Homework 0A
Deadline: 2018.03.18 (Sunday) 23:59

Problem: Find the Best Players in NBA History

The National Basketball Association (NBA) is the USA's premier professional men's basketball league. The NBA has 30 teams; 29 in the United States and one in Canada. The NBA is one of the four major North American professional sports leagues which are NBA, NHL, NFL and MLB. Now you are asked to write a program that can find the best players in NBA history. How do many NBA coaches quickly evaluate a player's game performance? They check the *efficiency* scores of players.

The problem aims to let you practice how to smartly store and process text files. (In Python, you will practice the manipulation of either `list` or `dictionary` data structure.) **You are also asked to define different `functions` in your code.** We provide you a *csv* file (**nba_data.csv**) that contains the raw NBA statistic data of all the players from 1946 to 2009. You are asked to write a program to compute the *efficiency* for all the players, and output the **20** most efficiency players in terms of *career efficiency*.

The format of **nba_data.csv** is easy to understand. The first line tells you the names of all columns. From the second line, each line's data corresponds to one player's different field values in a **particular** regular season. For example, suppose Michael Jordan had played multiple seasons, his data contains multiple lines for his seasons. You should note that if Michael Jordan had played for two different teams (for example: Chicago Bulls and LA Lakers) in season 1990, there will be two lines for his data in season 1990, in which two lines correspond to his data in Bulls and Lakers respectively. In this case, your program should first sum up the value of each column to obtain the total value in a season. For example, suppose Michael Jordan made 1800 points (pts) in Chicago Bulls in season 1990 and made 900 points (pts) in LA Lakers in season 1990. Then his total point made in season 1990 is 2700.

The efficiency of a player in a regular season i, termed eff_season_i, is defined by this formula.

$$eff\_season\_i = \frac{(pts + reb + asts + stl + blk) - ((fga - fgm) + (fta - ftm) + turnover)}{gp}$$

You can find the technical words on the right-hand side of this formula in the first line of **nba_data.csv**. Note that you can check out the meanings of each of the abbreviations in the end of this assignment. Since the above eff_season_i is for a particular regular season i, you need to compute the player's efficiency for every season, and average them to obtain the *career efficiency* of the player, termed eff_career. In other words, you can obtain eff_career by this formula:

$$eff\_career = \frac{\sum_{i=1}^{n} eff\_season\_i}{n}$$

where n is the number of seasons that the player played.

When you find the 20 players with the highest 20 career efficiency scores, you are asked to rank these players according to their career efficiency scores. Players with higher efficiency scores are ranked at top positions. Then you need to write these players into the output file **nba_best.txt**. In the output file, each line is required to have the format:

<div align="center">Rank X\tfirstname lastname\tcareer_efficiency</div>

Sample Output:
```
RANK  1          Wilt Chamberlain    41.14
RANK  2             Bill Russell     31.53
RANK  3          Oscar Robertson     31.38
RANK  4     Kareem Abdul-jabbar      30.90
RANK  5             Bob Pettit       30.85
RANK  6          Shaquille O'neal    29.88
RANK  7             Larry Bird       28.99
RANK  8           Magic Johnson      28.70
RANK  9          Michael Jordan      28.21
RANK 10             Jerry Lucas      27.96
...
```

You are asked to write comments to describe the meaning of each part in your code.

Abbreviations (in nba_data.csv)

- gp - Games Played (打了場數)
- minutes - Minutes Played (打了分鐘數)
- pts - Points made (得分)
- reb - Total Rebounds (籃板)
- asts - Total Assists (助攻)
- stl - Steals (抄截)
- blk - Blocks (火鍋)
- fgm - Field Goals Made (跳投命中次數)
- fga - Field Goals Attempted (跳投出手次數)
- ftm - Free Throws Made (罰球命中次數)
- fta - Free Throws Attempted (罰球出手次數)
- turnovers (失誤)

How to Submit Your Homework?

You will need to submit two files. One is your Python/R code, and the other is the output file. Please name the Python file as "姓名_hw0a.py" or "姓名_hw0a.R". For example, if your name is 陳宜均, then your file name is: "陳宜均_hw0a.py" or "陳宜均_hw0a.R". In addition, please also name the output file as "陳宜均_hw0a.txt" or "陳宜均_hw0a.R". Please upload your file to Moodle.