Geospatial Network Analysis Using Particle Swarm Optimization

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Abstract : The shortest path (SP) problem concerns with finding the shortest path from a specific origin to a specified destination in a given network while minimizing the total cost associated with the path. This problem has widespread applications. Important applications of the SP problem include vehicle routing in transportation systems particularly in the field of in-vehicle Route Guidance System (RGS) and traffic assignment problem (in transportation planning). Well known applications of evolutionary methods like Genetic Algorithms (GA), Ant Colony Optimization, Particle Swarm Optimization (PSO) have come up to solve complex optimization problems to overcome the shortcomings of existing shortest path analysis methods. It has been reported by various researchers that PSO performs better than other evolutionary optimization algorithms in terms of success rate and solution quality. Further Geographic Information Systems (GIS) have emerged as key information systems for geospatial data analysis and visualization. This research paper is focused towards the application of PSO for solving the shortest path problem between multiple points of interest (POI) based on spatial data of Allahabad City and traffic speed data collected using GPS. Geovisualization of results of analysis is carried out in GIS.