**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

Batch No. :

**DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS**

**Artificial Intelligence (BITS F444/ CS F407)**

**I Semester 2019-20**

**Programming Assignment-6**

**Coding Details**

**(November 29, 2019)**

*Instruction: Type the details precisely and neatly*

1. ID \_\_\_\_\_\_\_\_\_\_\_\_2017A7PS0068P\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_J LAKSHMI TEJA\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Mention the names of Submitted files :
   1. <bayesian.py>
   2. <run.py>
   3. <GUI.py>
   4. <input1.txt>
   5. <input2.txt>
2. Total number of submitted files: \_\_6\_\_\_\_\_\_\_\_\_
3. Name of the folder :\_\_\_\_\_\_\_\_\_\_\_2017A7PS0068P\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Have you checked that all the files you are submitting have your name in the top?Yes
5. Have you checked that all the files you are submitting are in the folder as specified in 4 (and no subfolder exists)?Yes
6. Modules implemented
   1. Created the Bayesian network? Yes
   2. Created Markov blanket? Yes
   3. Created expression from the inputs read ? Yes
   4. Computed probability ? Yes
7. Data structures used
   1. To represent the Bayesian network:\_\_\_\_\_A tuple of 2 dictionaries:

1) parents\_list: list of parents for all nodes

2) cpt\_list: \_\_\_A list of probabilities in same order as present in input file\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. To represent Markov blanket:\_\_\_\_\_\_\_\_\_List of variables\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. To represent the variables:\_\_\_\_\_\_\_\_\_\_\_A character\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. To represent the expression for probabilistic query:\_\_\_\_\_2 dictionaries:

1) query\_list: A dictionary of variables in the query and their truth

2) cond\_list: \_\_ A dictionary of variables in the condition and their truth\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Implementation Details
   1. How did you create the CPT reading the data from the file?

A list of probabilities in same order as present in input file

* 1. How did you access the BN to obtain the Markov blanket?

Traversed the network to find children of the node. Parents and spouses were obtained directly from network by indexing appropriately

* 1. How did you access the CPTs?

Indexed to the appropriate variable in the dictionary

* 1. How did you expand the expression for the conditional dependence on variables?

Obtained input from GUI and put them in 2 dictionaries, one for query other for conditions.

* 1. How did you marginalize the expression?

Used a set of variables that are not in either query list or the condition list and generated all combinations of their truth. Then summed over all these probabilities to get the final answer.

* 1. How many terms does a query have? Give example.
  2. How have you handled the conditional independence of variables?

1. Graphics: Created the graphics (yes/no)\_\_\_\_Yes\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Output
   1. Execute your program to answer the following probabilistic queries. Mention the answer obtained by your program. Also compute the Markov blanket of the variable A.

* P(D, A, L| R, X, P, O) = 0.09974328676359074664
* P(A)= 0.22758768058157086145
* P(F,R|A,P)= 0.12814958359293995849
* P(D)= 0.47212254678467191482
* P(D|P)= 0.50652782667980011944
* P(A|Y, C)= 0.04895618973565327853
* P(A,D|O,R,P)= 0.22423210378837790668
* Markov Blanket of A= ['C', 'X', 'B', 'G', 'Y', 'F', 'L', 'H', 'N', 'D', 'A']

1. Compilation Details:
   1. Code Compiles (Yes/ No):\_\_\_\_\_Yes\_\_\_\_\_\_\_\_\_
   2. Mention the .py files that do not compile:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_None\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Any specific function that does not compile:\_\_\_\_\_\_\_None\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Ensured the compatibility of your code with the specified Python version(yes/no)\_\_\_\_\_\_Yes\_\_\_\_\_\_
   5. Instructions for compilation of your files mentioning the multi file compilation process used by you (We may use the replica of these for compiling your files while evaluating your code)

python3 run.py <file\_name>

Ex. python3 run.py input1.txt

1. Driver Details: Does it take care of the options specified earlier(yes/no):\_\_\_\_\_\_Yes\_\_\_\_\_
2. Execution status (describe in maximum 2 lines)

Everything runs properly.

1. Declaration: I, \_\_\_\_\_\_\_J Lakshmi Teja\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name) declare that I have put my genuine efforts in creating the python code for the given programming assignment and have submitted only the code developed by me. I have not copied any piece of code from any source. If the code is found plagiarized in any form or degree, I understand that a disciplinary action as per the institute rules will be taken against me and I will accept the penalty as decided by the department of Computer Science and Information Systems, BITS, Pilani.

ID\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2017A7PS0068P\_\_\_\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_J Lakshmi Teja \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_29/11/19\_\_\_\_\_\_\_\_\_\_

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