PROJECT 2: REPORT

Group Members

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Implemented Topologies

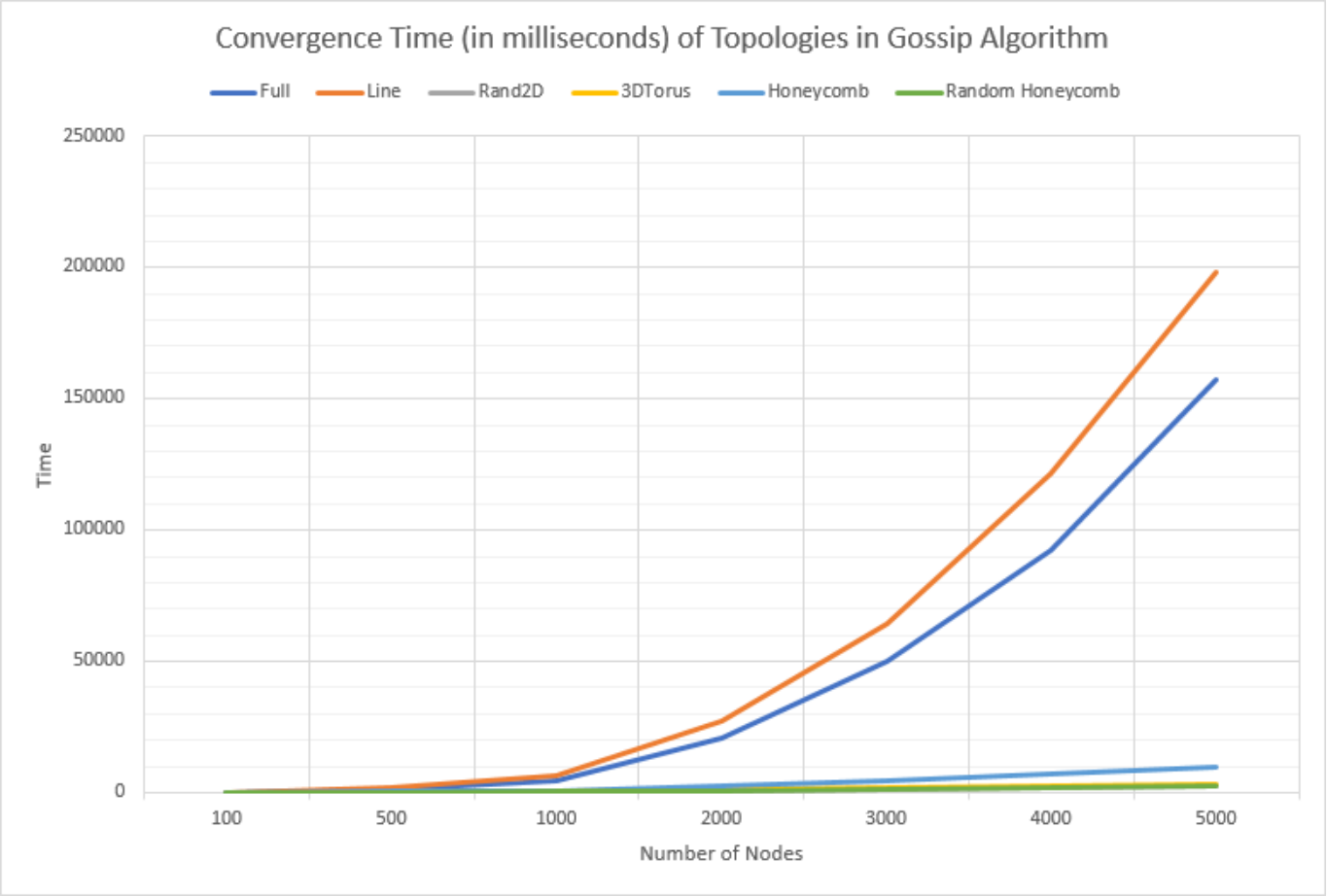
- **Full Network Topology**: Every actor is connected to every other actor in the network.
- **Line Topology:** The actors are arranged in a form of line. Every actor has a max degree of 2, i.e. it is connected to actors on the left and right except for the first and last node.
- **Random 2-D Grid Topology:** The actors are arranged in the form of a 2-D grid and connected to each other if they are within some distance of one another.
- **3D Torus Grid Topology:** The actors form a 3-D grid. The number of neighbors in a 3D torus network is 6. In case of nodes on the outer surface, the number of neighbors is limited, so, they are connected to the nodes on opposite sides.
- **Honeycomb Topology:** The actors are connected in the form of hexagons. Each actor can have a maximum degree of 3.
- **Honeycomb Topology with a Random Neighbor:** The topology is like honeycomb topology except that there is an extra connection to a random node in the entire network.

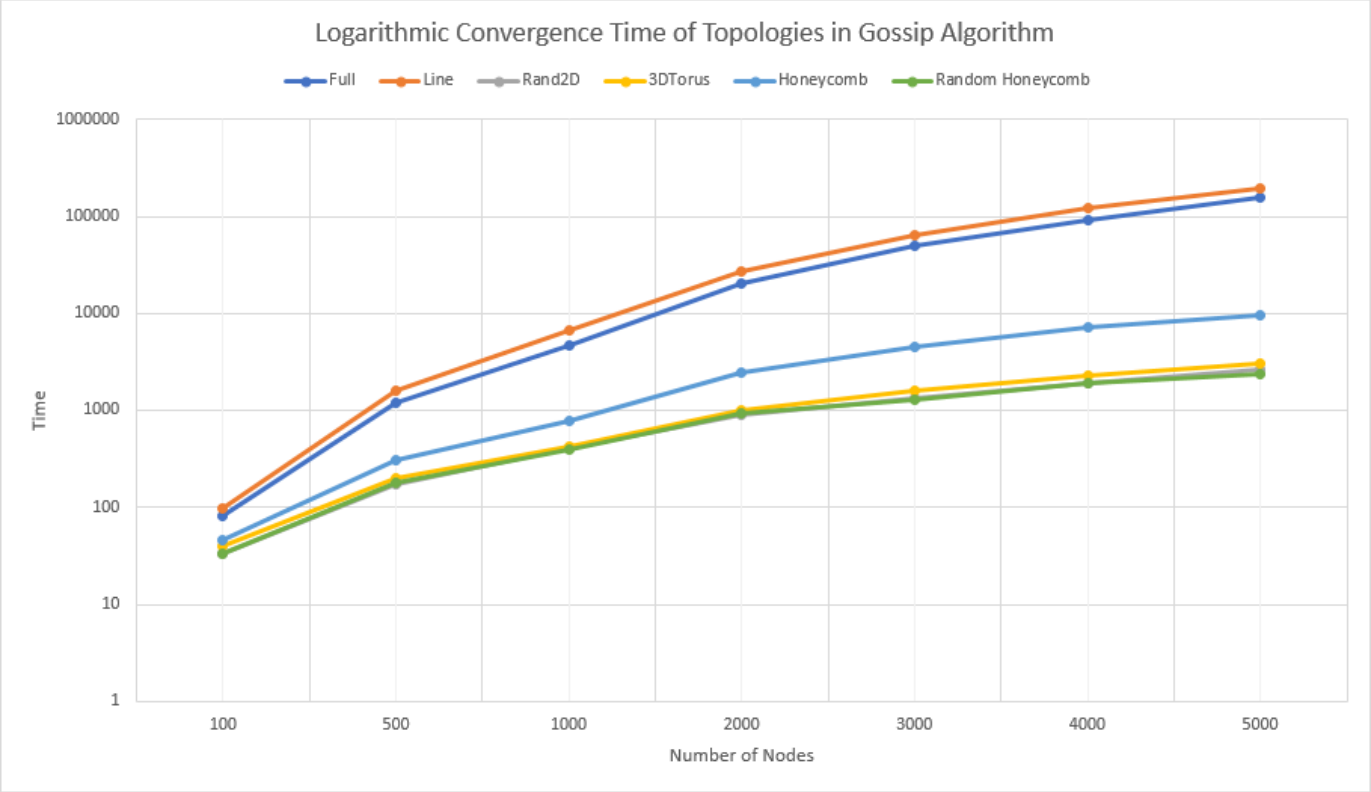
Implementation Details:

Gossip Algorithm

- The middle node (total nodes/2) sends the rumor to its neighbors.
- On receiving, each node sends the message to all its neighbors.
- Each node keeps track of how many times it received the rumor, it stops transmitting the message once it has heard the rumor 10 times.

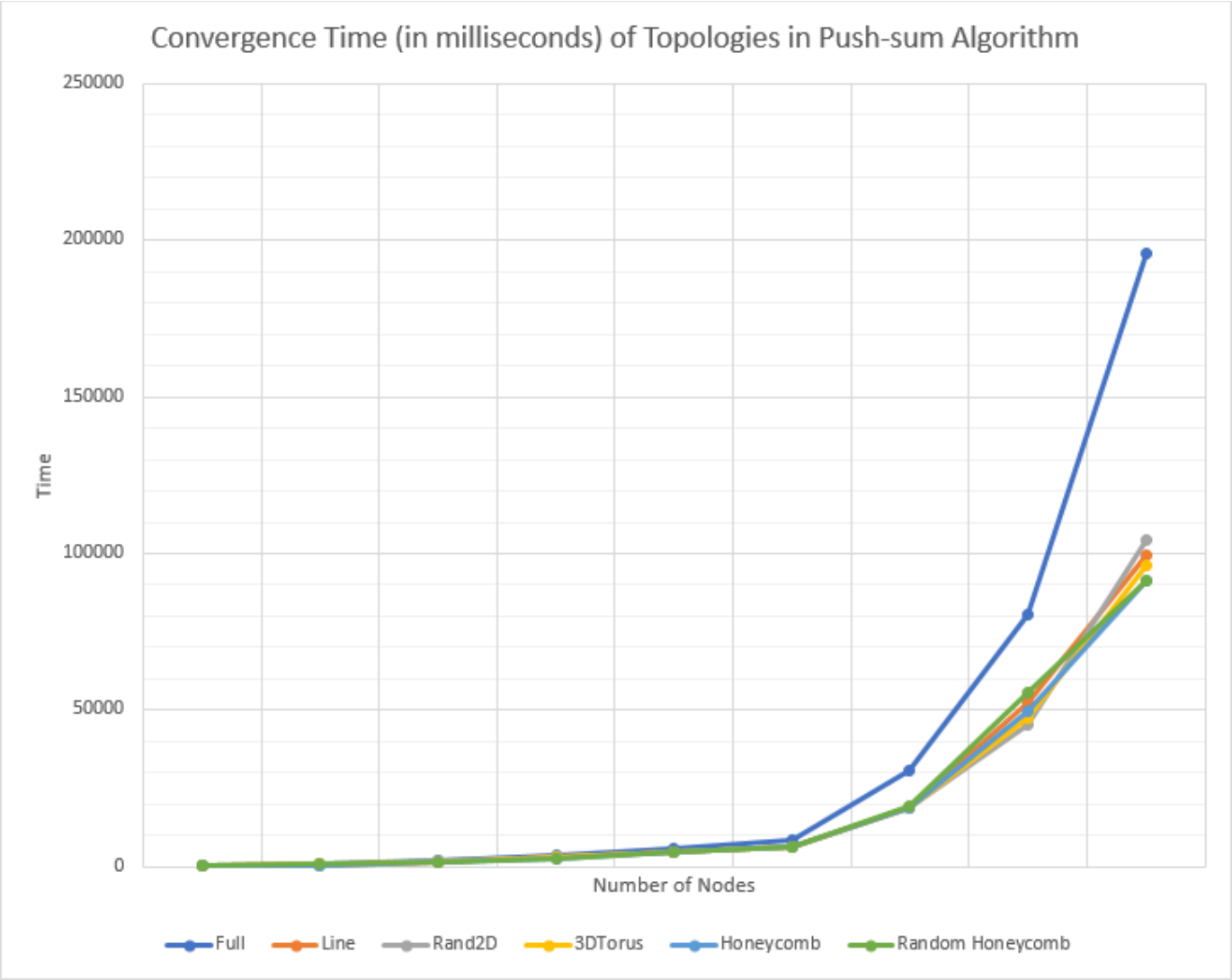
- Convergence is achieved when all the nodes have heard the rumor.

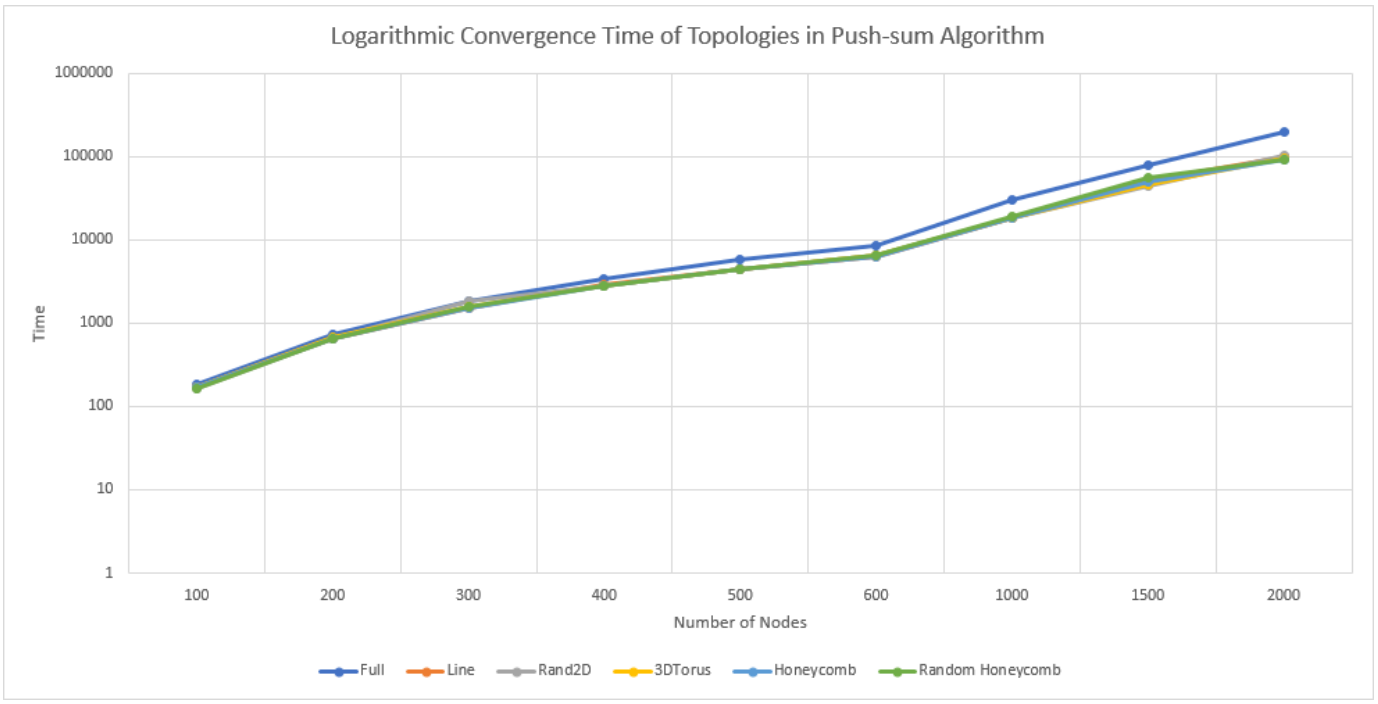




Observations:

Push-Sum Algorithm


Convergence Time (in milliseconds) of Topologies in Push-sum Algorithm
250000
200000
150000
100000
50000
0
Time
Number of Nodes
Full
Line
Rand2D
3DTorus
Honeycomb
Random Honeycomb


Logarithmic Convergence Time of Topologies in Push-sum Algorithm
1000000
100000
10000
1000
100
10
1
Time
100
200
300
400
500
600
1000
1500
2000
Number of Nodes
Full
Line
Rand2D
3DTorus
Honeycomb
Random Honeycomb