Birla Institute of Technology and Science, Pilani Hyderabad Campus

CS F407 (Artificial Intelligence) Second Semester 2019-20

Assignment 2 (Max. Marks: 30) Date of Submission: 28th April 2020

Q.1 Imagine that Telangana government has started a new initiative to develop safety regulations for monitoring of COVID-19 in the state. For this reason, they have put restrictions on the persons entering the state to prevent the growth of COVID-19 patients in the state and also to help the government decide whether to put a particular person in quarantine or not. Some government officers are assigned the job to check the health status of individuals entering the state. You are asked to construct a Bayesian network to help the government take decision whether to quarantine or not quarantine the individual. All the attributes listed below are Boolean. The attribute fly-in-person indicates whether the person flew in from COVID-19 infected country or not. View-Officer indicates whether the person has been checked by the official or not. Infected indicates whether or not the person is infected with Covid-19. Status-health indicates whether or not the person is having the classic symptoms of COVID-19. Quarantine-person indicates whether the person is quarantined or not.

P.s: You can add any other attributes/information you thought might be missing. Please mention the assumed data in the readme.txt file before submitting the assignment.

The following information is given:

P(Officer=T) = 0.3, P(View_Officer = T|Officer =T) = 0.5, P(View_Officer = T| Officer =F) = 0

P(Status_Health= T| Officer =T) = 0.7, P(Status_Health = T| Officer =F) = 0.3,

P(Quarantine-Person =T| Officer, Infected) =

{0.6, if Officer and Infected are T

0, Otherwise}

P(Fly-in-Person = T| Quarantine-Person, Infected, Status_Health) =

{0, if Quarantine-Person is T,

0.6, if Quarantine-Person is F and Infected is T,

0.5, if Quarantine-Person is F, Infected is F, Status_Health is F,

0.2, if Quarantine-Person is F, Infected is F and Status_Health is T}

Your job is to model the Bayesian network to depict the above situation and simulate it using Tensor flow/ SamIam tool/ Genie tool.

References:-

- TensorFlow is a free and open-source software library for dataflow and differentiable programming across a range of tasks.

- SamIam is a software tool for the creation and consultation of Bayesian networks. The SamIam software package can be downloaded from: http://reasoning.cs.ucla.edu/samiam/.
- An alternative package is Genie, a Windows-based system, which, however, also runs on Linux using wine; it contains much more functionality than SamIam. However, as a consequence of this, Genie it is less easy to use than SamIam.
  Genie can be downloaded from:https://www.bayesfusion.com/.

[**15 Marks**]

Q.2 Typical expert systems used the knowledge to reason about input data and produce meaningful results. This knowledge mostly consisted of simple if-then rules, like if temperature sensor values are > 100C then turn off the electric kettle. Knowledge bases and graphs are still playing a huge role in many intelligent systems. Develop a Question Answering Expert System where, you can consider any type of database like patient dataset, college db etc. One of the Scenario is given below:

Many rural areas in India have extremely limited access to medical advice. People travel long distances to clinics, or medical facilities and there is a shortage of medical experts in most of these facilities. This results in slow service, and patients end up waiting long hours without receiving any attention. Hence, medical expert systems can play a significant role in such cases where medical experts are not readily available. A Diagnosis Expert System can help a great deal in identifying those diseases and describing methods of treatment to be carried out. Design an expert system using knowledge graphs that aims to provide the patients with medical advice and basic knowledge on various diseases. It should consider various symptoms and signs like chest pain, cough, fainting, fatigue, headache, back pain, sunken eyes, low body temperature, restlessness, sore throat, fever etc. along with its severity status and provide the patients with medical advice.

You can use www.britannica.com/topic-browse/Health-and-Medicine/Diseases-and-Disorders or and other source to gather expert knowledge about some of the diseases with the given symptoms.

Note: The build to has to be implemented in Python. You can consider any of the datasets available in the Internet. Please output the rules as well which led to conclusion.

[**15 Marks**]

Mode of submission: Form your own groups of three only (same as 1st assignment group). Tar the entire source and executable files with your id as the tar file name (e.g. f20170055.tar) and send it to the mail id: p20170433@hyderabad.bits-pilani.ac.in.

Include a readme.txt with your group details in your tar file. Submit only one file per group.

(Date given:8th April 2020)
