COP 5612 – Fall 2015

Project 2 – Gossip Simulator

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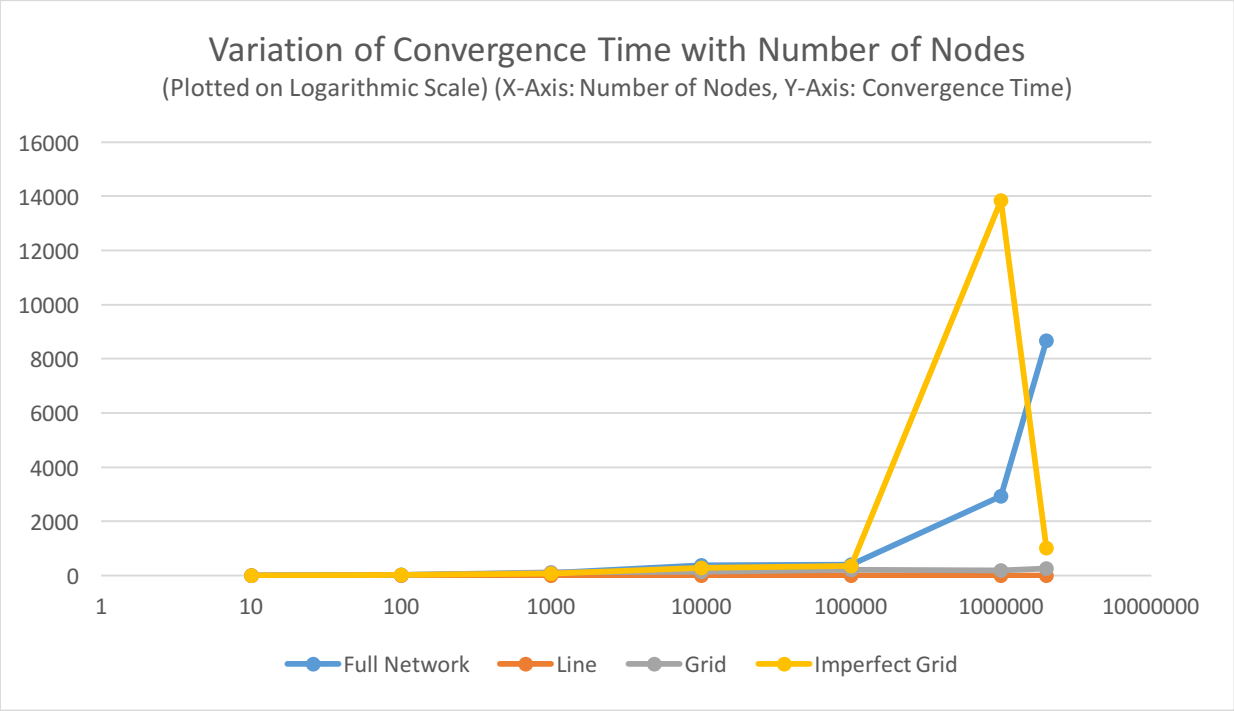
Dependence of Convergence Time on the Size of the Network

Gossip Protocol



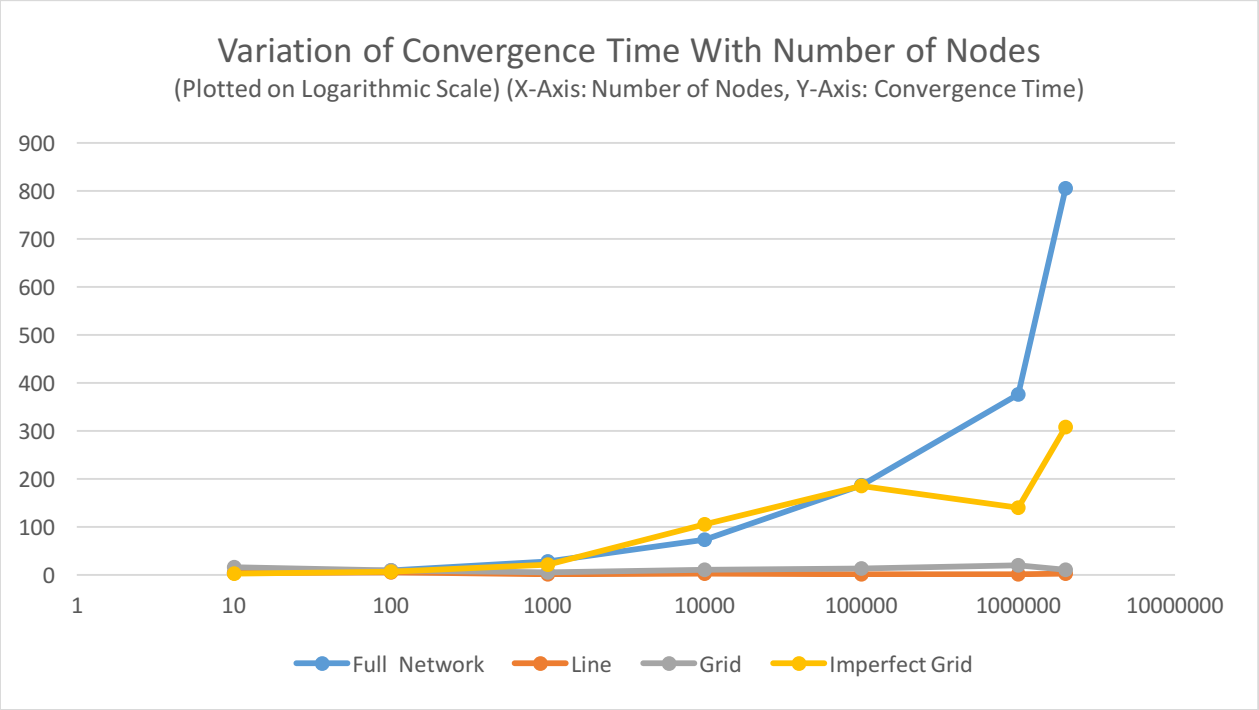
Observations

Figure 1 shows the variations of the convergence time with respect to the number of nodes in the network. After repeated execution of the program it has been observed that the variations in the convergence time with respect to the total number of nodes in

the network is quite random. It can be said that this is an implication of each node in the network selecting a random node to send the message.

The convergence time is usually higher when the message/rumor reaches more number of nodes in the network before termination. In the case of a full network or an imperfect grid topology, each node has relatively more number of neighbors to choose from (which implies that the randomness of the path of propagation of the message is more). In this case the gossip count of a given node tends to increase at a slower pace because of the high degree of randomness. On the other hand, in the case of a Line or a 3D grid topology, the number of neighbors of each of the nodes is relatively less in which case, the gossip count at a given node tends to increase quickly leading to an early termination of the node.

Push-Sum Protocol



Observations

The trend in the variations of the convergence time in the case of a push-sum protocol is largely similar to gossip protocol. But one significant observation is that the

range of convergence times in push sum protocol is quite less compared to the gossip protocol.

Thoughts

In the Gossip protocol when the ‘rumor’ is initiated by sending a message to one of the nodes to spread the ‘rumor’, the node picks ‘one’ random neighbor and sends the message to it. But the problem with this protocol is that, if the next randomly picked neighbor already has a gossip count of 10, it doesn’t transmit the message further leading to complete halt of the communication in the network which means that many nodes in the network may not get the message even once.

Similarly, in the case of the push-sum protocol, when the change in the S/W ratio of a node is negligible in three consecutive instances, it stops transmitting the message which means, it’s quite possible that many nodes may not get the message even once.

Further Work

These are some of the ways that can possibly solve the problems mentioned in the “Thoughts” section of the report.

1. Instead of initiating the communication from just one node, initiating the communication at multiple nodes might help the message reach more number of nodes in the network.
2. Another possible solution is that, instead of picking just one random neighbors, each neighbor can pick multiple neighbors and transmit the message to them. In this way if one of the nodes, is inactive the other neighboring nodes can transmit the message further.