CS105 Lab introduction

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Lab work and demo procedure

- Lab attendance is required.
- Student are highly encouraged to team up to finish and demo the lab work(two students a group, no more than 2).
- Please team up with the students in the same session for the regular lab.
- Each group need to sign up a time-slot for demo each week before the due. You can also demo during the lab time.
- During demo:
    - Both group members need to contribute to answer questions and explanations

Download and Install the anaconda

1. Download and Install the anaconda

   Download: https://www.anaconda.com/products/individual

2. Install (for Windows): https://www.datacamp.com/community/tutorials/installing-anaconda-windows
3. Install (for Mac): “Anaconda_Installation_Guide.pdf” is in the folder “labs” on elearn.

Python

- Python is used a lot in data analysis, machine learning, AI, etc.
- Flexible, without complicated syntax.
  - No declarations of variables, parameters, functions, etc.
  - Does not require a semicolon at the end of each statement. The end of a line marks the end of the statement.
  - Whitespace indentation is important. A logical block of statements should all have the same indentation.
- **The python packages(libraries):** there are a variety of packages that contain useful data analysis functions and visualization functions.
- In our labs, you need to learn to choose the functions and directly use those functions for your objectives instead of writing the code from scratch.

Some useful Packages for Data Analysis

- **Numpy:** an array processing package. Array is similar to the matrix in math. You can use the functions in numpy to do different array computations.
- **Pandas:** very powerful for data analysis. It provides functions to read, write and manipulate data and is flexible at dealing with relational dataset.
- **Matplotlib:** great for data visualization.
- **SCIPY**: more mathematical and statistical. It provides functions for statistics, linear algebra, etc.

(“Package Tutorial.ipynb” is in the folder labs on the elearn.)

Jupyter notebook has already installed most main packages. To use the functions from certain package, you just need to import those functions first.

Resources for learning python

- **The lectures and recording (prepared by Seyedehmaryam Shahcheraghi):** https://drive.google.com/drive/folders/1nprJzDEgqsb8WoObOYdJxBV3FCjLK8rR?usp=sharing
- **Tutorial:** https://docs.python.org/3/tutorial/
- **Also try Code Academy:** https://www.codecademy.com/learn/learn-python-3

Hints of useful functions for Lab1

- Question 1: pandas.DataFrame.set_index().sort_index()
- Question 2: pandas.Series.apply(); pandas.Series.value_counts(); and visualization functions, check “examples.ipynb”.
- Question 3: Similar to the question 2, but has 10 different digits.
- Question 4: Similar to the question 2 and question 3.

More examples about the functions please refer to the “Lab1 Examples.ipynb”.