item_id*]\t[*item_id*]\n

  [*item_id*]\t[*item_id*]\t[*item_id*]\t[*item_id*]\n
  - Row: transaction
  - *item_id* is a numerical value
  - There is no duplication of items in each transaction
  - Example:

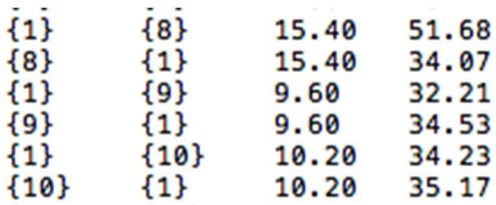
```
18      2       4       5       1
1       11      15      2       7       16
2       1       16
15      7       6       11      18      9
11      2       13      4
```

- Output file format (.txt)

  [*item_set*]\t[*associative_item_set*]\t[*support*(%)]\t[*confidence*(%)]\n

  [*item_set*]\t[*associative_item_set*]\t[*support*(%)]\t[*confidence*(%)]\n

  - [*item_set*]\t[*associative_item_set*]: association rules with minimum support
    - [*item_set*] → [*associative_item_set*]
    - Use braces to represent item sets: {[*item_id*],[*item_id*],…} (*Important!!*)
      - e.g., {0}, {0,4}, {0,3,1}
  - *Support*: probability that a transaction contains [*item_set*] ∪ [*associative_item_set*]
  - *Confidence*: conditional probability that a transaction having [*item_set*] also contains [*associative_item_set*]
  - The order of output is unimportant.
  - The value of support and confidence should be rounded to two decimal places.
    - e.g., 24.631 rounded to two decimal places should become 24.63.
  - An additional penalty will be imposed if you don't keep the output file format.
  - Example:



{1}	{8}	15.40	51.68
{8}	{1}	15.40	34.07
{1}	{9}	9.60	32.21
{9}	{1}	9.60	34.53
{1}	{10}	10.20	34.23
{10}	{1}	10.20	35.17

  - **Note: Please make sure to match the output format!**
    If the format is not correct, you can't get any score.

4. Submission

- Please submit the program files and the report **to GitLab**
  - Report
    - The file format of report must be *.pdf.
    - Guideline
      - ✓ Summary of your algorithm
      - ✓ Detailed description of your codes (for each function)
      - ✓ Instructions for compiling your source codes at TA's computer (e.g. screenshot) (*Important!!*)
      - ✓ Any other specification of your implementation and testing
  - Program files
    - A executable file (.exe or .py)

- All source files
  - ✓ MakeFile if you use Linux
- Note: submission details for GitLab will be announced later.

5. Penalty

- Late submission
  - 1 week delay: 20%
  - 2 weeks delay: 50%
  - Delay more than 2 weeks: 100%
- Requirements unsatisfied
  - Significant penalty up to 30% will be given when the requirements are not satisfied