Beihang University
School of General Engineering

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Data Management and Artificial Intelligence
Lab Class 4

Task 1 ***Simple matplotlib exercises*** *(20 minutes)*

For each of the following subtasks, use the Python package *matplotlib* to draw the figure and save it as a *png* file. Try to recall as much from the code without looking it up. Only once you are stuck, check what is missing.

1. Draw the sine and cosine functions in one plot. The curves should be sampled at 101 points in the interval $-\pi$ to π.

2. Adapt the visualization of the two functions with the following parameters (color=red vs. blue, line width=2.5, line style= dash vs. straight, label= sine vs. cosine). Show the legend in the upper left corner.

3. Draw the two functions in two separate sub figures with using *subplot(1,2,..)*. Check the Internet for the usage of mapltolib's subplot.

The desired output figures are as follows:

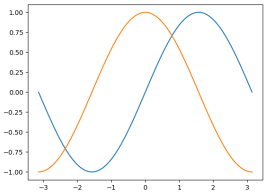

Figure 3: Task1-1

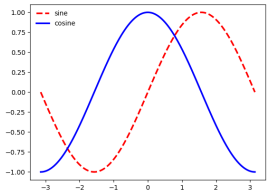

Figure 4: Task1-2

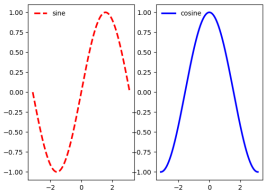

Figure 5: Task1-3

Task 2 ***Visualization of the Beijing subway network*** *(30 minutes)*

The two files *subwaynodes.csv* and *subwaylinks.csv* give you information on station locations and subway line connections (pairwise connected stations) in Beijing.

1. Explore the two files with pandas or Excel

2. Plot the subway network using matplotlib . Each station should be represented with a red filled circle and two linked stations should be connected by a blue line in the plot. Highlight the position of Beihang University on the map witha green cross (latitude: 39.975848, longitude:116.344193)

3. Highlight the three closest stations to Beihang University with a green circle.

The desired output is shown in Figure 6.

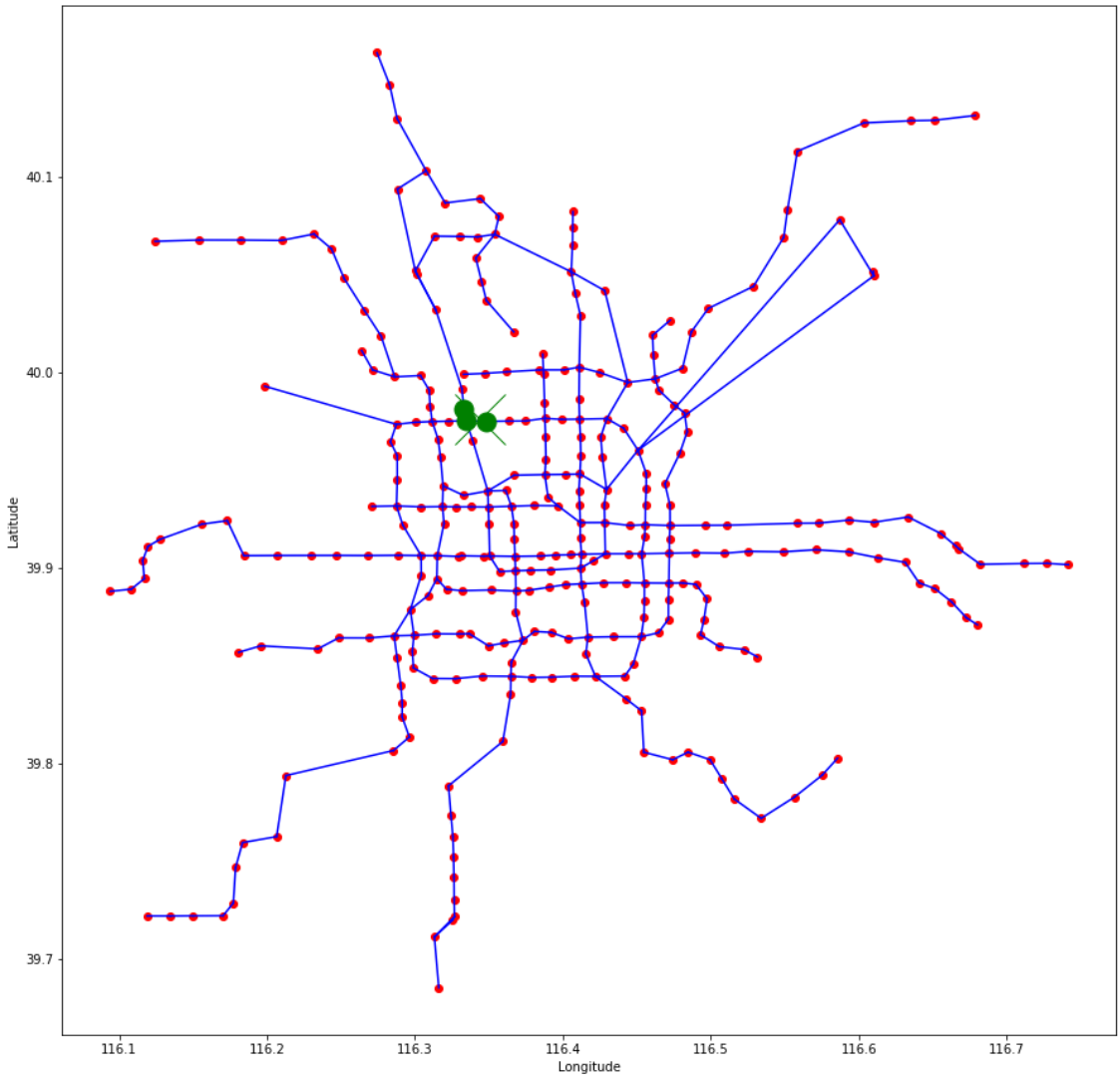

Figure 6: Task2

Task 3 ***Visualization of the corona virus condition in China*** *(30 minutes)*

The two files *cities.csv* and *coronavirus_China.csv* give you information on the locations and corona virus condition of cities in China. Please draw two subfigures for showing the distribution of total confirmed people and the total dead people. As shown in Table 1, draw a circle with the correct color for each city. The color depends on the number of conformed/dead people in each city. The desired output is shown in Figure 7.

Note that some cities in *coronavirus_China.csv* are not recorded in *cities.csv*. You should discard these cities.

Table 1: Numbers of confirmed/dead people and the corresponding colors.

Dead	Confirm	Color
< 1	< 10	green
< 3	< 30	lightgreen
< 10	< 100	yellow
< 30	< 300	gold
< 100	< 1000	darkorange
< 300	< 3000	red
< 1000	< 10000	darkred
≥ 1000	≥ 10000	purple

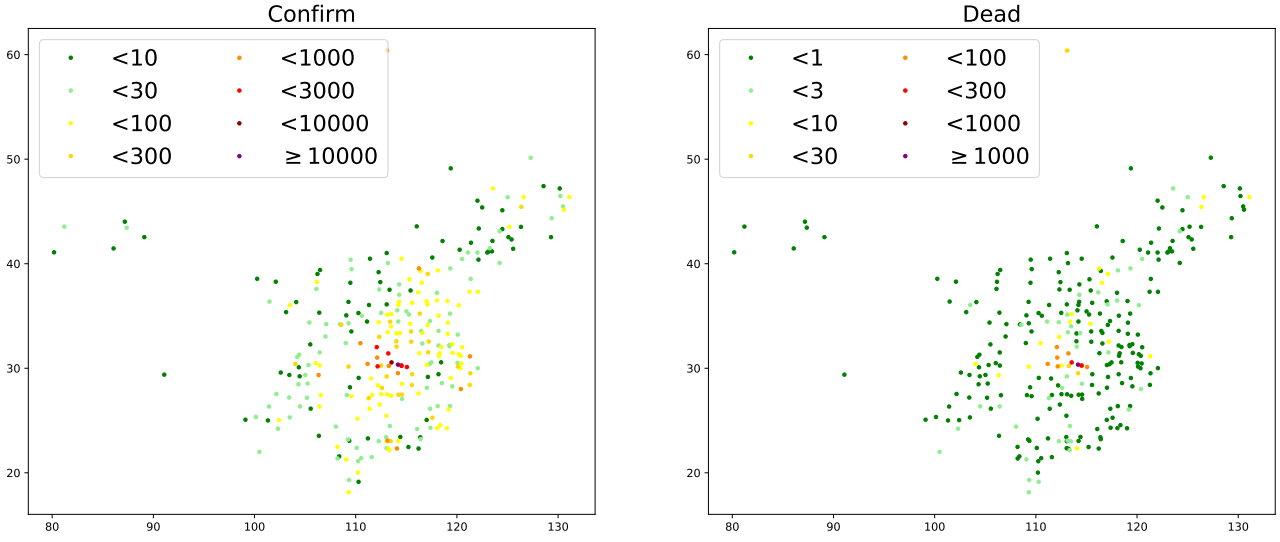

Figure 7: Task3