< Programming Assignment #2 >

See announcement in our LMS (learning.hanyang.ac.kr)

- Due Date, submission e-mail address, etc

1. Environment

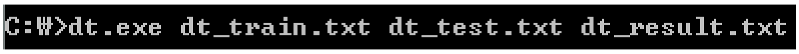
- OS: Windows, Mac OS, or Linux
- Languages: Java or Python (any version is ok)

2. Goal: Build a decision tree, and then classify the test set using it

3. Requirements

The program must meet the following requirements:

- Execution file name: **dt.py** (or, dt.exe, dt.jar, dt.java, dt.etc…)
- Execute the program with three arguments: training file name, test file name, output file name
    - Example:



```
C:₩>dt.exe dt_train.txt dt_test.txt dt_result.txt
```

        - Training file name='dt_train.txt', test file name='dt_test.txt', output file name='dt_result.txt'
- Dataset
    - We provide you with 2 datasets
        - Buy_computer: dt_train.txt, dt_test.txt
        - Car_evaluation: dt_train1.txt, dt_test1.txt
    - You need to make your program that can deal with **any** datasets
    - We will evaluate your program with other datasets. (format will be the same)
- File format for a training set

[*attribute_name_1*]\t[*attribute_name_2*]\t … [*attribute_name_n*]\n

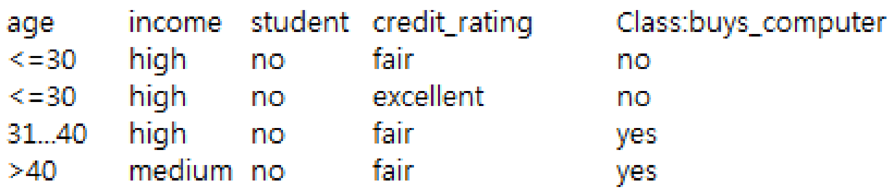
[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

    - [*attribute_name_1*] ~ [*attribute_name_n*]: *n* attribute names
    - [*attribute_1*] ~ [*attribute_n-1*]
        - *n-1* attribute values of the corresponding tuple
        - All the attributes are **categorical** (not continuous-valued)

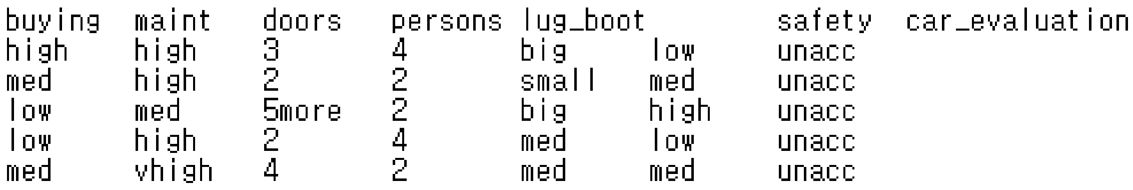
- [*attribute_n*]: a **class label** that the corresponding tuple belongs to
- Example 1 (data_train.txt):



age	income	student	credit_rating	Class:buys_computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
31...40	high	no	fair	yes
>40	medium	no	fair	yes

Figure 1. An example of the first training set.

- Example 2 (data_train1.txt):



buying	maint	doors	persons	lug_boot	safety	car_evaluation
high	high	3	4	big	low	unacc
med	high	2	2	small	med	unacc
low	med	5more	2	big	high	unacc
low	high	2	4	med	low	unacc
med	vhigh	4	2	med	med	unacc

Figure 2. An example of the second training set.

- Data name: car evaluation database
- Attribute values
  - Buying: vhigh, high, med, low
  - Maint: vhigh, high, med, low
  - Doors: 2, 3, 4, 5more
  - Persons: 2, 4, more
  - Lug_boot: small, med, big
  - Safety: low, med, high
- **Class labels**: unacc, acc, good, vgood
- Number of instances: training set - 1,382; test set - 346

- Attribute selection measure: **gain ratio**
- File format for a test set

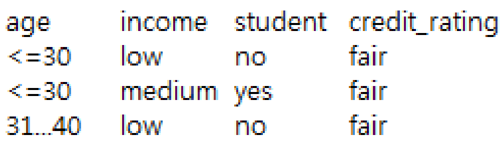
[*attribute_name_1*]\t[*attribute_name_2*]\t … [*attribute_name_n-1*]\n

[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n-1*]\n

[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n-1*]\n

[*attribute_1*]\t[*attribute_2*]\t … [*attribute_n-1*]\n

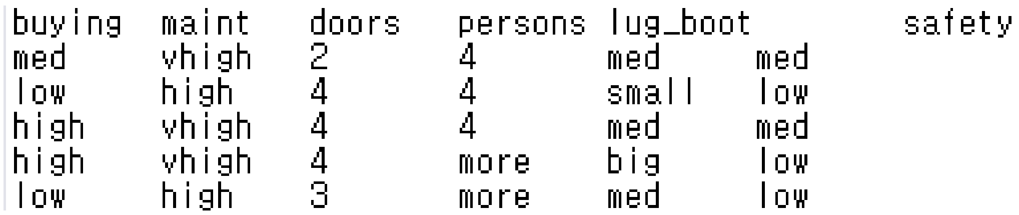
- The test set does not have [*attribute_name_n*] (class label)
- Example 1 (dt_test.txt):



age	income	student	credit_rating
<=30	low	no	fair
<=30	medium	yes	fair
31...40	low	no	fair

Figure 3. An example of the first test set.

- Example 2 (dt_test1.txt):



```
buying   maint    doors    persons  lug_boot          safety
med      vhigh    2        4        med      med
low      high     4        4        small    low
high     vhigh    4        4        med      med
high     vhigh    4        more     big      low
low      high     3        more     med      low
```

Figure 4. An example of the second test set.

- Output file format

  [*attribute_name_1*]\t[*attribute_name_2*]\t … [*attribute_name_n*]\n

  [*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

  [*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

  [*attribute_1*]\t[*attribute_2*]\t … [*attribute_n*]\n

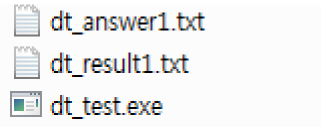
  - Output file name: **dt_result.txt (for 1th dataset), dt_result1.txt (for 2^{nd} dataset)**
  - You must print the following values:
    - [*attribute_1*] ~ [*attribute_n-1*]: given attribute values in the test set
    - [*attribute_n*]: a class label predicted by your model for the corresponding tuple
  - Please **DO NOT CHANGE the order of the tuples** in each test set when you print your outputs
  - **Please be sure to use \t to identify your attributes.**

5. Submission

- Please submit a single .zip file to TA's email address
  - Guileline
    - The file format of report must be *.pdf. or *.doc or *.hwp
    - Content
      - ✓ Instructions for compiling and running your source codes on other person's computer (e.g. screenshot) (*Important!!*)
      - ✓ Java or Python version, and any other specification that our TA must know for running your code
  - Program files
    - An executable file (.exe or .py)
      - ✓ For JAVA users, if you have a problem in making or sending .exe file, you can submit .jar or .java instead.
    - All source files
      - ✓ For JAVA users, include MakeFile if you use Linux

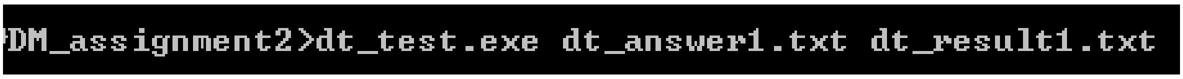
6. Testing program

- Please put the following files in a same directory: Testing program, your output files (dt_result.txt, dt_result1.txt), an attached answer file (dt_answer.txt, dt_answer1.txt)



```
dt_answer1.txt
dt_result1.txt
dt_test.exe
```

- Execute the testing program with two arguments (answer file name and your output file name)



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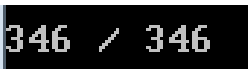
DM_assignment2>dt_test.exe dt_answer1.txt dt_result1.txt
```

- Check your score for the input file



```
346 / 346
```

  - the number of your correct prediction / the number of correct answers

- The test program was build with program 'mono'. So, even if you are using mac or linux instead of window, you can run dt_test.exe using C# mono.

7. Penalty

- Late submission
  - 1 week delay: 20%
  - 2 weeks delay: 50%
  - Delay more than 2 weeks: 100%
- Requirements unsatisfied
  - Penalty up to 100% will be given depending on how the requirements are well-satisfied