APPLICATION FLOYD-UORSHOLLA IN MODELING SERVICE POWER SYSTEMS

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When planning the electrical service maintenance of the energy system deserves special attention task of developing entrance routes to them. A detailed grid of roads identifies a large number of possible routes of access to electrical facilities, so there is the problem of optimizing routes, reducing material costs of the enterprise, which in turn leads to cost savings and increase profitability of energy systems.

In addition, the ways and time spent on the move through them can be used for planning daily or weekly amount of work teams with technical or service grid.

The purpose of research - modeling of electrical facilities and access routes are based on graph theory and development of computer programs in C ++ to implement Floyd-Uorsholla finding shortest paths between all n objects graph.

Materials and methods research. All future developments will concern southeast of the city. Bershad, Ternopil region.

To develop optimal routes brigade maintenance of electrical facilities energy system must solve the following problem:

1) create a graphical model of the location of electrical facilities of a territory;

2) Supplement model of road junctions that can change the route;

3) establish links between objects graph and determine the real distance;

4) to calculate the shortest paths between all pairs of n vertices.

Objective 1. To create a graphic model of electrical facilities necessary topographical map of the area. For a list of electrical facilities (in our case, transformer substations) carry out mapping graphics for their locations. Graphically, the main electrical objects denoted by squares. Each square can be signed code as it is indicated in Remy, but the codes in column will not be used. They will only carry data on a data transformer substation.

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Task 2. As the network of roads of the city is quite extensive, the map denote the intersection of highways nodal points as circles. These units will be used as reference points for the routes of movement. Each object that is depicted graphically is the top graph. Graphical model of location of main and auxiliary peaks is as follows (Figure).

Task 3. If between objects is a direct connection, then connect them line (arc). With Internet resource perform the calculation of distances between them. Each arc has a numerical value, and therefore weight.

In addition, each connection can have direction on which the move. If between the selected objects possible two-way traffic, then the column he portrayed double-headed arrow, if one-sided, it sided arrow in the direction where you can move.

Task 4. To find the lengths of the shortest paths between all pairs of vertices n apply the algorithm Floyd-Uorsholla previously folded square matrix D of order n with lengths of arcs directed graph. The element matrix Dij is the length of the arc between vertices (i, j). If the arc between the elements (i, j) does not exist, assume that the distance is infinitely large value (∞). After analyzing the value of all arcs take for ∞ number 9990.

In forming the matrix D are faced with a lot of numerical data and thus possible errors in filling it. Since the matrix is symmetric with respect to the main diagonal, then one way to verify the correctness of administration may be viewing matrix symmetry visual way.

Another issue is the training data for programs written in C ++. Matrix form of a table in a text editor, and you save a document (data_b.txt) use the file type "Plain Text" option from the "insert line breaks."

At the same time form a matrix S order n, where Sij = j, and the diagonal elements are zero. The matrix S is a matrix previous peaks.

The basic idea of the algorithm Floyd-Uorsholla is the claim that if the inequality Dik + Dkj <Dij (i = 1 ... n, j = 1 ... n, k = 1 ... n), the path arc (i, j) is replaced by two successive arcs (i, k) and (k, j), and Sij = k, which is a sign of the path (i, k) and (k, j).

For the numerical calculations of the algorithm implemented in the programming language C ++.

After the program receive a text file data_e.txt - matrix lengths between the vertices of the graph. For convenience, this file is converted to a table in a text editor. Table. 2 shows a fragment of the resulting matrix.

Analyzing the nodal points, we conclude that when moving from the top 1 (SEM) to 9 (transformer substation) we pass two transformer stations 15 and 18. The target time for maintenance () of these objects is 2 hours. Summing up time maintenance of three objects 15, 18, 9 and the journey (53 min ≈ 1 hour), we get 7 hours. This time is embedded in planned eight-hour day. So, this route may serve as one of the points schedule work crews EMDU of electrical or technical service of the energy systems of the city.

The material in this work can be used to further plan the simulation of various forms of electrical energy and services company, reducing material costs. This in turn will lead to cost savings and increase profitability of energy systems.