Pytuto (Python Tutorial) 6th assignment.

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This task was designed for those who just started python. I wish them try to complete the task and improve their python skill. Please search as many solutions as you can through the internet and ask questions to me and your teammates to tackle down the tasks. However, DO NOT share codes. Good luck.

Introduction

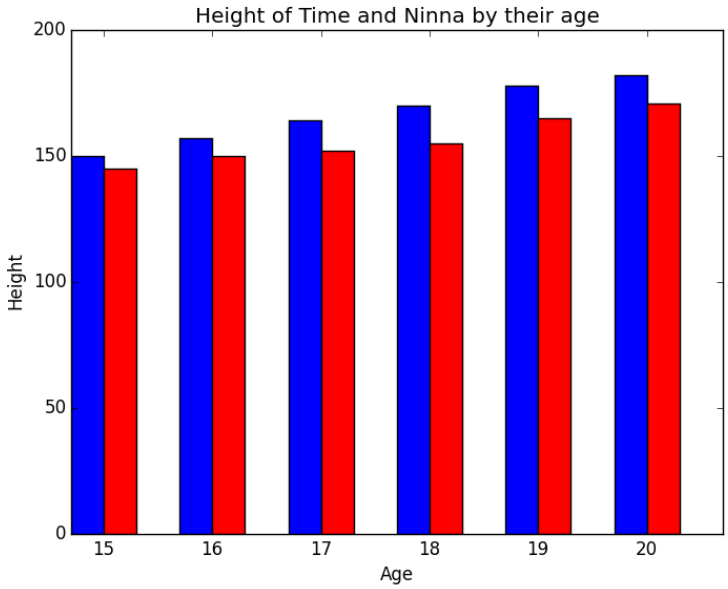
Data Plotting

Even if you have collected a number of data, data itself might not be very informative. Therefore, you have to preprocess the data such as reorganizing them based on their characteristics or discarding unimportant parts. Once you have cleaned the data, you might think of how to make your own data attractive. In this case, data visualization is one of the important techniques that support your data information clear, vivid, and strong.

1. Bar plot
'matplotlib' module is very useful when you plot the data. Let's plot the height of Tim and Ninna.

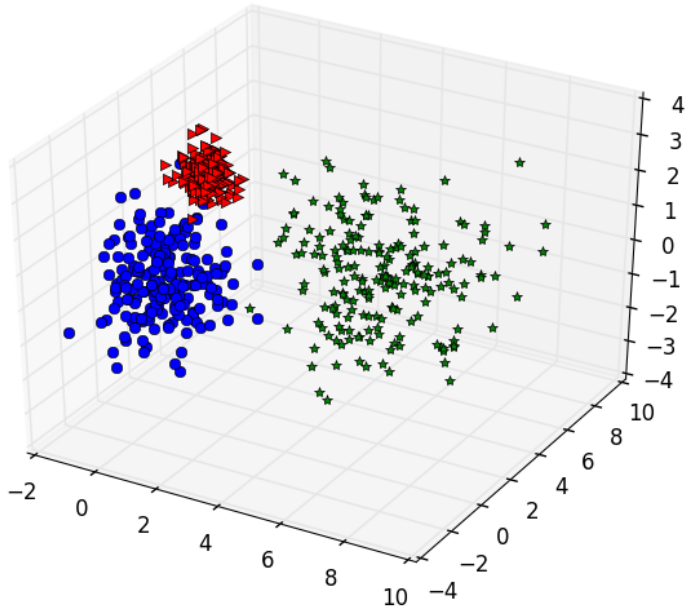
```
>>> # Import modules
>>> import numpy as np
>>> import matplotlib.pyplot as plt
>>> # Set the height of Tim and Ninna + Age
>>> Age = [15, 16, 17, 18, 19, 20]
>>> Tim = [150, 157, 164, 170, 178, 182]
>>> Ninna = [145, 150, 152, 155, 165, 171]
>>> # X tick range and the bar width
>>> xtotal = np.arange(len(Age))
>>> width = 0.3
>>> # Assign Tim and Ninna's values
>>> bar1 = plt.plot(xtotal, Tim, width, color='b')
>>> bar2 = plt.plot(xtotal + width, Ninna, width, color='r')
>>> # Set the labels and title and display the bar graph
>>> plt.ylabel('Height')
>>> plt.xlabel('Age')
>>> plt.title('Height of Tim and Ninna by their age')
>>> plt.xticks(xtotal + width, Age)
>>> plt.show()
```

Find and read ‘height_bar.py’ for the source information.



2. Scatter plot

Once you get used to the module, plotting the data in another way is not difficult. Let’s do the scatter plot with random numbers. (check ‘3d_plot.py’ you may need to install ‘mpl_toolkits’ in order to run this script.) If you visit ‘http://matplotlib.org/’, then you will see many examples and tips for using it.



Task

A) Histogram

A-1. **Make a bimodal histogram.**

- Use ‘numpy’ module in order to generate 2 random number distributions. Two random number distributions should have different means and standard deviations.
- Plot a bimodal histogram.

A-2 **Three sine waves.**

- Make 3 sine waves. Those waves should be different in terms of frequencies and amplitudes.
- Xtick and Ytick should designate time values and amplitude value respectively.
- Put legend on right top of the plot and give each sine wave different colors and line types.

B) Data scatter plot

B-1. **Data Visualization**

- Use ‘readbody.py’ to import ‘bodyData.mat’: you have to type as follows
  >>> from readbody import readbody
  >>> bodyfatFactors, bodyfatRatio = readbody(‘bodyData’)
- bodyfatFactors variable contains 13 factors that decide bodyfat ratios, and bodyfatRatio variable contains 1 values (body fat percentages) and it is dependent to those factors. Please check those variable values.
  Ex) bodyfatFactors[0], bodyfatFactors[8]
- **You need to plot those data and try your best to display their correlation**. (explain their relationship and prove it by plotting them.) If you need, then discard some of the factors from total 13 factors. **Any plotting methods are acceptable as long as they provide a solid explanation of those factors and fat ratio relationship.**
- [Suggestion] subplot, scatter plot, bar plot, x and y tick & label control, legend, color, etc… (You don’t have to make it a big project. Don’t spend too much time on it.)

[Data Details]

bodyfatFactors:

1. Age (year)
2. Weight (lbs)
3. Height (inches)
4. Neck circumference (cm)
5. Chest circumference (cm)
6. Abdomen 2 circumference (cm)
7. Hip circumference (cm)

8. Thigh circumference (cm)
9. Knee circumference (cm)
10. Ankle circumference (cm)
11. Biceps (extended) circumference (cm)
12. Forearm circumference (cm)
13. Wrist circumference (cm)

If you finish your assignment, please send the code to 'hyung8758@gmail.com'. The script name should be '?th_Assignment_YourName.py'. In the code script, the assignment number (e.g, 1st assignment), your name and email address should be written in the first line. Ask questions and give comments to me. It is always welcome.