

# Finding the inverse of the fuzzy matrix using fuzzy linear equation system

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## Abstract

Linear equation systems play a very important role in engineering, mathematics, statistics and other disciplines. For example, one can easily compute the inverse of a given matrix whose entries are real numbers using this tool. The explanation of the usage of this tool can be easily found in any of the linear algebra books. In the last three decades, several disciplines have witnessed to fuzzy set theory applied to many research areas. For instance, fuzzy linear equation systems constructed by fuzzifying either parameters or variables or both have been one of the research areas in mathematics and have been encountered in several diverse disciplines. Also, the solution procedures of these systems are very active research area and depend on different methods such as extension principle and interval arithmetic. However, there has been no attempt in finding the inverse of a given matrix whose entries are fuzzy numbers using fuzzy linear equation systems. Therefore, we search for fuzzy inverse matrix in this paper. For this purpose, we proposed a new method and gave some new definitions such as fuzzy zero number, fuzzy one number and fuzzy identity matrix. This new method extends the notions used in real numbers to fuzzy settings. Calculations are based on hypothetical and original fuzzy matrices. The first of which is based on hypothetical example in order to show how computations are done. The second are original fuzzy matrices taken from statistics and operation research. In the hypothetical and the original examples, two types of results are exhibited which are direct numerical solutions and the solution by the choice of decision maker. It is noted that the uniqueness of the calculated fuzzy inverse matrix is not guaranteed.

## Keywords

Fuzzy number, Fuzzy matrix, Fuzzy linear equation system, Fuzzy inverse matrix.

## References

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