Course: **Artificial Intelligence [C]** 26-March-2022 **(Fall 2021)**

Resource Person: **Muhammad Shakeel** **COURSE PROJECT**

Total Points: 50 [Code: 25 + Report: 25]
Submission Due: Saturday April 16, 2022

Instructions: Please Read Carefully!

- **This is an individual project assignment. Everyone is expected to complete the given assignment on their own, without seeking any help from any website or any other individual.** There will be strict penalties for any work found copied from any source and the university policy on plagiarism will be strictly enforced.
- This project carries a weightage of **20%** towards the final grade.
- You are expected to submit this assignment as:
    a. Submit the code solution of the CSP and the project report (PDF) as a zip file having your ID as its name against this project assignment on Google Classroom on or before the due date.
- Assignment is to be submitted only via Google Classroom. **No email submissions will be accepted!**
- Late submissions will **not be graded.**

INSTRUCTIONS:

1. **Write code using ONLY the Python programming language to solve the given CSP below. You must use only the simpleai library as discussed and used in the course labs. Make sure to fully comment your solution. [25]**

   Make sure to create a Python (.py) file and not create a Jupyter Notebook file. Only .py files will be accepted.

   YCPS@GIFT is going to arrange a gaming competition at campus. They are considering using seven games for this competition:

   1) Supreme Commander (SC)
   2) Grand Theft Auto (GTA)
   3) Call of Duty: Modern Warfare (CoD)
   4) Mortal Kombat (MK)
   5) Tactical Ops (TO)
   6) Rocket League (RL)
   7) Dark Souls (DS)

   YCPS President has assigned seven YCPS members to supervise the competition. They are:

   a) Baber
   b) Daud
   c) Faisal
   d) Jameela
   e) Kiran
   f) Marium
   g) Naila

   These members can also work together, but it turns out there are various constraints as given below that they must follow:

   1) Daud will not supervise the game in which Jameela is already assigned
   2) Kiran must supervise either SC, GTA, or CoD
   3) Marium can only supervise any one of games DS, CoD, or TO
   4) Naila can supervise a game that comes before Marium's game in the list
   5) Kiran can supervise a game that comes before Daud's game in the list
   6) Baber can only supervise the game RL
   7) Jameela can supervise a game that comes after Naila's game in the list
   8) Baber cannot supervise a game with Naila
   9) Naila cannot supervise the game RL
   10) Faisal cannot supervise any of the games MK, TO, or RL
   11) Daud cannot supervise the game TO
   12) Daud must supervise a game that comes before Faisal's game in the list

   This problem can be modeled as a CSP, with the **name of each YCPS member as a variable**, and the **domains are the game names**.

   a) What would be left in each variable's domain if we apply the unary constraints on each variable?

   You should write your answer as: variable name: domain value(s)

b) If the MRV (Minimum Remaining Values) heuristic is applied, what variable would be assigned first?

c) Now we will use the LCV and MRV heuristics to assign values. We will select Marium as the first variable to be assigned. We begin by using the Forward Checking with the LCV and MRV heuristics to find the remaining values in each variable's domain. What would be the order of assigned variables using the LCV heuristic? You will need to completely show your work in which you clearly show the result of Forward Checking with LCV and MRV heuristics on each variable's domain.

d) Find a solution of this given CSP problem using the forward checking combined with the MRV and LCV heuristics. For this part, you may take the result of part-(d) as your initial assignment, and clearly state that assignment. You will need to show complete working for this part.

2. Create a report as a PDF file in which you explain each section of your code fully. You must explain how you have written that section of the code and the logic behind that section of the code. Finally, you must show the complete output of the code at the end of your report. [25]

END OF PROJECT