Gossip Simulator

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Aim of project to implement Gossip and Push-Sum protocol on multiple topologies.

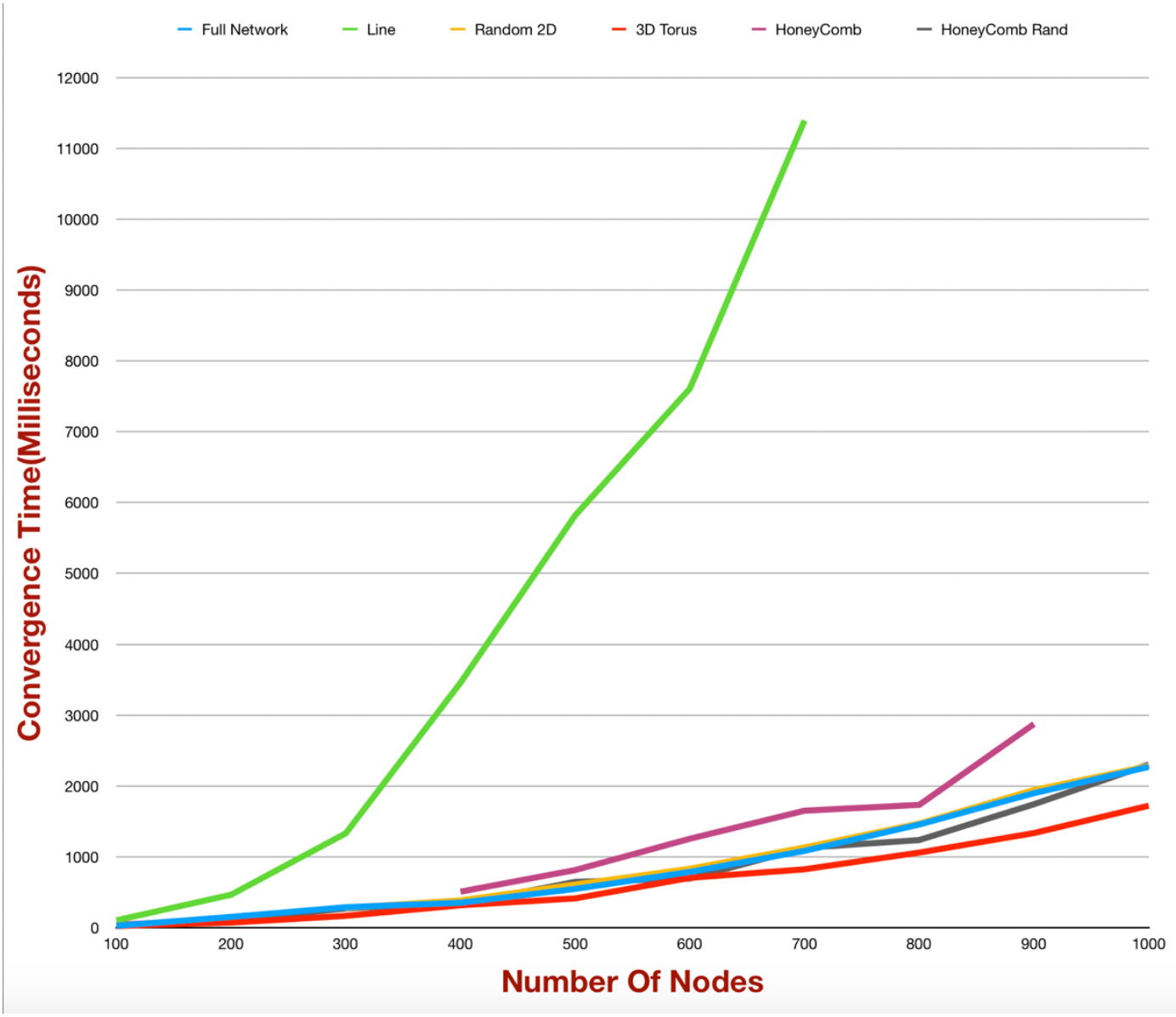
Implementation Details:

The convergence of the Gossip Algorithm occurs when all the node has heard the rumor 10 times. In the implementation, if a node has heard rumor more than 10 times, it declared itself as converged. If all the nodes are converged in the topology the program ends and displays the convergence time.

Similarly, for push-sum, the convergence occurs when a nodes ratio has not changed more than 10^-10 in 3 successive rounds. Then we terminate the program and give the convergence time achieved.

Gossip Algorithm

Nodes	Full Network	Line	Random 2D	3D Torus	Honeycomb	Honeycomb Rand
100	28	104		26	43	27
200	153	466		73	114	100
300	290	1333	280	167	389	273
400	353	3458	386	317	509	335
500	548	5819	610	414	814	647
600	788	7609	833	704	1256	695
700	1085	11392	1133	825	1652	1127
800	1457	33319	1471	1061	1734	1238
900	1899	34546	1943	1336	2875	1743
1000	2269	57206	2282	1722	3678	2303



Observations for Gossip Algorithm:

- Line is the most inefficient topology
- Honeycomb is also inefficient one below Line topology
- Honeycomb with random neighbor converges faster, performs better than Honeycomb
- We see the Random 2D and full network perform the same for converging
- 3D torus performs best for large number of Nodes among the topologies

Largest Network Achieved (Gossip)

Topology	Num of Nodes	Time in milli sec
Full Network	15000	993184
Line	1500	252139
Random 2D	4000	48045
3D Torus	10000	424890
Honeycomb	5000	357488
Honeycomb with random Neighbor	5000	144096

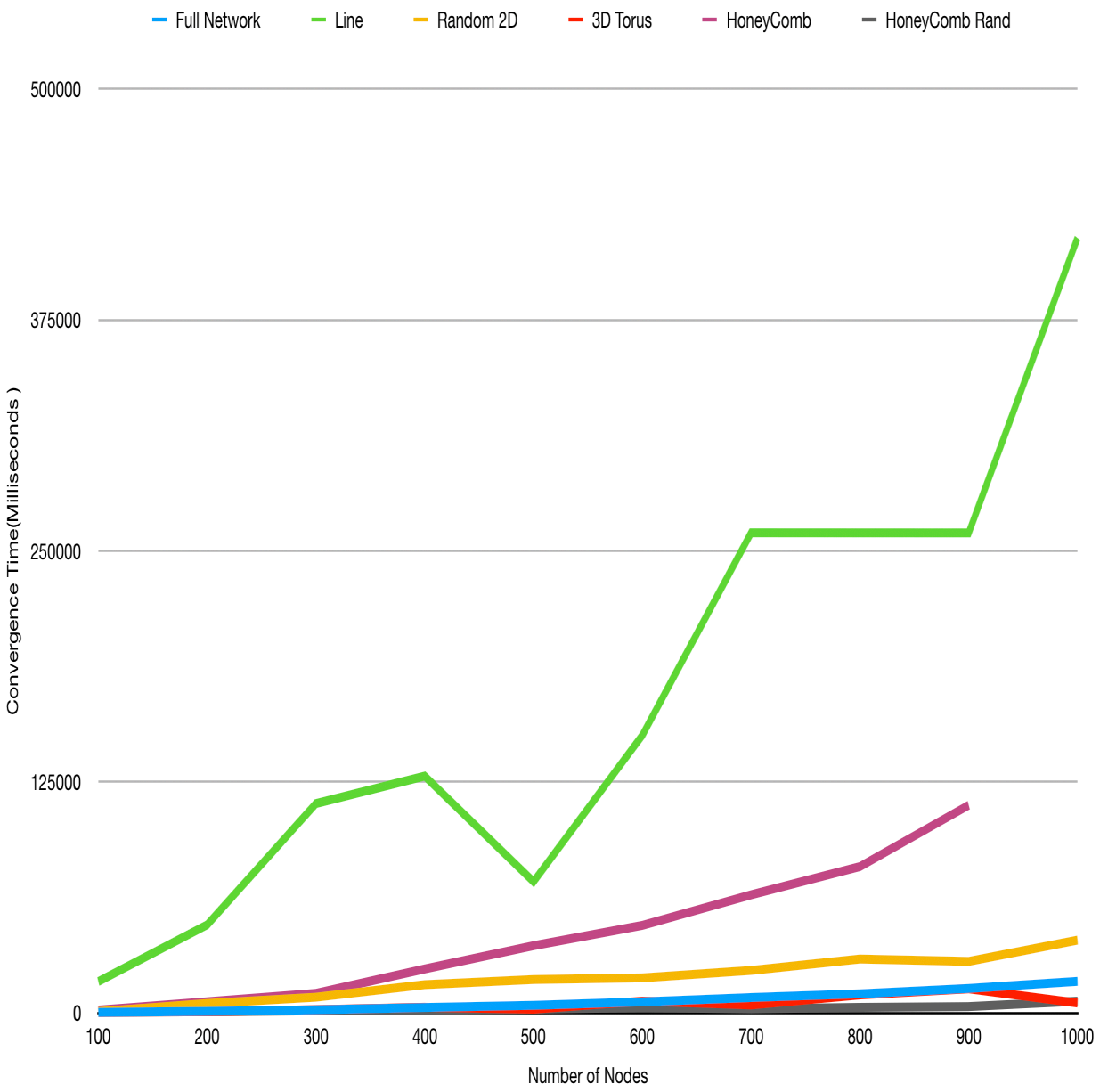
Push-Sum Algorithm

PushSum Algorithms

Nodes	Full Network	Line	Random 2D	3D Torus	HoneyComb	HoneyComb Rand
100	241	16937	689	334	1470	370
200	777	47622	5062	602	5987	600
300	1647	113244	8455	1704	10547	1124
400	2887	128084	15245	2998	23752	1226
500	4051	70969	18025	1985	36336	1952
600	5938	150162	18929	6301	47319	2857
700	8285	259741	22951	4241	63869	2138
800	10297	259708	29121	9677	79123	2948
900	13186	259691	27839	12989	112365	3369
1000	17018	419248	39331	5302		6284

Observations for Push-Sum Algorithm:

- Even here, Line is the most inefficient topology
- Honeycomb is also inefficient one below Line topology similar to Gossip
- Honeycomb with random neighbor converges faster, performs better than Honeycomb
- We see the Random 2D performing worst then full network and better than honeycomb here.
- For initial nodes till 800 full network and 3d Torus perform the same and later the 3d Torus performs better than full network.
- 3D torus performs best for large number of Nodes among the topologies



Largest Network Achieved (PushSum)

Topology	Num of Nodes	Time in milli sec
Full Network	5000	441548
Line	1000	419248
Random 2D	4000	285627
3D Torus	5000	173795
Honeycomb	4000	131455
Honeycomb with random Neighbor	5000	42543