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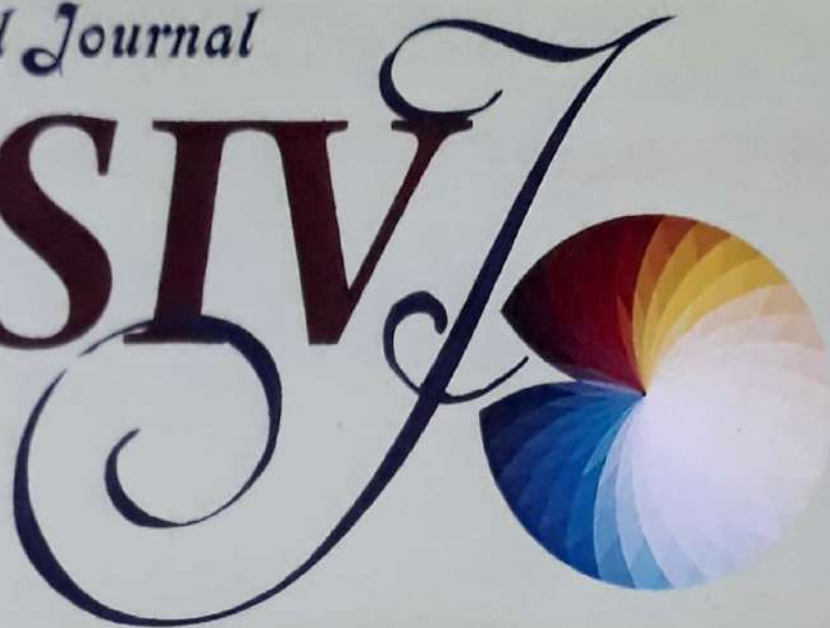
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A COGNITIVE METHOD TO SOLVE WATER JUGS PROBLEMS

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Abstract - The Water Jug problem is a famous problem in Artificial Intelligence, Problem solving, Recreational, Computer Programming and Psychology. The solution of the problem is mainly based on some search methods such as Breadth First Search (BFS) or Depth First Search (DFS) or Diophantine approach. In BFS, DFS and Diophantine approach we find a drawback while finding out the solution. In this paper, a new arithmetic approach called Extended Euclidean approach which is used to solve the problem, it is simple and suitable for manual calculation or programming language implementation. Analysis of the solution involves various steps and some illustrative examples are provided with different stages.

Key words - Water jugs problem, Artificial Intelligence, Problem solving, Diophantine approach, Extended Euclidean approach

I. INTRODUCTION

The Artificial Intelligence is the study of how to make computers to do things better than the human being. As the term says, here the water jug problem is well-known problem in Artificial Intelligence [1], Computer Programming [2], Problem solving [3], Geometry [4], Recreational and discrete Mathematics [5,6] and Psychology [7,8,9].

"You are at the side of a river. You have a 3 liter jug and a 5 liter jug. The jugs do not have markings to allow measuring smaller quantities. How can you use the jugs to measure 4 liters of water?"

There are various methods to solve this problem, including Breadth First search [10], Depth First Search [11] and the Diophantine approach [12]. However each and every method has its own

disadvantages that is in BFS the robot does not get trapped by exploring a long path. In DFS, by chance we can arrive at the goal and the memory space is less. In Diophantine approach the goal is reached depends on the assumption that are made over the value of X and Y.

In this paper a simple Arithmetic approach to solve the problem that is introduced. A novel feature of this approach is that one can deduce the required amount of water in jugs at each step by getting the value of X and Y by using the backward approach. When these values are just substituted in the Extended Euclidean equation our goal will be reached. Due to its simplicity it is very suitable for manual calculation of the proving steps.