

## A NEW HYBRID ANT BASED GENETIC ALGORITHM – FUZZY SHORTEST PATH PROBLEM

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### ABSTRACT

Shortest Path (SP) problems in which, the determination of minimal path from source to the destination in the network graph  $G=\{V, E\}$ , have many dimensions in various fields of application. While considering a network graph, the arc length may represent distance, time, bandwidth or cost. But, in real life applications, there is certain uncertainty in the representation of real values as the arc length which in turn gives rise to fuzzy shortest path. In fuzzy shortest path problem, the edges are represented by fuzzy numbers and here we use generalized trapezoidal fuzzy numbers. The distance between the fuzzy edges is known to be fuzzy distance which comprises of centroid points, left spread and right spread. Genetic Algorithm (GA) is the most powerful among the optimization methods which involves 'natural selection' and the survival of the best individual to next generation. Ant Colony Optimization (ACO) works on the behaviour of the ants and the swarm intelligence. We propose a new hybrid ant based genetic algorithm with integrates the behaviour of ants and the genetic operators (specifically crossover and mutation operators). The implementation of proposed algorithm shows better convergence than the conventional algorithm.

**KEYWORDS:** Genetic Algorithm, Ant Colony, Generalized Trapezoidal Fuzzy Number, Shortest Path Problem