values to these 3 parameters which will make it different from each other. This parameters and confidence of path is deciding factor to choose selected paths from all available paths. The confidence of a path is nothing but average of confidence of all node forming that path. Means paths with higher confidence nodes will only get selected as selected path on the basis of confidence. The selected path will have nodes with confidence above some threshold value and that path is confident path and that is only short listed. The data is send over these paths to calculate latency, delay, and packet delivery ratio. The latency describe the total time it take a data packet to travel from one node to another. Delay in the network path due to waiting at queue, waiting for buffer to get free, waiting on path to become conjunction free etc. Packet delivery ratio is ratio of input and output. Means how much data is received out of how much data was sent over the path.

3.2 Proposed algorithms

Finding confidence of node in delay tolerant networks using mathematical model design as:
Let N be total number of nodes in the delay tolerant network.
N= {1, 2, 3 . . . n}
Let L, P, G, be the features of node as language, position, gender respectively.
Let count be a integer,
Confidence is a integer,
Now comparing node 1 and node 2,

```
if (node1.gender.equals(node2.gender))
   {
   count++;
   }
   if (node1.language.equals(node2.language))
   {
   count++;
   }
   if (node1.position.equals(node2.position))
   {
   count++;
   }
   Then total count is : count;

   if (count >= 2)
{
Then increase the confidence of node
   confidence++;
   }
```

Like vise compare node 1 with node 3 up to n,
Compare node 2 with n nodes,
Thus we get confidence of each node with other n nodes.

Finding dependable and reliable paths in delay tolerant networks on the basis of confidence of nodes in a path using mathematical model design as:

Let x be total all possible paths in a delay tolerant network,
Let n be total nodes in a path,
Let threshold be integer,

```
For x(all) paths generated in network
   {
   If confidence of n > threshold;
   {
   Then confidence of path is increased;
   }
   Print that path as selected path among all generated paths
   }
```

Thus we will get all paths having confident nodes in it.
Thus we get confident paths to send data.

Using algorithms we can find faulty nodes whose confidence is below some limit and having less social behavior and less communication path with other nodes, so these node can't send data to destination node successfully. The paths containing this type of node are not able to send data within small time thus increasing delay these nodes are not selected while finding various combinations paths selecting non-faulty nodes in path from source node to destination node. Thus only selected paths are considered to send data those having good confidence. So that delay and latency is reduced using social features and packet delivery ratio is increased.

4. Data Sending with Non Shortcut Method

The non-shortcut method means sending data hope-by- hope. In this method data is send over all selected paths obtained on confidence basis. The random generated array list is send and latency, delay is calculated in milliseconds. Each integer value in an array is considered as a packet send and whole array as data. The latency is time difference between receiving data at each node. The delay is time taken to send data from source to destination along with waiting in buffer, waiting in queue, waiting in network for path to get free. The latency and delay of path is low for most efficient path that is selected path 1.As well as delivery ratio is 100% for that path. The best path generated is shown by dotted lines during execution of hope by hope method that is best path of non-shortcut method.

5. Data Sending with Shortcut Methods

To send data with shortcut method we have two procedures as by two hope method and by four hope method.
Sending data with two hope method:
This shortcut method consist of sending data by two hopes means the data is send to node omitting one node to third node on the generated path.
For example generated path is as below
[2, 3, 12, 11, 10, 6, 1, 7, 0, 13, 14, 5, 8, 9, 15]
Where 2 is source node and 15 is destination node.
Then by two hope path data will send over path taking jump to direct third node and that will be next intermediate node by two hope method.
Then by hope above path will become as
[2, 12, 10, 1, 0, 13, 5, 9, 15]
Due to two hope method data is send faster than hope by hope hence latency and delay is low than hope by hope method. Short cut using two hope reduces path distance to half as number of node to visit and send data over that is recued to half.
Sending data with four hope method:
In this method data is send directly to fourth immediate node after sender node i.e. omitting three intermediate nodes.

For example generated path is as below
[2, 3, 12, 11, 10, 6, 1, 7, 0, 13, 14, 5, 8, 9, 15]
Where 2 is source node and 15 is destination node.
Then by four hope data will traverse as
[2, 10, 0, 13, 8, 15]
The advantage of this method over hope by hope and two hope is that data reach to destination within minimum jumps and instead of visiting each node or alternate node it direct jump to fourth node hence latency and delay is reduced packet delivery ratio is maximized. Distance of path is reduced so that data is send faster to destination.

6. Results

The results that we expect from this system are best routing path selecting best confidence nodes to consume less time in the system. Thus selected path will able to send data through nodes with maximum confidence to reduce latency and delay, increasing packet delivery ratio.

6.1 Result from hope by hope method

The hope by hope method will send data node by node and graph is generated with latency delay and packet delivery ratio is obtained. The path shown in network is path having 100% packet delivery ratio.
Ex. The Sending of a Data Through
[0, 4, 3, 6, 7, 5] hope by hope
The path shown in network as below: shown by yellow dotted lines where 0 is source and 5 is destination.

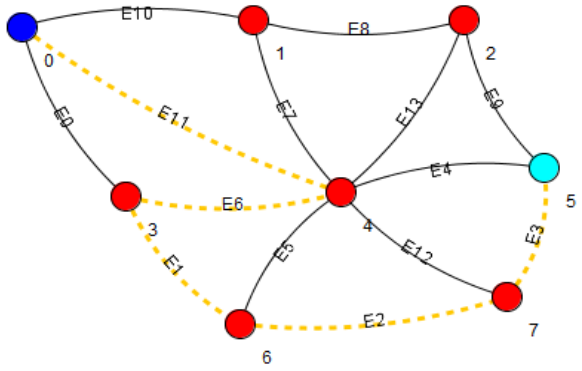

Figure 2: Delay tolerant network with hope by hope path

The Latency to Receive the data is: 284 ms
The Delay to Receive the data is: 254 ms
The Packet Delivery Ratio is: 100.0%

6.2 Result from two hope method:

The two hope sending for same above path will be as with red dotted line.
Applying two hope method to this path [0, 4, 3, 6, 7, 5]
The two hope path will be as [0, 3, 7, 5] with same source and destination

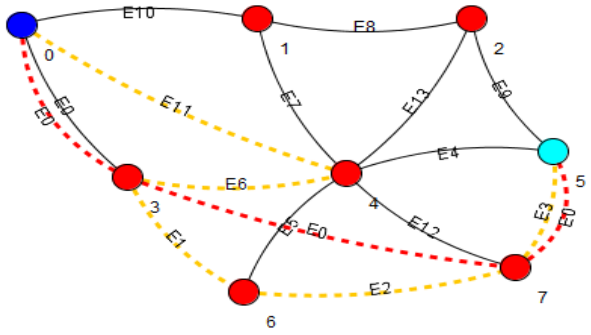

Figure 3: Delay tolerant network with two hope path

The Latency to Receive the data is: 253 ms
The Delay to Receive the data is: 49 ms
The Packet Delivery Ratio is: 100.0%

6.3 Result from four hope method:

The four hope method considering same source destiantion path will be shown by green dotted line as below:
[0, 7, 5]

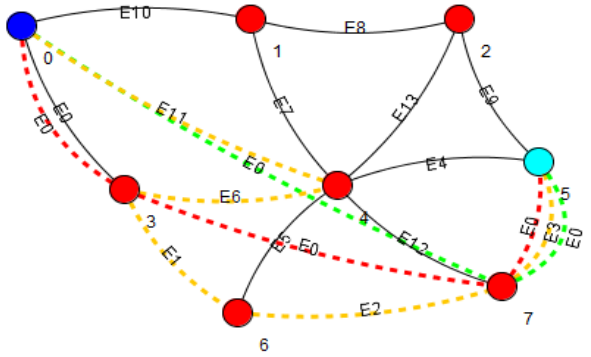

Figure 4: Delay tolerant network with four hope path

The Latency to Receive the data is: 220 ms
The Delay to Receive the data is: 25 ms
The Packet Delivery Ratio is: 100.0%

7. Comparison of shortcut and non shortcut method with graphs

Latency in three methods

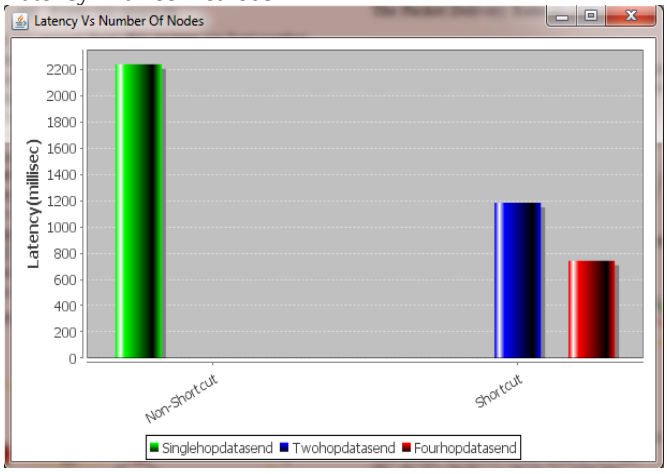

Figure 5: Graph of comparision of latency in shortdut & nonshortcut schemes.

Packet delivery ratio in three methods

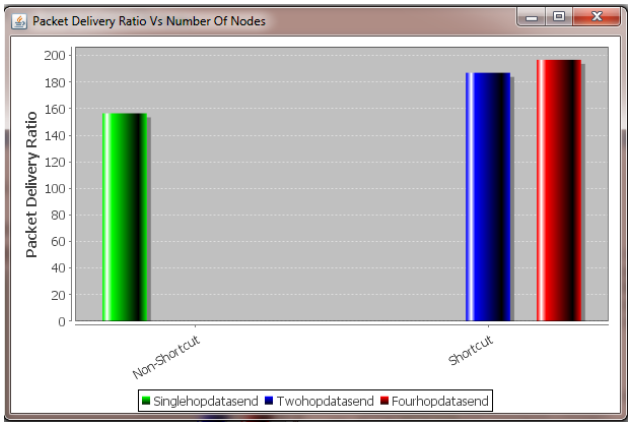

Figure 6: Comparision of packet delivery ratio in shortcut and non shortcut method

The study about using Multipath in sending data so as to increase packet delivery ratio and reduce latency and delay taking shortcuts where more social nodes i.e. more confident nodes and more confident paths where selected. This shows comparisons in table taking shortcut and without shortcut.

Table 1: Comparison of Shortcut and Non shortcut in the Delay tolerant network

	Path confidence	Most confident path	more confident path	less confident path	Least confident path
Delivery rate	Non-shortcut	100%	92%	84%	76%
	Shortcut	100%	96%	92%	85%
Latency (ms)	Non-shortcut	461	553	603	668
	Shortcut	211	276	428	556
Delay (ms)	Non-shortcut	198	251	395	480
	Shortcut	150	173	298	350

8. Conclusion and Future Enhansement

The comparisons of two methods show that shortcut method is more efficient that non shortcut method in terms of packet delivery ratio, latency and delay. The two hope and four hope methods increases packet delivery ratio reducing latency and delay. Thus shortcut method is better than non shortcut in all concern. Thus due to shortcut methods latency and delay is reduced increasing packet delivery ratio.

The future enhancement can be done in area of retuning latency delay increasing hope count and finding source to destination path only on considering source destination position and area where they are located.

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