ASSIGNMENT:01

Artificial Intelligence

Deadline: 9th March 2024

Instructions:

1. Each student must complete the assignment independently without collaboration.
2. The assignment should be implemented using the Python programming language.
3. Strict adherence to academic integrity is required, with no plagiarism permitted. Any form of copying, whether from other students or online sources, will result in zero marks for the entire assignment.
4. The code must be well-commented for clarity and understanding.
5. Submissions must be made on time, as late submissions will be penalized.
6. Incomplete submissions lacking either the source code or the accompanying report will not receive any marks. The report should provide a concise explanation of the steps involved in the program for each question, along with the obtained results.
7. To submit the assignment, compress both the source code and the report into a single folder, named as ROLLNO_NAME.ZIP

Question 1:

Cryptarithmetic puzzles are intriguing mathematical problems where numbers are represented by letters or symbols. The objective is to decipher the correspondence between these symbols and digits in a way that satisfies a given arithmetic equation. Each letter represents a unique digit, and the puzzle solver must find the correct digit-letter mapping to make the equation valid.

These puzzles often involve addition, subtraction, multiplication, or division operations. However, what makes cryptarithmetic puzzles particularly challenging and interesting is that certain constraints must be adhered to, such as each digit representing a unique letter, and leading digits cannot be zero. Solving cryptarithmetic puzzles requires logical deduction, trial and error, and sometimes even clever strategies.

For example, in a puzzle like SEND + MORE = MONEY, the solver must find unique digits for each letter so that when the equation is solved, it holds. This requires careful consideration of possible combinations and systematic elimination of incorrect mappings until a valid solution is found.

Requirements:

- Please provide solutions (at least two algorithms) that are generic and utilize multiple efficient AI search algorithms (only those you have learned) to ensure optimal performance. Additionally, calculate both the running time complexity and space complexity of the programs for thorough analysis.
- Secondly, you must provide a document in which you'll describe how you formulate the problem into a search problem, make a tree, or whatever steps you think should be added for better understanding. The report shouldn't exceed 4 pages. Also, you'll write your observations about algorithms and the best algorithm according to your opinion.

Helping Material:

- Video Guide
- Starter Code Guide
- Online Calculator for confirming your solutions
- Reading Material