DOS PROJECT 2 REPORT

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GOSSIP ALGORITHM:

Results:

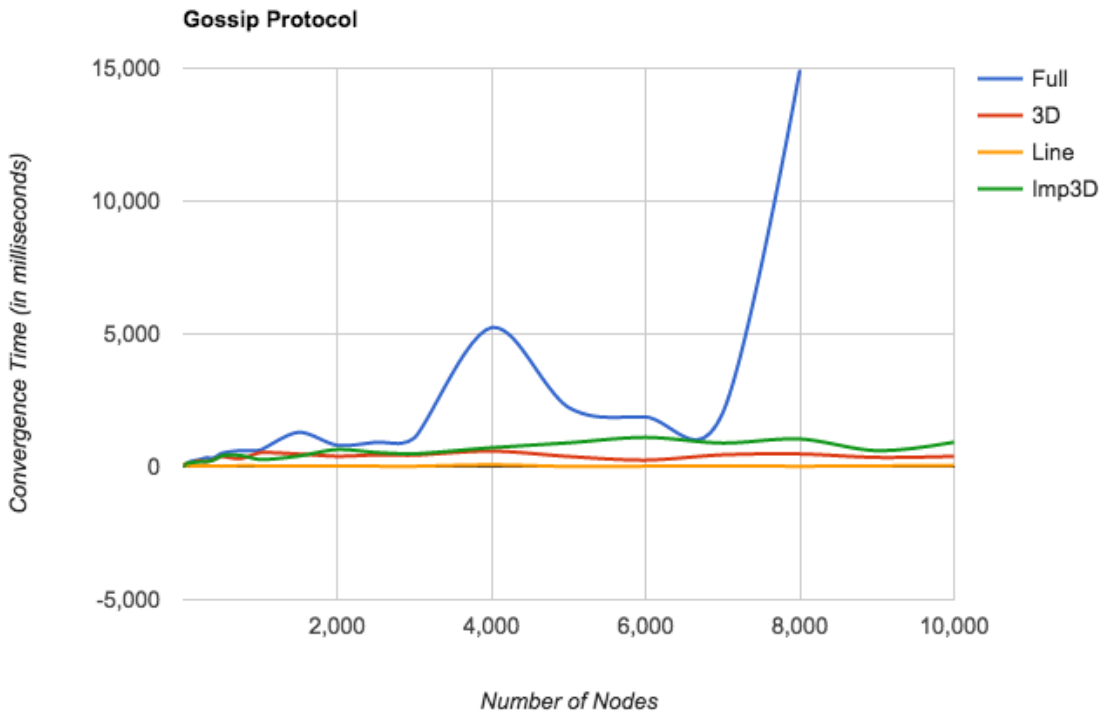

Fig 1: Shows the dependency of convergence time of gossip protocol on the size of the network for four different topologies

Observations:

1. For full topology, the convergence time on the whole with increase in the number of nodes. However we can see the increase is not constant. Intact the graph consists of a number of local maxima and minima. This shows that till a certain minimum number of nodes, some network sizes may give a better convergence time for this topology than others. However, once the nodes become larger, the convergence time grows exponentially.
2. For line topology, we can see that it's almost a straight line close to 0. This shows that number of nodes has essentially no effect on convergence time. This may be due to the fact that nodes have only two options to forward the gossip - forward in the chain or backward. Hence, nodes closer to starting node including the starting node itself may have the

tendency to attain their gossip threshold quicker while nodes near the end of the chain may not have even received the message.

3. For 3D and imperfect 3D topology, the graphs are almost the same and slightly higher than for line topology. This shows that 3D and imperfect 3D do slightly worse than line topology in terms of convergence time. Imperfect 3D topology has slightly higher convergence time, particularly when the size of network is greater. It points to the same argument as above that nodes are less number of neighbors and hence higher chance of passing the message back to their sender. As a result, the nodes closer to the starting node may converge quickly compared to nodes at farther end of the graph.

PUSH SUM ALGORITHM:
Results:

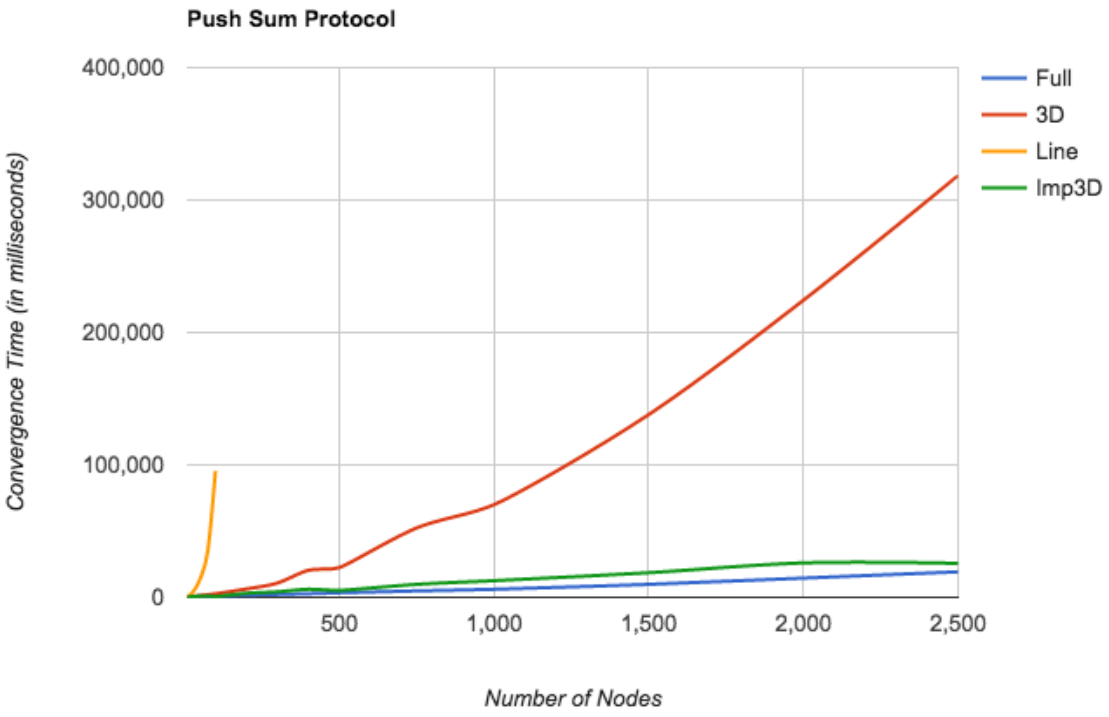

Fig 2: Shows the dependency of convergence time of gossip protocol on the size of the network for four different topologies

Observations:

1. In case of Line topology, graph shows almost an exponential increase in convergence time with increase in number of nodes. This may be due to the fact, that with a linear topology, the probability of receiving three current similar sum to weight ratios may decrease.

2. For 3D topology, we can see a quadratic-kind of dependence of convergence time on the number of nodes in the network. This show that convergence takes longer to occur as the size of the network increases as can be expected.
3. For Full and Imperfect 3D topology, the graph is almost linear with very low slope. This shows that convergence time is not very dependent on the size of the network. This may be due to the fact like line topology, each node has less number of options to push sum to but also enough to that probability of receiving current sum/weight ratio is higher as compared to line topology.