Lecture 1: Dealing with Data

COSC 526: Introduction to Data Mining

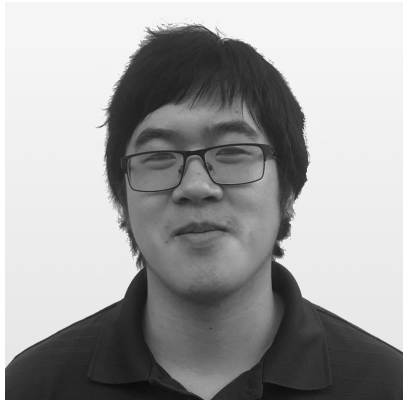
THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

Instructors:

Michela Taufer

Assistants to the Instructor:

Ian Lumsden



Nigel Tan

Kae Suarez

Paula Olaya

Leo Valera

Text Representation and Handling

COSC 526 - Assignment 01

January 22, 2021

In this notebook, we provide you with basic functions for completing the assignment. *You will need to modify existing code and write new code to find a solution*. Each member of the group must upload their own work to their personal GitHub repository, which we set up during the first class.

Practical Tasks:

This set of practical tasks is to be completed during the first class.

Definitions:

- **GitHub:** web-based hosting service for version control used to distribute and collect assignments as well as other class materials (e.g., slides, code, and datasets)
- **Git:** software used by GitHub

Practical Tasks:

- Create your own GitHub account
- Submit your GitHub username to the Google form: https://forms.gle/CKugke8Dzqjm9tQ89
- Install Git on your laptop

This Assignment is due (pushed to your personal class GitHub repository) at the start of the second class.

Problem 1

In this problem we explore reading in and parsing delimiter-separated values stored in files. We start with comma-separated values and then move on to tab-separated values.

Problem 1a: Comma-Separated Values (CSV)

Assignment 1: Dealing with Text

- Reading in, parsing, and processing delimiter-separated values stored in files – **comma-separated values (csv)** and **tab-separated values** (**tsv**)
  - Count (and print) the number of rows of data (header is excluded) in the csv file
  - Count (and print) the number of columns of data in the csv file
  - Calculate (and print) the average of the values that are in the "age" column - You can assume each age in the file is an integer, but the average should be calculated as a float

comma-separated values (csv)

In [ ]:
```
def parse_delimited_file(filename, delimiter=","):
    # Open and read in all lines of the file
    # (I do not recommend readlines for LARGE files)
    # `open`: ref [1]
    # `readlines`: ref [2]
    with open(filename, 'r', encoding='utf8') as dsvfile:
        lines = dsvfile.readlines()

    # Strip off the newline from the end of each line
    # Using list comprehension is the recommended pythonic way to iterate through lists
    # HINT: refs [3,4]


    # Split each line based on the delimiter (which, in this case, is the comma)
    # HINT: ref [5]


    # Separate the header from the data
    # HINT: ref [6]


    # Find "age" within the header
    # (i.e., calculating the column index for "age")
    # HINT: ref [7]


    # Calculate the number of data rows and columns
    # HINT: [8]
    num_data_rows = 0
    num_data_cols = 0

    # Sum the "age" values
    # HINT: ref [9]


    # Calculate the average age
    ave_age = 0

    # Print the results
    # `format`: ref [10]
    print("Number of rows of data: {}".format(num_data_rows))
    print("Number of cols: {}".format(num_data_cols))
    print("Average Age: {}".format(ave_age))

# Parse the provided csv file
parse_delimited_file('data.csv')
```

References:

- 1: open
- 2: readlines
- 3: list comprehension
- 4: rstrip
- 5: split
- 6: splice
- 7: "more on lists"
- 8: len
- 9: int
- 10: format

tab-separated values (tsv)

```
    # Print the results
    # `format`: ref [10]
    print("Number of rows of data: {}".format(num_data_rows))
    print("Number of cols: {}".format(num_data_cols))
    print("Average Age: {}".format(ave_age))

# Parse the provided csv file
parse_delimited_file('data.csv')
```

In [ ]:
```
# Further reading on optional arguments, like "delimiter": http://www.diveintopython.net/power_of_introspection/optiona
parse_delimited_file('data.tsv', delimiter="\t")
```

Assignment 1: Dealing with different encoding

Standards for encoding text:

- ASCII
  - Use numeric codes to represent characters
- Unicode:
  - Map every character to a specific code U+<hex-code>, ranging from U+0000 to U+10FFFF
  - Define Unicode transformation formats: UTF-8, UTF-16, and UTF-32

Converting the unicode-formatted names into ascii-formatted names

- Use the provided tranliteration **dictionary** that maps several common unicode characters to their ascii transliteration to convert the unicode strings to ascii

convert unicode strings to ascii

```
In [ ]: translit_dict = {
            "ä" : "ae",
            "ö" : "oe",
            "ü" : "ue",
            "Ä" : "Ae",
            "Ö" : "Oe",
            "Ü" : "Ue",
            "ł" : "l",
            "ō" : "o",
        }

        with open("data.csv", 'r', encoding='utf8') as csvfile:
            lines = csvfile.readlines()

        # Strip off the newline from the end of each line


        # Split each line based on the delimiter (which, in this case, is the comma)


        # Separate the header from the data


        # Find "name" within the header


        # Extract the names from the rows
        unicode_names = []

        # Iterate over the names
        translit_names = []
        for unicode_name in unicode_names:
            # Perform the replacements in the translit_dict
            # HINT: ref [1]
            False

        # Write out the names to a file named "data-ascii.txt"
        # HINT: ref [2]


        # Verify that the names were converted and written out correctly
        with open("data-ascii.txt", 'r') as infile:
            for line in infile:
                print(line.rstrip())
```

References:

- 1: replace
- 2: file object methods

Free-Form Questions:

Q1. Your solutions for Problems 1 & 2 probably share a lot of code in common. You might even have copied-and-pasted from Problem 1 into Problem 2. Refactor parse_delimited_file to be useful in both problems

In [5]:
```
# Add here your code
```

Q2. Are there any pre-built Python packages that could help you solve these problems? If yes, refactor your solutions to use those packages.

In [6]:
```
# Add here your code
```

Q3. Tell us about your experience (for each point below provide a couple of sentences).

- Describe the challenges you faced in addressing these tasks and how you overcame these challenges.
- Did you work with other students on this assignment? If yes, how did you help them? How did they help you?

Write here your answers

Assignment 1: Practical tasks

- Create your own GitHub account
- Send your GitHub username to

  https://forms.gle/BBdtpSQeYaeut3ru9

  THIS IS DUE ON FRIDAY JAN 29 before 8AM ET
- Install and test your working environment
- Enter your professional information in the Student Slides

  https://tinyurl.com/yyet2har

  THIS IS DUE ON FRIDAY JAN 29 before 8AM ET

For the next week ….

- Get your solution done before our next class
  - We will share with you your own repos before the end of Monday

- Next week ….
  - More about private GitHub repos
  - Pull your solution into your GitHub
  - More practice with Jupyter, Python, and problem solving
  - Learn how different solutions for a given problem can have different performance (execution time)