National University of Computer & Emerging Sciences

AL2002 – Artificial Intelligence – Lab (Spring 2025)

BSCS-6B

Lab Work 8 (Constraints Satisfaction Problem (CSP) - Heuristics)

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Instructions:

Note: Carefully read the following instructions

1. You also have to submit .ipynb file.
2. Comments in the code explaining chunks of the code are important.
3. Plagiarism is strictly prohibited, 0 marks would be given to students who cheat.
4. First think about the problems statements then you may start your programming.
5. At the end when you done your tasks, attached .py or .ipynb files on google classroom.
6. Please submit your file in this format 22Fxxxx_Name_SecB_Lab#
7. Do not submit your assignment after deadline. Late and email submission is not accepted.

Lab Tasks:

Task 1:

We have five trains: T1, T2, T3, T4, and T5 and two platforms: Platform A and Platform B. Each train must be assigned a time slot and a platform to either arrive or depart. There are four time slots available: 1,2,3,4. You need to find a suitable schedule for the trains that meets the following constraints.

Variables:

- T1, T2, T3, T4, T5 representing the trains.

Domain:

- Time slots for each train: {1,2,3,4}

Constraints:

1. Train T1 is an express train and must depart at time slot 1.
2. Train T2 has limited fuel and must arrive by time slot 2 at the latest.
3. Train T4 will arrive late and can only arrive at time slot 3 or later.
4. Train T4 must arrive before Train T3 departs because passengers are transferring from T4 to T3.
5. No two trains can use the same platform at the same time.
6. Trains T1, T2, and T3 serve long-distance routes and can only use Platform A.
7. Trains T4 and T5 serve local routes and can only use Platform B.
8. Adjacent trains in the sequence T1,T2,T3,T4,T5 must have different time slots.

Apply the heuristics; minimum-remaining-values (MRV), degree heuristic (DH), and least constraining-value (LCV) accordingly for computational analysis.

- Display the Solution
- Time Complexity