

## **ANALYSIS AND DEVELOPMENT OF CONDITIONAL OPTIMIZATIONALGORITHMS IN DYNAMIC SYSTEMS**

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Almost every day, a large number of people are faced with the question of building routes. This problem can arise when planning a trip to the store, returning home from work, or even a long-distance car trip. In those cases when the route becomes routine, in most cases it becomes well-practiced, people know approximately the arrival time of the tram or bus at the stop, know how long certain parts of the route take, etc. But when it comes to irregular routes, the possibility of human error increases, such routes are more difficult to plan, it is difficult to estimate the necessary time for transfers, to plan a route along unknown paths. In such cases, it is better to trust specially developed route planning services, such as, for example, Google maps. They have years of accumulated information about moving along certain roads, often have information about possible traffic delays, road closures, etc. The use of such services can completely eliminate the human factor and plan the optimal path, taking into account tens or even hundreds of factors. Thus, now the ability to use such services, to understand the basic principles of work and its possibilities is an integral part of a modern person.

To effectively solve these problems, service developers usually resort to the application of various algorithms for finding the shortest paths on graphs[1][2], algorithms for dynamic connectivity verification[3], data storage in data structures based on dictionary arrays instead of adjacency and incidence matrices or any other format, caching different parts of routes and abstraction of regions. During region abstraction, the shortest distances between all pairs of entries and exits to them are cached. Additionally, as a rule, Yen's algorithm[4] for constructing k different shortest paths and the possibility of using machine learning algorithms to predict the weight of a rib for a certain period of time depending on various parameters (time of day, day of the week, weather, etc.) [5] are implemented.

### **References (translated):**

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