SETSCI Conference Indexing System,
Volume 2 (2018), 57-57

ISAS 2018
I[st] International Symposium on Innovative Approaches in Scientific Studies
April 11-13, 2018, Kemer-Antalya, Turkey

Heuristic solution with similarity, affinities and projective transformation problems with Backtracing Search Algorithm (BSA)

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Presentation/Paper Type: Oral / Abstract

Abstract- In this paper, three different types of coordinate transformations that are frequently used in geodetic applications are given the details of their application with evolutionary algorithms. Similarity (Helmert), Affin and Projective transformation models commonly used in coordinate transformation applications are examined in detail and classical and computational intelligence solutions of related problem solutions are compared. In numerical problem solving, the classic Least-Squares method can be easily captured in local solutions. Evolutionary algorithms have the ability to avoid local solutions, unlike classical methods, in solving numerical problems because of their intuitive solution search capabilities. Evolutionary search algorithms do not need derivative components of a problem in solving a numerical problem. For this reason, the use of evolutionary algorithms in system identification problems such as coordinate solutions provides highly efficient solutions. The application was made using a geodetic GPS measurement data in a test network built on the campus of Erciyes University. Backtracking Search Optimization Algorithm (BSA) is used in practice. BSA results were also compared with the results of four different evolutionary search methods.

Keywords- Evolutionary Search Algorithms, Backtracking Search Optimization Algorithm (BSA), Geodetic Transformation