On Minimum Cost of Transportation from Afghanistan to India

A Parthiban*, Farzana Mohammadi[$]

Department of Mathematics, Lovely Professional University, Punjab-144411, India

Abstract

In this paper, a detailed study is undertaken on transporting essential commodities from Afghanistan to India via Pakistan and Iran. We also estimate the minimum transportation cost for transporting goods especially almond from the several places of Afghanistan to Mumbai, India.

Key words: Transportation cost, The Shortest path problem, Afghanistan, India

Introduction

A graph G is a collection of vertices ("nodes") and edges ("branches"). Graphs can be connected, directed or undirected. In this paper we consider directed graphs. Vertex is a point where two or more line segments are connected and they show the start point and end point of a line in other side edge is the line between two corners or surfaces which link vertices or points in a network and network is a set of nodes or vertices that are connected with each other.

Figure 1: A map in which the four countries are seen

Figure 2: A map shows the route from Kabul to Mumbai

The Shortest Path Problem

The "problem of finding the shortest path from the initial node to the terminal node in the network is called the shortest path problem". The shortest path problem ("also called a single-pair shortest path problem") which can be distinguished from the following differences. First is single-source shortest path problem, in which "one can find shortest paths from a source vertex v to all other vertices in G". Second is single-destination shortest path problem, in which "one finds shortest paths from all vertices in the graph G to a single destination vertex v". And the third is all-pairs shortest path problem, in which "one finds the shortest paths between all pair of vertices v, v' in the graph".

The most important algorithms for solving this problem are Dijkstra's algorithm, Bellman–Ford algorithm, A* search algorithm, Floyd–Warshall algorithm, Johnson's algorithm and Viterbi algorithm. For a detailed study on various shortest path problems and algorithms one can refer to [1-7].

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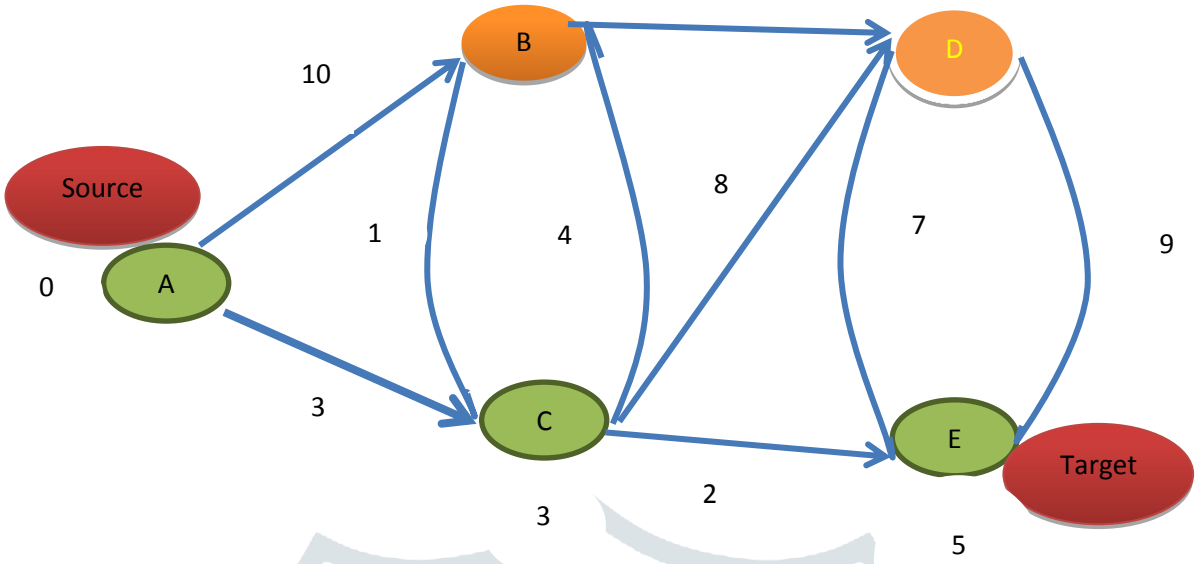
Illustration 1.



The shortest path from A to E is 5 .

Dijkstra's Algorithm

Dijkstra's algorithm is an algorithm to the shortest paths between vertices in a graph G. It was introduced in 1956 by Edsger W. Dijkstra.

Rules for Dijkstra's Algorithm

1:- Both directed and undirected graphs and the difference between both of them

2:- All edges must have nonnegative weights

3:- Graph must be connected

How to find the shortest path from initial vertex to all other vertices:-

1:- We create a set and this set is empty.

2:- Then we put source vertex value 0 and all other vertices as infinite.

3:- Then we initialize all distance values which can have relation with source and the other vertices remain infinite.

4:- Next we see the distance value and we choose the vertex with minimum value as a next stop.

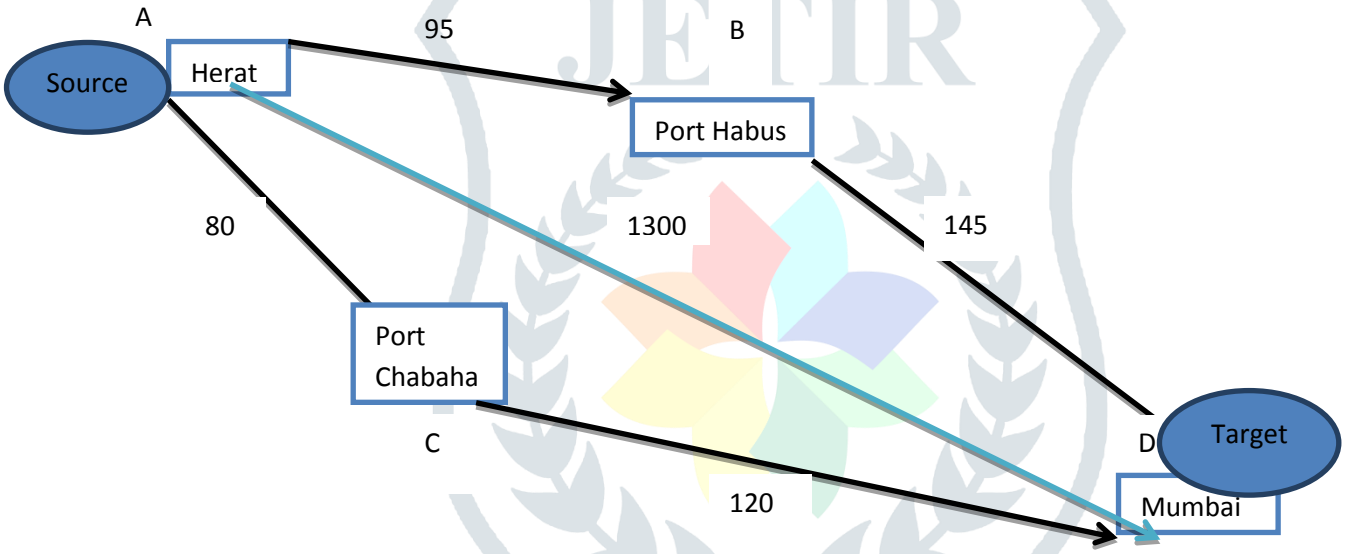
5:- Further, we have all the connections of those second vertices with distance values and we choose the minimum distance value for next step.

6:- We continue these steps until we reach to the target vertex.

2. Main Results

In this section, we study the transportation cost of transporting almond from several places of Afghanistan to Mumbai through many feasible routes.

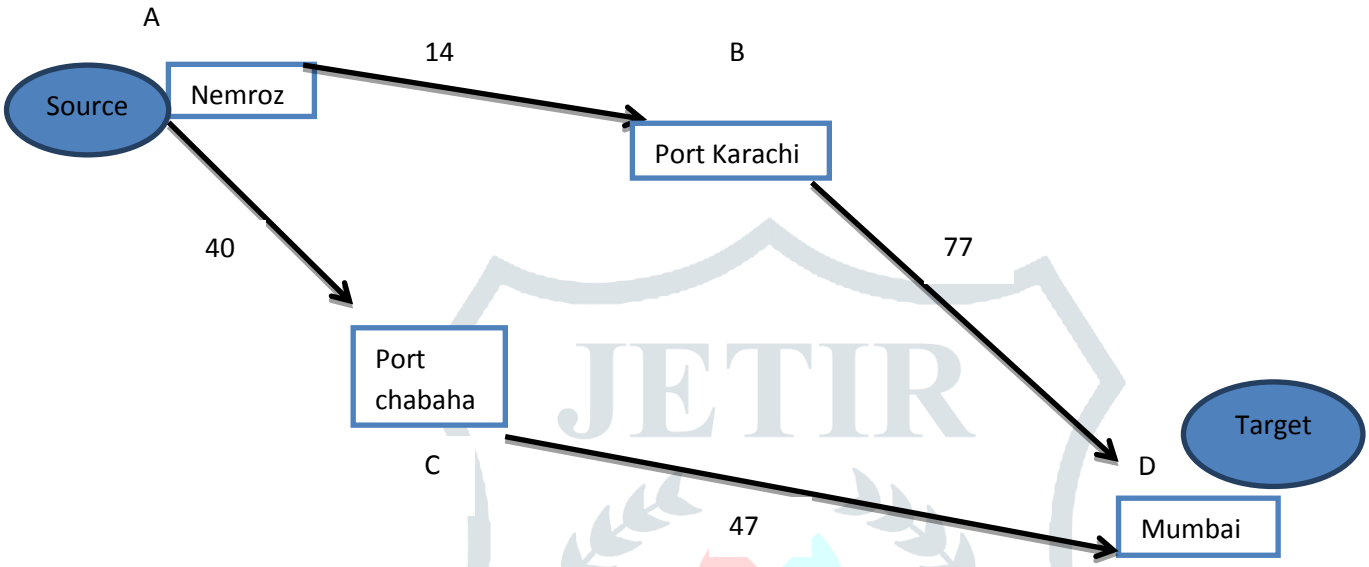
1. Herat to Mumbai



Visited	A	C	B	D
	0	∞	∞	∞
$\{A\}$	0	80	95	1300
$\{\mathbf{A}, \mathbf{C}\}$	0	80	95	200
$\{A, C, B\}$	0	80	95	200
$\{A, C, B, D\}$	0	80	95	200

Cost: Price for transporting of one ton of almond from Herat to Mumbai via Port Chabahar is 200$.

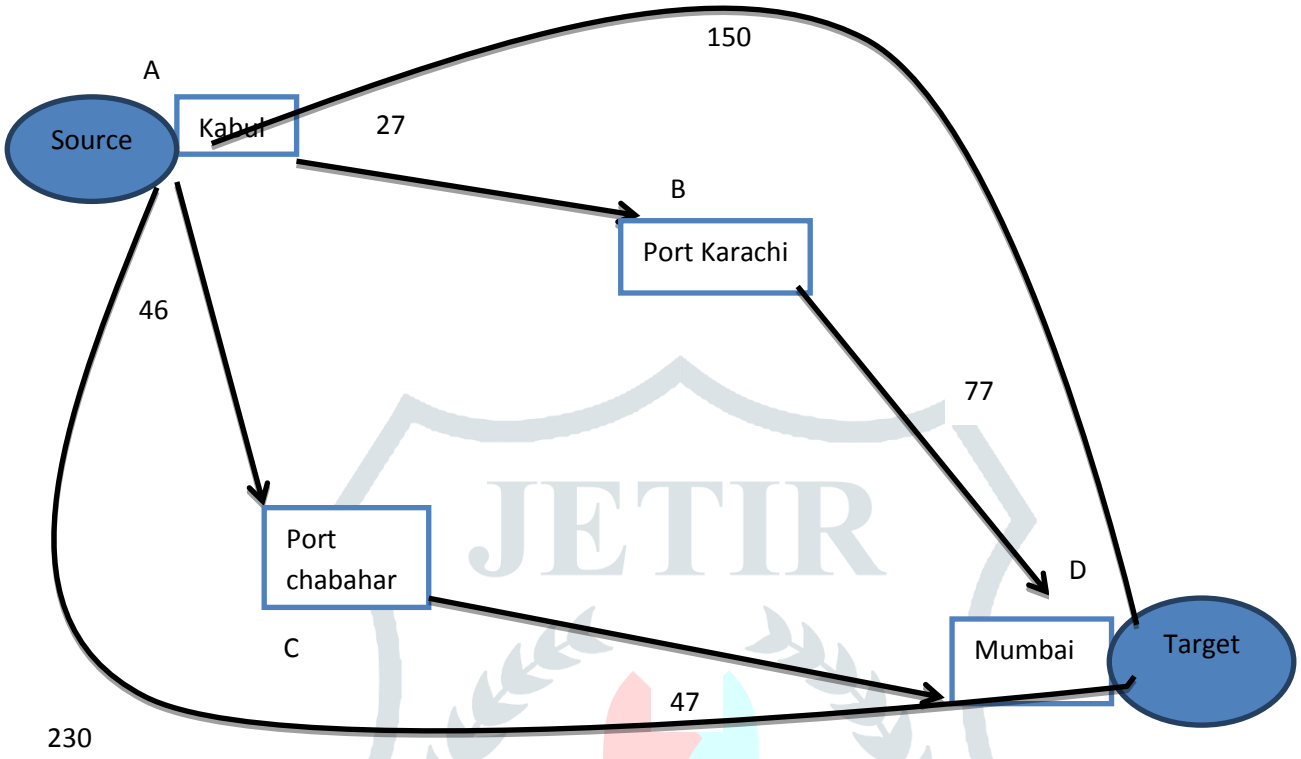
2. Nemroz to Mumbai



Visited	Herat	Chabahar	HUBAS	Mumbai
	0	∞	∞	∞
$\{A\}$	0	14	40	∞
$\{\mathbf{A},\mathbf{B}\}$	0	14	40	91
$\{A,B,C\}$	0	14	40	87
$\{A,B,C,D\}$	0	14	40	87

Cost: Transportation cost of transporting one ton of almond from Nemroz to Mumbai via Port Chabahar is 87$.

3. Kabul to Mumbai



Visited	A	B	C	D
	0	∞	∞	∞
$\{A\}$	0	27	46	150
$\{\mathbf{A},\mathbf{B}\}$	0	27	46	104
$\{A,B,C\}$	0	27	4 6	93
$\{A,B,C,D\}$	0	27	46	93

Cost: Transportation cost of transporting one ton of almond from Kabul to Mumbai via Port Chabahar is 93$.

Conclusion

In this paper, we considered some cities from Afghanistan and Mumbai to study the minimum transportation cost for transporting almond. We have also approximated the minimum transportation cost from those cities in Afghanistan to Mumbai via various routes. The result shows that the transporting goods from Afghanistan via Port Chabahar through ship give us the optimum cost.

References

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