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**COMPUTER SCIENCE AND APPLICATIONS**

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# A DIRECT COMPARISION METHOD TO THE WATER JUGS PROBLEM

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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 mainly based on heuristic approach or some search methods such as Breadth First Search (BFS) or Depth First Search (DFS) or Diophantine approach or Extended Euclidean approach. The existing methods of solutions are often non-algorithmic in nature. In this paper, we present an algorithmic approach to solve this problem and describe its implementation in Excel. Illustrative examples are provided.

**Keywords**-Water jugs problem, Artificial Intelligence, Problem solving, Diophantine approach, Extended Euclidean approach.

## 1. 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 marking 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], the Diophantine approach [12] and Extended Euclidean approach [13]. However, most of them are not algorithmic in nature and the time and memory taken to solve it could be expensive sometimes. In this paper, we present a simple algorithmic approach to solve this problem, which was introduced by the author in [13]. By using this approach, we can obtain the total amount of water in the jugs at each pouring step by using the extended Euclidean approach. In Breadth First Search we will be forced to find many answers and it is waste of time, Depth First Search is an unfruitful path is being carried out for a very long time and longer path never explored until the entire shorter one has been examined, in Diophantine equation x and y values are assumed and it may work by chance, Extended Euclidean Approach is that by having the input itself we are able to get the output without any guesses. By following the Extended Euclidean Approach we the appropriate result with less effort, complication and memory. We can assure that the answer what is found out is efficient and effective. The complete paper is planned like this. In the next segment, we will set up the algorithmic approach for solving the common two water jugs problem and illustrate the mathematical environment behind. In the