Fuzzy Approach for the Evaluation of Feasibility Levels of Vehicle Movement on the Disaster-Streaking Zone's Roads

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Abstract : Route planning problems are among the activities that have the highest impact on logistical planning, transportation, and distribution because of their effects on efficiency in resource management, service levels, and client satisfaction. In extreme conditions, the difficulty of vehicle movement between different customers causes the imprecision of time of movement and the uncertainty of the feasibility of movement. A feasibility level of vehicle movement on the closed route of the disaster-streaking zone is defined for the construction of an objective function. Experts' evaluations of the uncertain parameters in q-rung ortho-pair fuzzy numbers (q-ROFNs) are presented. A fuzzy bi-objective combinatorial optimization problem of fuzzy vehicle routine problem (FVRP) is constructed based on the technique of possibility theory. The FVRP is reduced to the bi-criteria partitioning problem for the so-called "promising" routes which were selected from the all-admissible closed routes. The convenient selection of the "promising" routes allows us to solve the reduced problem in real-time computing. For the numerical solution of the bi-criteria partitioning problem, the -constraint approach is used. The main results' support software is designed. The constructed model is illustrated with a numerical example.