ABSTRACT

Master dissertation: 107 pp., 19 fig., 4 tab., 1 app., 54 sources.

The relevance. Vehicle routing is a process, which directly influences prices of all goods, because transportation is directly or indirectly involved in all areas of production of goods. It is estimated that the cost of transportation makes 5 to 30% of the price of the final product, which means that correct construction of logistic routes is a key to reduce price. Nowadays routing becomes even more important topic for research, and there are several reasons for that. First reason is a constant increase in cargo number that must be delivered, and as result – more money saved if right routing is involved. Second reason is a fast development of self-driving cars that are able to aggregate data from their car park in real-time. This in turn sets new challenge for routing systems. A demand for a systems that are able to control routes for whole fleet of transport simultaneously, decreasing both time and distance. Third reason lies in popularity of delivery services of small packages, which almost always goes with time limits, when client defines, at what timeframe package should be delivered. Such conditions are taken into account in Vehicle routing problem with time windows (VRPTW). Work describes investigation and development of method that solves VRPTW.

Relationship with academic programs, plans, themes. Master dissertation is done with regard to optimization plan of controlled processes departure of V.M. Glushkov Institute of Cybernetics of NAS of Ukraine in scope of research topic «Develop mathematic tool, aimed at creation of intellectual information technologies for solving combinatorial optimization problems and information security» (number of state registration 0117U000323)

The purpose and objectives of the study. The aim is to reduce costs and increase loyalty of customers by building best possible route that satisfies time windows condition for each machine. To reach the goal such tasks should be done:

- review known results in the area of vehicle routing;
- analyze mathematical models that are used to plan routes with time windows;
- investigate formalization of vehicle routing problem with time windows;

- review algorithms that are based on heuristics and metaheuristics;
- develop own algorithm based on previous results;
- implement algorithms and models in code so that result can be used in determination of most suitable routes for the carrier;
- analyze results.

The object of the study – the process of routes construction for transport with time windows limitation.

The subject of the study – heuristic methods that build routes for problems with time windows.

Methods - simulation.

Scientific novelty of the results – introduced the scheme of the hybrid evolutionary algorithm with local search, crossing over and mutation that are adapted to the vehicle routing problem with time windows.

Publications. Work results are published in the scope of the iScience XXIV international scientific conference «Recent challenges of modern science», international scientific conference «Innovative development of science of the new millennium». Report was presented at the conference «Information and Computer Technology - 2017».

VEHICLE ROUTING PROBLEM, TIME WINDOWS, OPTIMAL PLAN, METAHEURISTIC ALGORITHMS, ROUTE COST