Project 2 - REPORT
CONVERGENCE OF GOSSIP & PUSH-SUM FOR VARIOUS TOPOLOGIES

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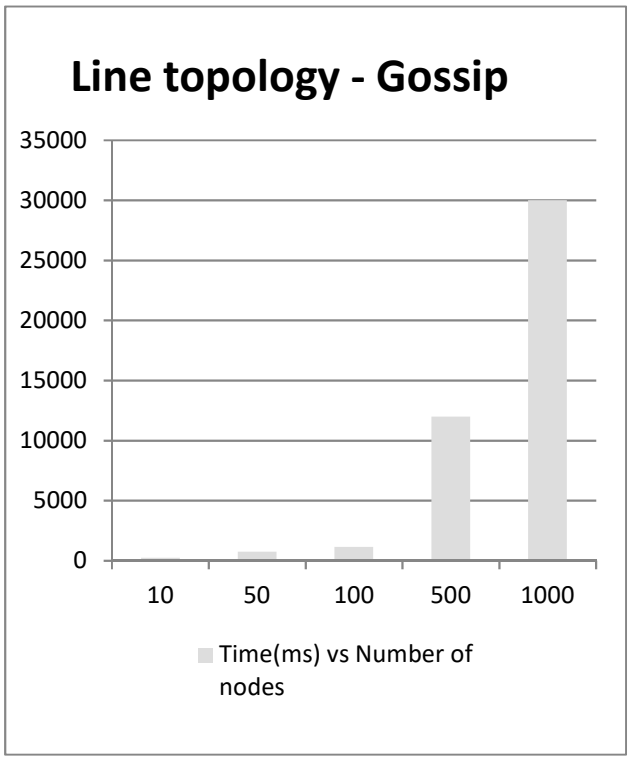
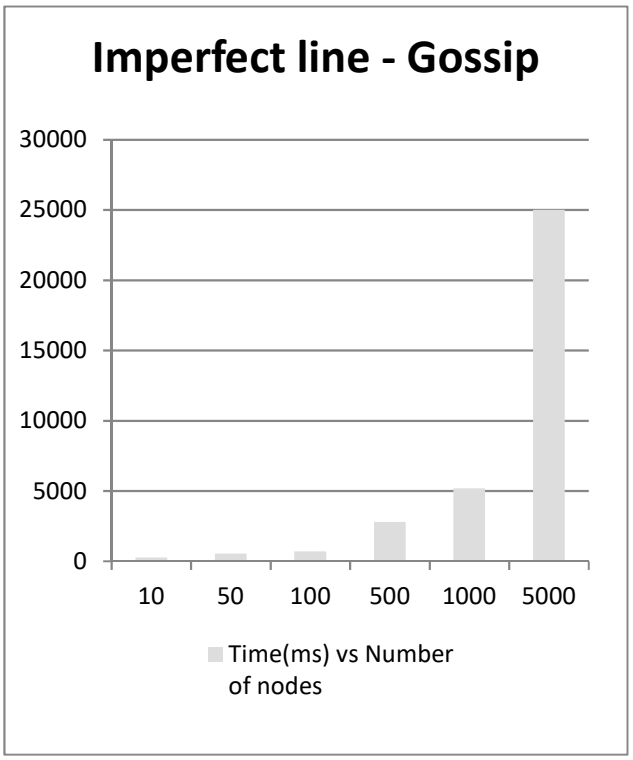
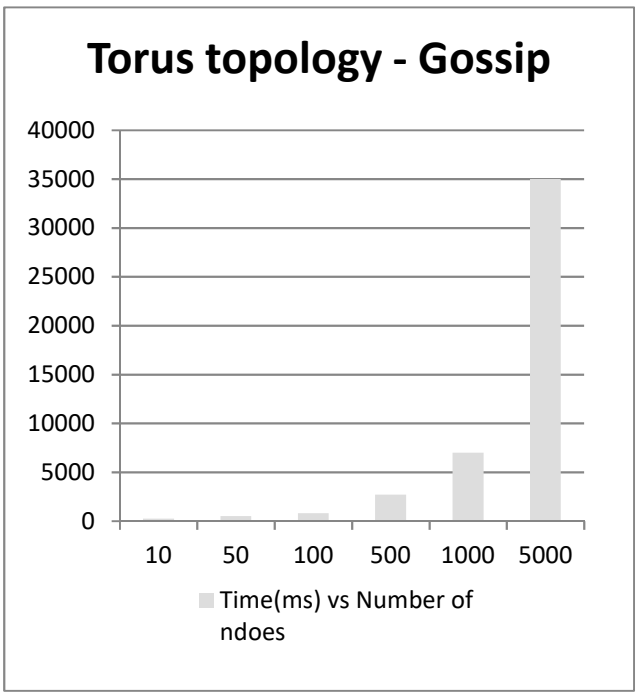
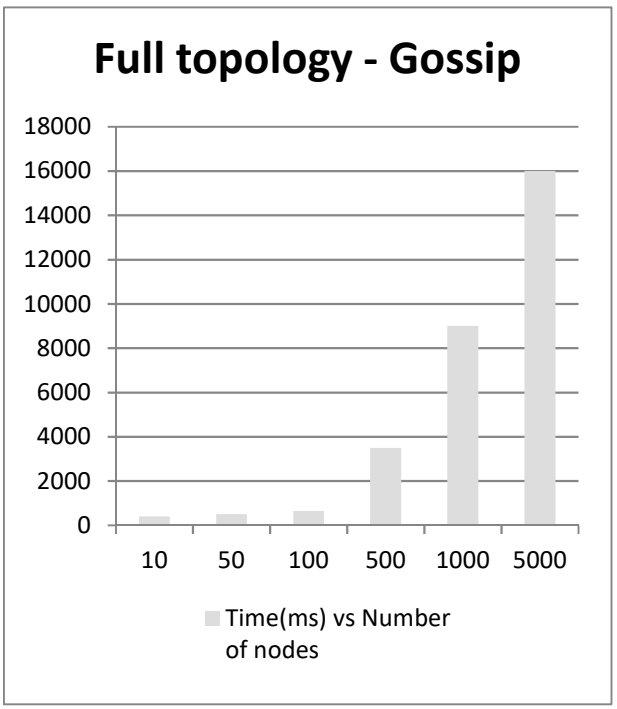
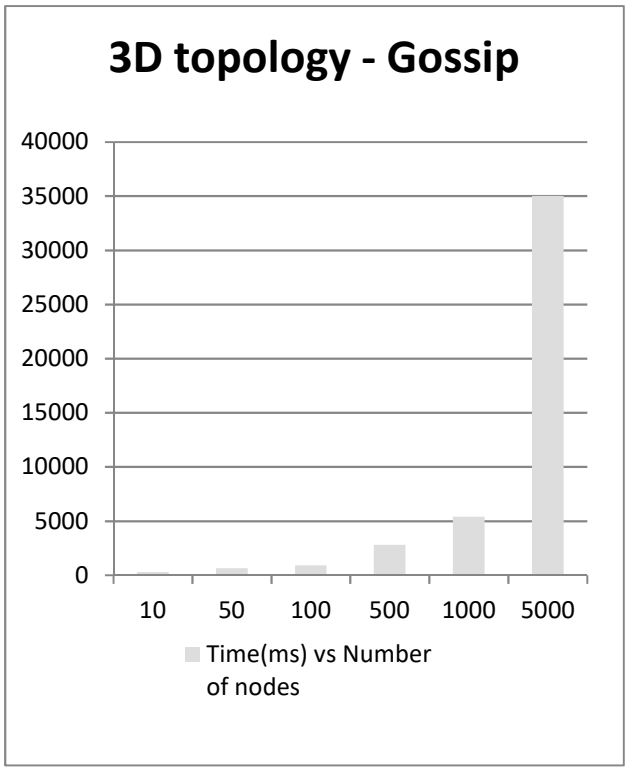
Drawn below are graphs showing the dependency of convergence time as function of number of nodes (size of the network) for each of the topologies for both algorithms – Gossip and Pushsum.

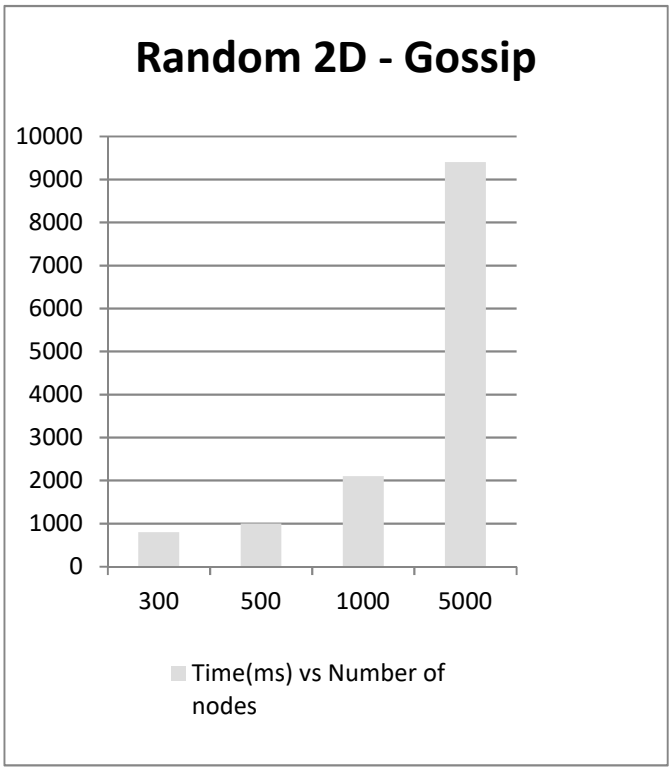


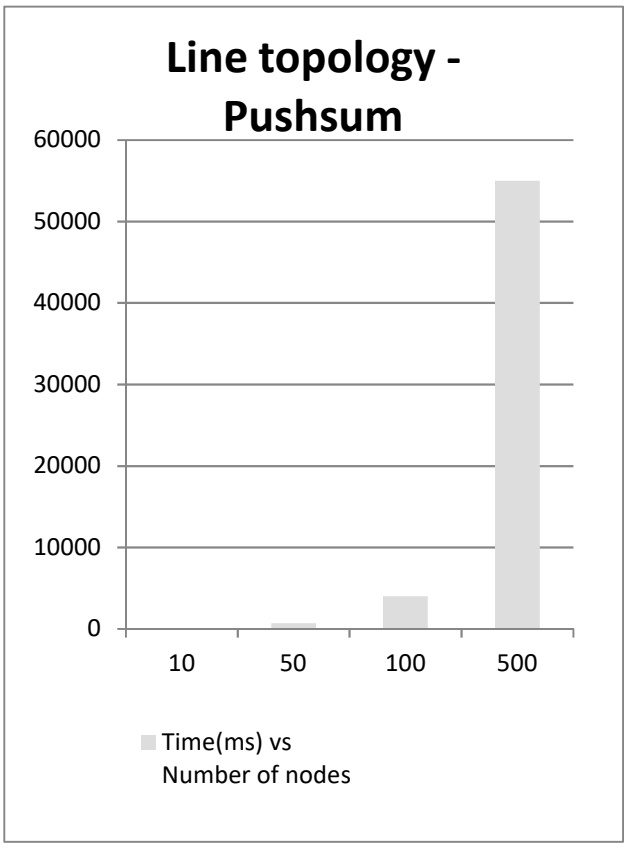


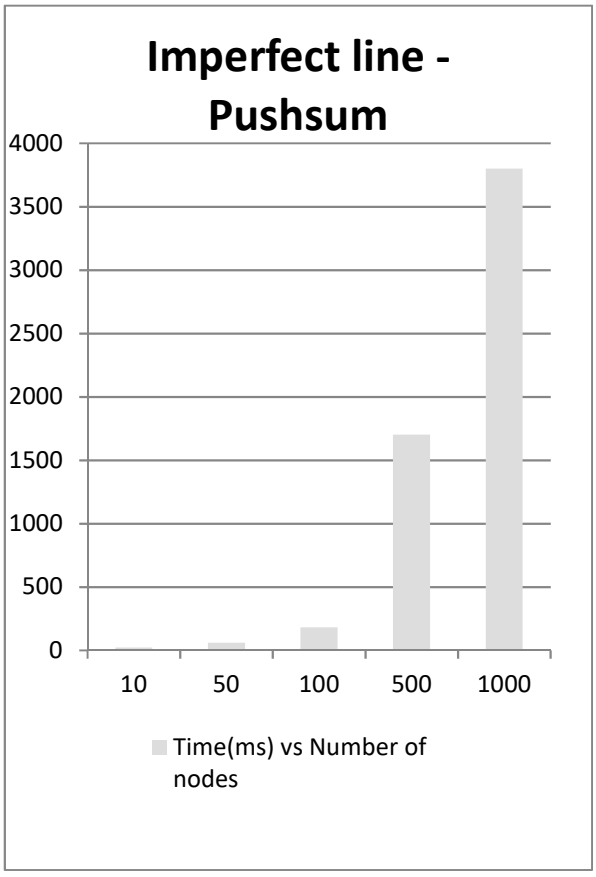


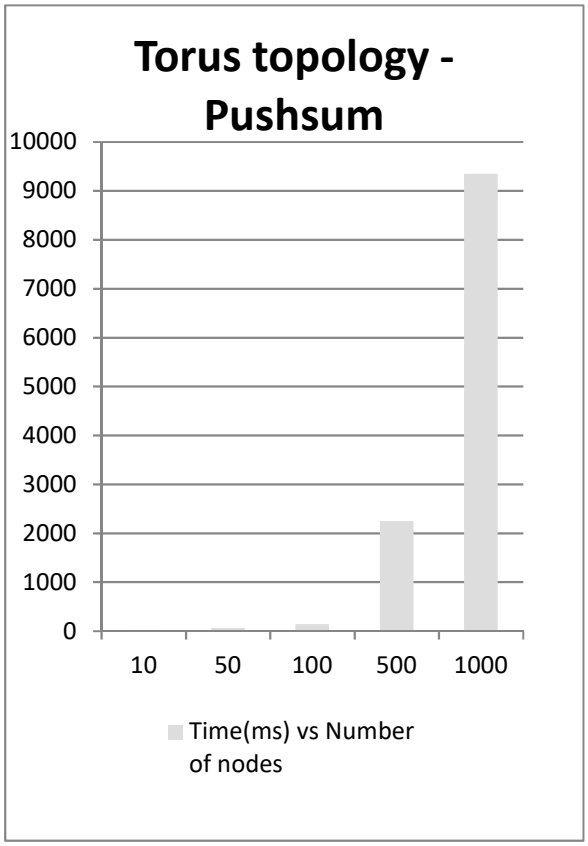


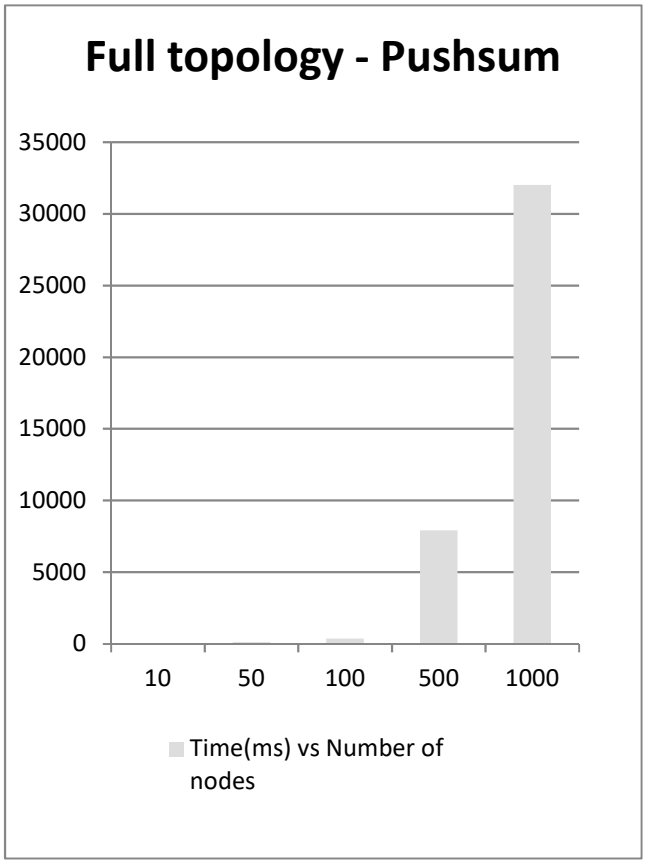

3D topology - Gossip
40000
35000
30000
25000
20000
15000
10000
5000
0
10
50
100
500
1000
5000
Time(ms) vs Number of nodes

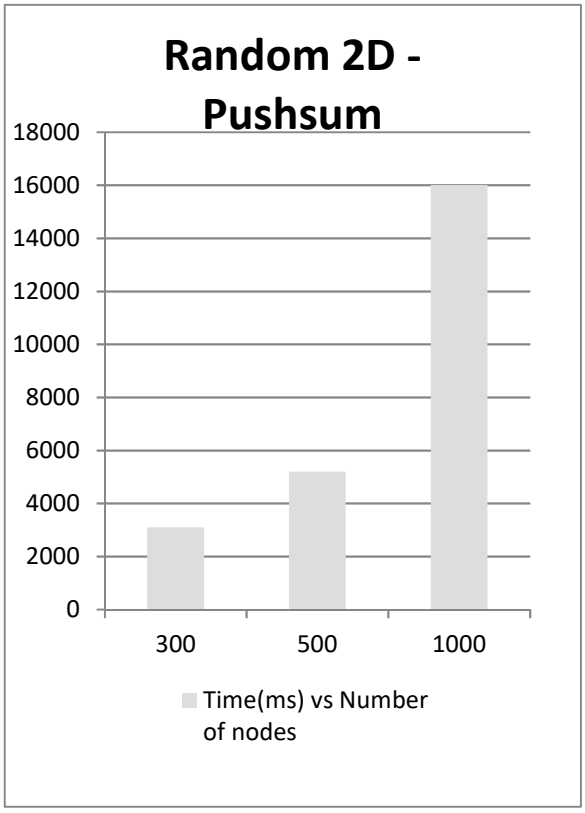

Random 2D - Gossip
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
300
500
1000
5000
Time(ms) vs Number of nodes


Line topology - Pushsum
60000
50000
40000
30000
20000
10000
0
10
50
100
500
Time(ms) vs Number of nodes


Imperfect line - Pushsum
4000
3500
3000
2500
2000
1500
1000
500
0
10
50
100
500
1000
Time(ms) vs Number of nodes


Torus topology - Pushsum
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
10
50
100
500
1000
Time(ms) vs Number of nodes


Full topology - Pushsum
35000
30000
25000
20000
15000
10000
5000
0
10
50
100
500
1000
Time(ms) vs Number of nodes


Random 2D - Pushsum
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
300
500
1000
Time(ms) vs Number of nodes

Interesting findings:

As per our observation, for Gossip algorithm, Full topology is comparatively better than other topologies in case of the time convergence.
Imperfect 2D topology appears to be a good choice for smaller sized network in both gossip as well as push-sum algorithms.
Line topology takes the largest amount of time to converge with respect to both Gossip and Pushsum algorithms.
For Gossip algorithm, Full topology is observed to have the best convergence. This must be based on the fact that it very well supports the actual concept of gossip algorithm.
In case of Pushsum algorithm, if we reduce the allowed error in s/w ratio to 10^(-5), the convergence time reduces to almost half.