NEW ARTISTIC APPROACH FOR SHORTEST PATH BY USING SWARM INTELLIGENCE

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ABSTRACT: *The concept of swarm intelligence is derived from activity of Ants that collect food from certain places and deposit into the nest. Ant are choose shortest path form source to destination with collaboration in specified sequence. The work activity is much greater than sum of individual activity. The concept of shortest path using swarm intelligence widely used in circuit switching as well as wireless communication. It is decentralize approach where efficiency via specialized division of labor in colony of bees. The movement of traffic either in highway as well as bridges. I have proposed the method to achieve the efficient shortest path between source and destination of certain nodes. The respective algorithm minimizes the cost of certain vertices between start and endpoints.*

Keywords: Swarm Intelligence, Shortest Path, Decentralize approach, Shimbel Method

1.0 INTRODUCTION

The shortest path method is widely used in different application in computer science like wired network [8] is called guided media. The graph theory defines the shortest path from source to destination by using minimum cost of weight. Ant used shortest path to collect food form forest and accumulate into to nest in wire or wireless network shortest path is used to minimum cost of weight in terms of bandwidth and delay etc. The productivity is very much high. The route is sequential order with distributed approach among Ant.

A Graph is formed by using point to point connectivity of nods with by respective vertices-[15] A Graph contains certain nodes called Edges E which are connected with Vertices V the notation are given as e.g. $G= (V, E)$- [1]

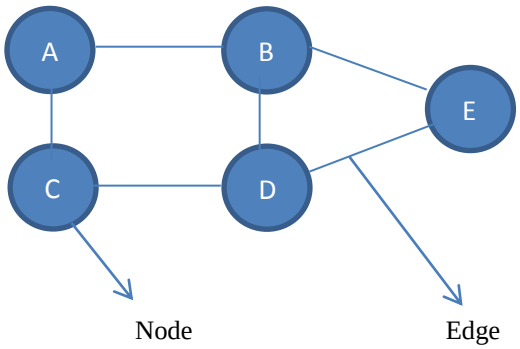

Figure 1

In figure 1 e.g. Node = {A, B, C, D, E}
Edges = {AB, AC, BD, CD, DE}

Two vertices are meet at a point is called node. E.g. AC and AB are meeting at node A.

The purpose of our investigation to calculate the shortest path between networks. The network can be either cellular or wired between sources to destination. We used shimbel method to minimize the distance between start and endpoints.

The paper is organized as follows. Section 2 describe the routing procedure of centralize and Decentralize approach. In section 3 describe the routing in telecommunication of connected Graph with certain nodes and further describe about the wire and wireless network. In section 4 describe swam intelligence routing where Ant choose shortest path from start to end points. In section 5 describe about the connection oriented network of circuit switching. In section six describe about the connection less network. In section 7 describe about the proactive routing algorithms of ad hoc approach of wired network. In section 8 describe about the reactive and hybrid swarm intelligence routing. In section 9 describe about the shimbel method to calculate shortest path using pseudo cod is attached. At last section conclusion describe about the efficiency of this approach in swarm intelligence and it can be most effective in optimize the path.

2.0 ROUTING PROCEDRE

Routing procedure can be divided into static or dynamic or it may be centralized and Decentralized approach. Centralized approach is used in legacy system where all nodes connected to centralized network requiring human attention-[2] another drawback in case failure at central station, whole network is down. In static routing network condition is time-invariant. The method does not assess the load of network trying to find shortest path. Ahuja, Magnanti, and Orlin-[3] maximize throughput for a time changing load in limited capacity. Routing schemes also have problems, including inconsistencies arising from node failures and potential oscillations that lead to circular paths and instability-[4]

Routing algorithm can be further divided into minimal or non-minimal. Minimal routing where packets of data follow minimal cost while non-minimal routing path is more flexible to choosing the cost of paths-[6]

Minimal routing further divided into optimal and shortest path routing. The objective to optimize the mean flow of network while shortest-path routing to calculate the minimum cost of network-[4, 7]

3.0 Routing in Telecommunication networks

A telecommunication network consists of Graph $G= (N, E)$ where N represents the node and E represents the Edges which are communication link with other nodes. Links can be directed or undirected in term physical implementation of wired and wireless. Data can be load from source node and travel towards the destination node. The routing algorithm is used to find that the data travel from correct source and delivered into appropriate destination. Routing path information is stored at the node is also called routing table. In swarm intelligence distributed approach is commonly used

which has advantages when compared to centralized approach. There are two type of network guided and unguided. Guided relate to wire as well as unguided relate to wireless network. In wire network has some advantages like point to point and point to multipoint are quite reliable. Wireless network has lower capacity than wire network and less reliable for data transport

.*3.1* ROUTING IN WIRED NETWORK

Wired networks connected with internet from wide area network backbone to metropolitan networks and local area networks. It is potentially very large network and continually changes with network traffic pattern.

A wired network is used top down approach where all nodes are connected with centralized node. if a message generate form central node then it receives on entire nodes on the network-[8]

3.2 ROUTING IN WIRELESS NETWORK

In wireless network all the nodes on the network acting as peer. Example is mobile or cellphone is connected by using guided media. Top down approach is used for connecting in hybrid network with dynamic and unstable environment

4.0 SWARM INTELLIGENCE ROUTING

Swarm intelligence follows the decentralized approach of optimization and controlling of work in sequential order. This approach is inspired from the Ant society with collaboration of work in appropriate order-[9, 10]. Ant choose shortest path between start and endpoint and productivity is much greater than individual works We have calculate shortest by using shamble method to find shortest path between start and end points we have to choose three node and three edges and assigned weights on each vertices. This approach is very effective in computer networks either guided or unguided media.

5.0 CONNECTION ORIENTED NETWORK

The first SI Network algorithm is used in 1996 with name Ant-Based Control (ABCT)-[11] the Circuit switching telephone where each node s in a network running periodically sends out ants and randomly chosen destination through destination d. in this approach the cost of path loaded on visited site are symmetric.

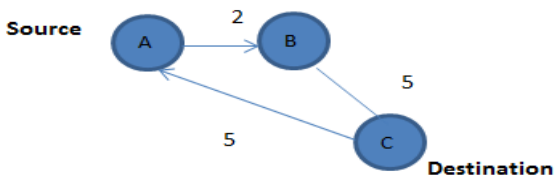

Figure 2

6.0 CONNECTIONLESS NETWORK

The connectionless network algorithm is first placed base on AnNet or AntNet-FA-[12] In this type of network the data travel are faster but the updating take more time.

7.0 PROACTIVE SI ROUTING ALGORITHMS

It is designed for wired network directly to ad hoc network. In this approach all nodes send to all possible destinations-[13]

8.0 REACTIVE AND HYBRD SI ROUTNG

In this type of approach to routing in ad hoc network is their limited efficiency. In this case continuous Sending of ant agent between all possible pair of source and destination nodes can be easily saturated with limited bandwidth resource on network-[14]

9.0 RESEARCH METHOD

In this study shimbel method to calculate shortest path

First Step

Step Two

In above we choose three node and three edges and assigned weights

If i = j then 0

If edges is not connected then 1

$$A = \begin{bmatrix} 0 & 2 & 1 \\ 2 & 0 & 5 \\ 1 & 5 & 0 \end{bmatrix}$$

Step Three

We applied inverse on each element.

$$B = \begin{bmatrix} 0 & 0.5 & 1 \\ 0.5 & 0 & 0.2 \\ 1 & 0.2 & 0 \end{bmatrix}$$

Step Four

We multiplied matrix B with another B matrix.

$$C = B \times B = \begin{bmatrix} 0 & 0.2 & 0.1 \\ 0.2 & 0 & 0.5 \\ 0.1 & 0.5 & 0 \end{bmatrix}$$

Step Five

Now we repeated next iteration C X C

$$\begin{bmatrix} 0 & 0.05 & 0.1 \\ 0.05 & 0 & 0.02 \\ 0.1 & 0.02 & 0 \end{bmatrix}$$

After experiment the weight of nodes are under as

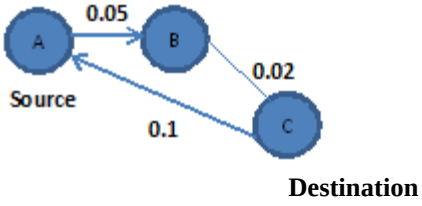

Figure 3

Pseudo Code (Step 4)

Step 4

```
for (int i = 0; i < 3; i++)
{
for (int j = 0; j < 3; j++)
{
Console.WriteLine("Enter 1st Matrix: ");
matrix1[i, j] = 1 / Convert.ToDouble(Console.ReadLine());
}
}
for (int k = 0; k < 3; k++)
{
for (int l = 0; l < 3; l++)
{
Console.WriteLine("Enter 2nd Matrix: ");
matrix3[k, l] = 1 /  Convert.ToDouble(Console.ReadLine());
}
}
if (k != l)
{
Console.Write(matrix3[k, l] + "       ");
sw.Write(matrix3[k, l] + "       ");
}
else
{
matrix3[k, l] = 0;
Console.Write(matrix3[k, l] + "       ");
sw.Write(matrix3[k, l] + "       ");
}
for (int i = 0; i < 3; i++)
{
for (int j = 0; j < 3; j++)
{
result[i, j] = 0;
for (int k = 0; k < 3; k++)
{
if (( i != j ))
{
result[i, j] = (result[i, j]) + (matrix1[i, k]) * (matrix3[k, j]);
}
else
{
result[i, j] = 0;
}
```

Step 5 (Next Iteration)

```
for (int i = 0; i < 3; i++)
{
for (int j = 0; j < 3; j++)
{
Console.WriteLine("Enter 1st Matrix: ");
matrix1[i, j] =  Convert.ToDouble(Console.ReadLine());
}
}
for (int k = 0; k < 3; k++)
{
for (int l = 0; l < 3; l++)
{
Console.WriteLine("Enter 2nd Matrix: ");
matrix3[k, l] =   Convert.ToDouble(Console.ReadLine());
}
}
if (k != l)
{
Console.Write(matrix3[k, l] + "       ");
sw.Write(matrix3[k, l] + "       ");
}
else
{
matrix3[k, l] = 0;
Console.Write(matrix3[k, l] + "       ");
sw.Write(matrix3[k, l] + "       ");
}
for (int i = 0; i < 3; i++)
{
for (int j = 0; j < 3; j++)
{
result[i, j] = 0;
for (int k = 0; k < 3; k++)
{
if (( i != j ))
{
result[i, j] = (result[i, j]) + (matrix1[i, k]) * (matrix3[k, j]);
}
else
{
result[i, j] = 0;
}
```

CONCLUSION

Ant travel in decentralize approach and perform the task from food to nest with collaboration in sequential order. The productivity is much greater than the sum of individual work. Ant choose short possible path from source to destination which are used in different approaches in telecommunication for sending and receiving data. This approach is most Reliable and effective in circuit switching as well as wireless communication.

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