This quiz consists of two separate phases:

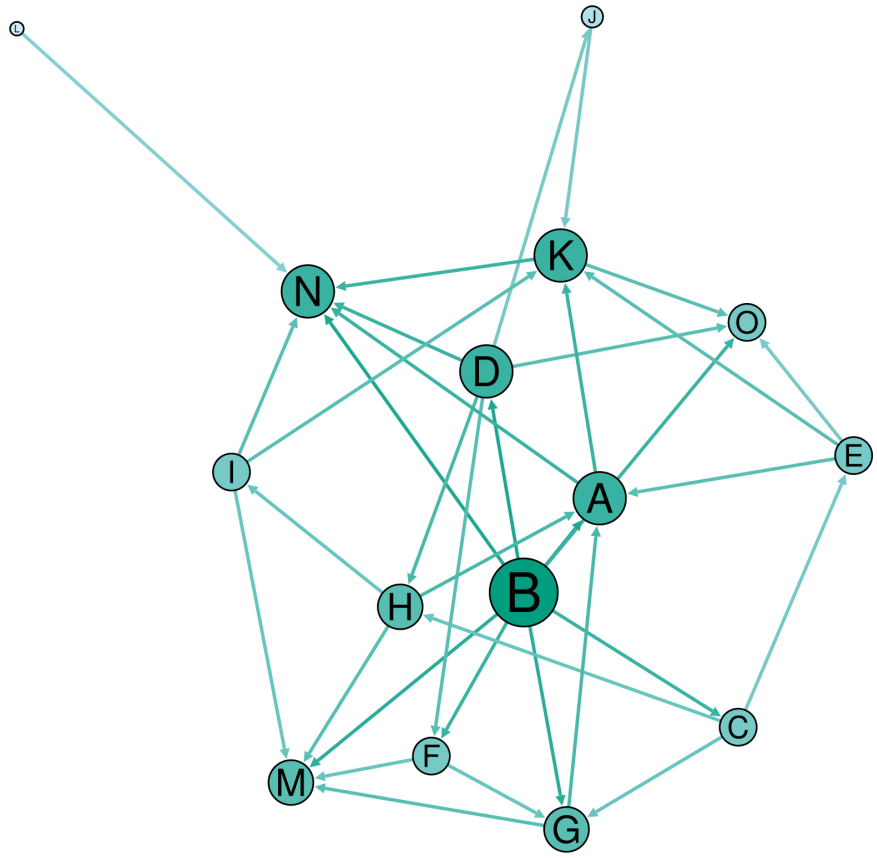
PROBLEM STATEMENT of PHASE1 (60 points):

Consider the graph[1] given below. Write a *Python* program that finds the x-hops away neighbors of the node N. Use recursive function named ***path_analyze*** to traverse on the graph. Save the output in a file named <**Phase1.txt**>

Note:

- *N* is a node label and can take more than one node label.
- The output should be displayed in ascending order.

  For example: path_analyze should return ['K', 'M', 'N', 'O']; for N='C' and x=3.



INPUT FORMAT

Sample command line input:

python	quiz8.py	B,C,O	3
interpreter	py file	Node Label -*N*	Distance -*x*

OUTPUT FORMAT

B: ['A', 'G', 'I', 'K', 'M', 'N', 'O']

C: ['K', 'M', 'N', 'O']

O: []

[1]*You can reach this graph from the file named* ***paths.txt***

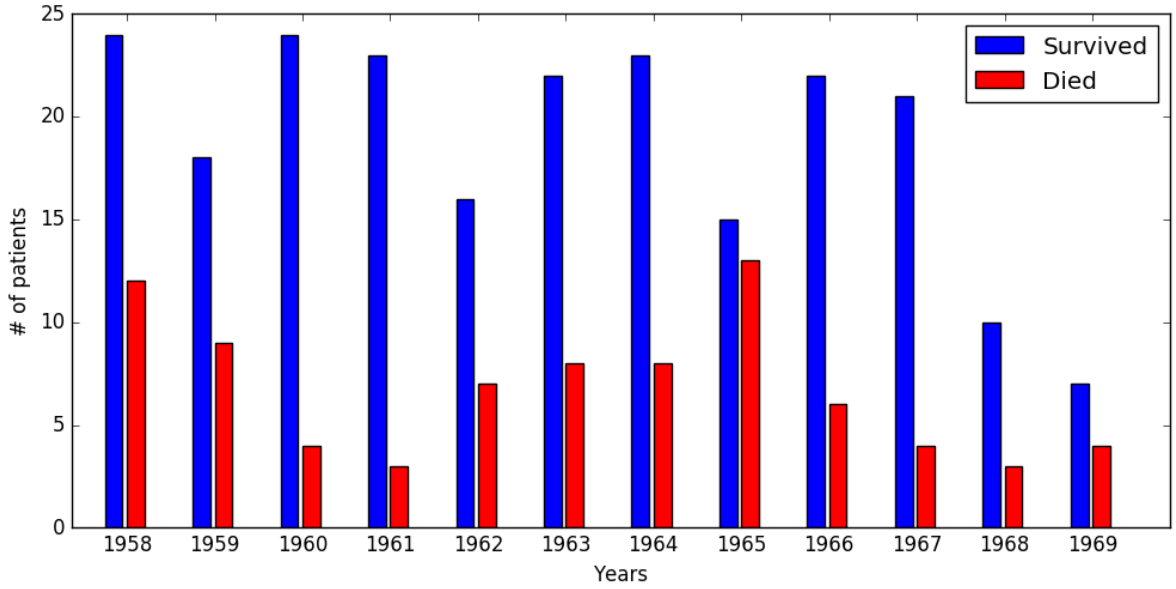
PROBLEM STATEMENT of PHASE2 (20+20 points):

In this phase, you will work on *Haberman's Survival Dataset*[2] <haberman.data> . The cases in the dataset were collected from the patients who had undergone surgery for breast cancer between 1958 and 1970 at the University of Chicago's Billings Hospital. There are four attributes in the dataset:

1. Age of patient at time of operation (numerical)
2. Patient's year of operation (year - 1900, numerical)
3. Number of positive axillary nodes detected (numerical)
4. Survival status (class attribute)
   -- 1 = the patient survived 5 years or longer
   -- 2 = the patient died within 5 year

Considering the dataset, you are to:

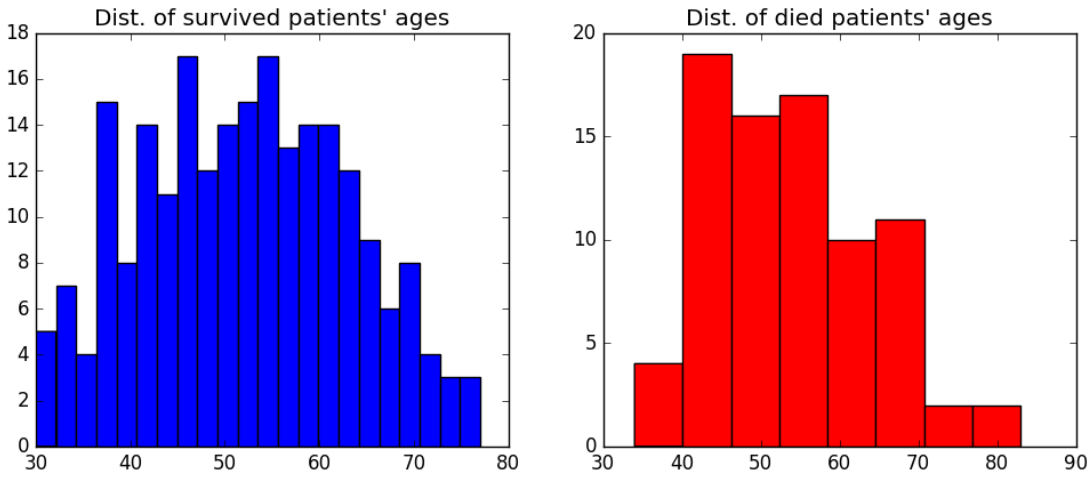
1. Create bar plot that displays the number of patient who survived 5 years long and died within 5 years as a function of operation year. Save as <**Fig1.pdf**>



2. Create two separate histogram plots within a single figure window. These plot should visualize the distribution of patient ages who survived and died. Save as <**Fig2.pdf**>

Number of bins (NB) for the histogram figures should calculated as follows:

$$NB = \frac{\#\ of\ patient\ who\ survied/died}{10}$$



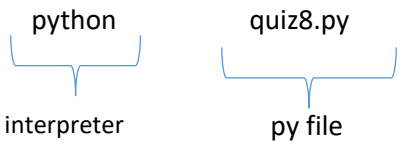
[2]available at: http://archive.ics.uci.edu/ml/machine-learning-databases/haberman/
just download and use it, do not modify the content of the file!

Note:

- Your figures should exactly match to the figure below –including legend box and *x,y*-labels.
- Do not show the figure window but save.

INPUT FORMAT

Sample command line input:



OUTPUT FORMAT

Two figure windows as shown above.

SUBMISSION FORMAT

Zip your file before submitting (not .rar, only .zip files are supported by the system). File hierarchy:

- **<student id>.zip**
  - **quiz8.py**

General Note: **As you see only one py file containing two phases is allowed to submit, so your implementation should call 1st or 2nd phase depending on the existence of argument.**

Remember last quiz/last chance :)