

Birla Institute of Technology and Science, Pilani Hyderabad Campus

2nd Semester 2017-2018

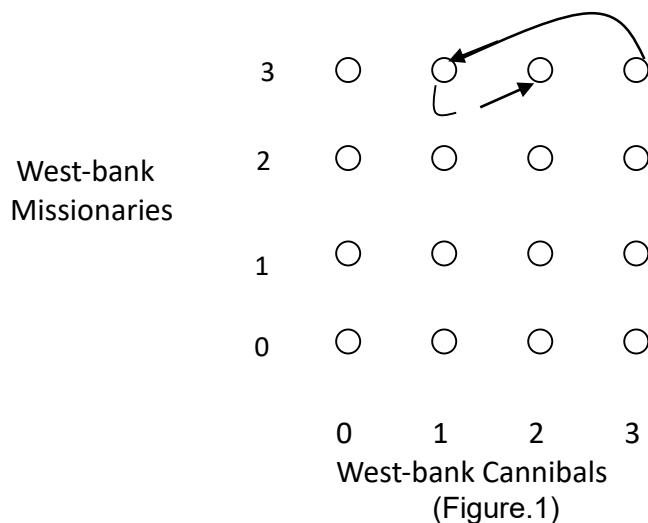
(CS F407: Artificial Intelligence)

Assignment 2 (Max Marks:18) Date of Submission: 4th Feb 2018 (11:55pm)

Q.1:

Three cannibals & three missionaries are standing on the west bank of river Ganges in Varanasi, Uttar Pradesh. A boat is available that will hold either one or two people. If the missionaries are ever outnumbered – on either bank or in the boat – the cannibals will eat them. Write a program to implement a **depth first backtracking** solution to find a path via safe points (states) from the initial state to the desired state.

To solve this problem, you may have to choose a right state-space representation. One example is given below:



Nodes here indicate the number of missionaries and cannibals on the west bank. Solid line arrows indicate trips from west to east, and dotted-line arrows indicate trips from east to west. A trip with two cannibals from west to east is followed by a trip with one cannibal from east to west.

Here, west-to east trips and east-to-west trips must alternate, giving a valid sequence of alternating solid-line arrows and dotted-line arrows.

[8 marks]

Q.2:

Map shown in Fig.2 is an extract of the various transit routes available for commuting from RGIA, Shamsabad to Secunderabad railway station. Your task is to write a program to find out an optimal route from RGIA airport to Secunderabad other than the ones given in the map. These results are given by Google maps. Your solution could also be same as Google map's on some occasions. To solve the problem of finding an optimal route, you should use OpenStreetMap API [Ref:1] (as shown in Fig.3) to fetch the coordinates of townships (localities) in latitude and longitude from the source to the destination. This data has to be pushed into a database like PostgreSQL [Ref:2] (an open source database) in conjunction with PostGIS [Ref:3] or can be stored in a flat file. An A* search algorithm (Best-first search) has to be implemented to calculate the transit time to reach a particular destination from any source. For getting the transit time between different locations in the database file (or in the flat file stored in the previous step) you can use the distance metric API from google [Ref:4] which can be used as the heuristic function in the A* algorithm. The result of the A* algorithm has to be projected by the help of REST APIs on the map or shown in the form of coordinates of the nodes, followed by the computed route, as output on the monitor. The build has to be implemented using Python.

