Ministry of Education and Science of Ukraine

National Technical University of Ukraine

«Kyiv Polytechnic Institute. Igor Sikorsky »

Faculty of Informatics and Computer Technologies

Department of Computer Engineering

LAB № 7

from the discipline "Theory of Algorithms"

on the topic «Greedy algorithms»

PERFORMED BY:

1st year student

group ІП-93

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The credit - 9311

Variant – 11

CHECKED:

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c.t.s.,s.r.

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**TASK**

**Goal:**

implementation of the greedy algorithm for the traveling salesman task.

**Option task:**

In this work, it is necessary to propose a greedy algorithm for the task of a salesman.

The task of the salesman is formulated for a complete graph. For a weighted complete graph G with n vertices, the distances between all pairs of vertices (i, j) are given. You need to find the shortest route that runs through all vertices of the graph and enters each vertex only once.

**CODE**

**using** System**;**

class Lab7

**{**

// Find the fastest path

static int TravellingSalesmanProblem**(**int **[,]**Graph**,** bool **[]**ArrayVertexes**,**

int PresentPosition**,** int Vertex**,**

int Total**,** int Price**,** int FinalResult**)**

**{**

**if** **(**Total **==** Vertex **&&** Graph**[**PresentPosition**,**0**]** **>** 0**)**

**{**

FinalResult **=** Math**.**Min**(**FinalResult**,** Price **+** Graph**[**PresentPosition**,**0**]);**

**return** FinalResult**;**

**}**

**for** **(**int i **=** 0**;** i **<** Vertex**;** i**++)** **{**

**if** **(**ArrayVertexes**[**i**]** **==** **false** **&&** Graph**[**PresentPosition**,**i**]** **>** 0**)**

**{**

// Mark as visited

ArrayVertexes**[**i**]** **=** **true;**

FinalResult **=** TravellingSalesmanProblem**(**Graph**,** ArrayVertexes**,** i**,** Vertex**,** Total **+** 1**,**

Price **+** Graph**[**PresentPosition**,**i**],** FinalResult**);**

// Mark i-th node as unvisited

ArrayVertexes[i] = false;

}

}

return FinalResult;

}

static void Main()

{

// Vertex = number of vertexes

int Vertex = 6;

int [,]Graph =

{

{ 0, 75, 5, 15, 25, 40},

{ 15, 0, 55, 15, 10,75 },

{ 35, 25, 0, 10 ,10,5},

{ 40, 15, 45, 0 ,25,35},

{ 15, 25, 20, 10 ,0,20},

{ 50, 5, 5, 95 ,25,0}

};

//if the vertex was visited

bool[] ArrayVertexes = new bool[Vertex];

// 0th vertex is visited

ArrayVertexes[0] = true;

int FinalResult = int.MaxValue;

// Setting the value

FinalResult = TravellingSalesmanProblem(Graph, ArrayVertexes, 0, Vertex, 1, 0, FinalResult);

// FinalResult is the minimum weight Hamiltonian Cycle

Console.WriteLine(FinalResult);

}

}

**RESULTS OF THE PROGRAM WORK**

The input arrays are:

{ 0, 75, 5, 15, 25, 40},

{ 15, 0, 55, 15, 10,75 },

{ 35, 25, 0, 10 ,10,5},

{ 40, 15, 45, 0 ,25,35},

{ 15, 25, 20, 10 ,0,20},

{ 50, 5, 5, 95 ,25,0}

Output:

70

**CONCLUSIONS**

I got acquainted with the topic of laboratory work.

Have acquired relevant work skills.

An appropriate test program has been developed.

Learn the story of Traveling Salesman Problem. Understand how greedy algorithms work.