

Project 2 – Gossip Simulator

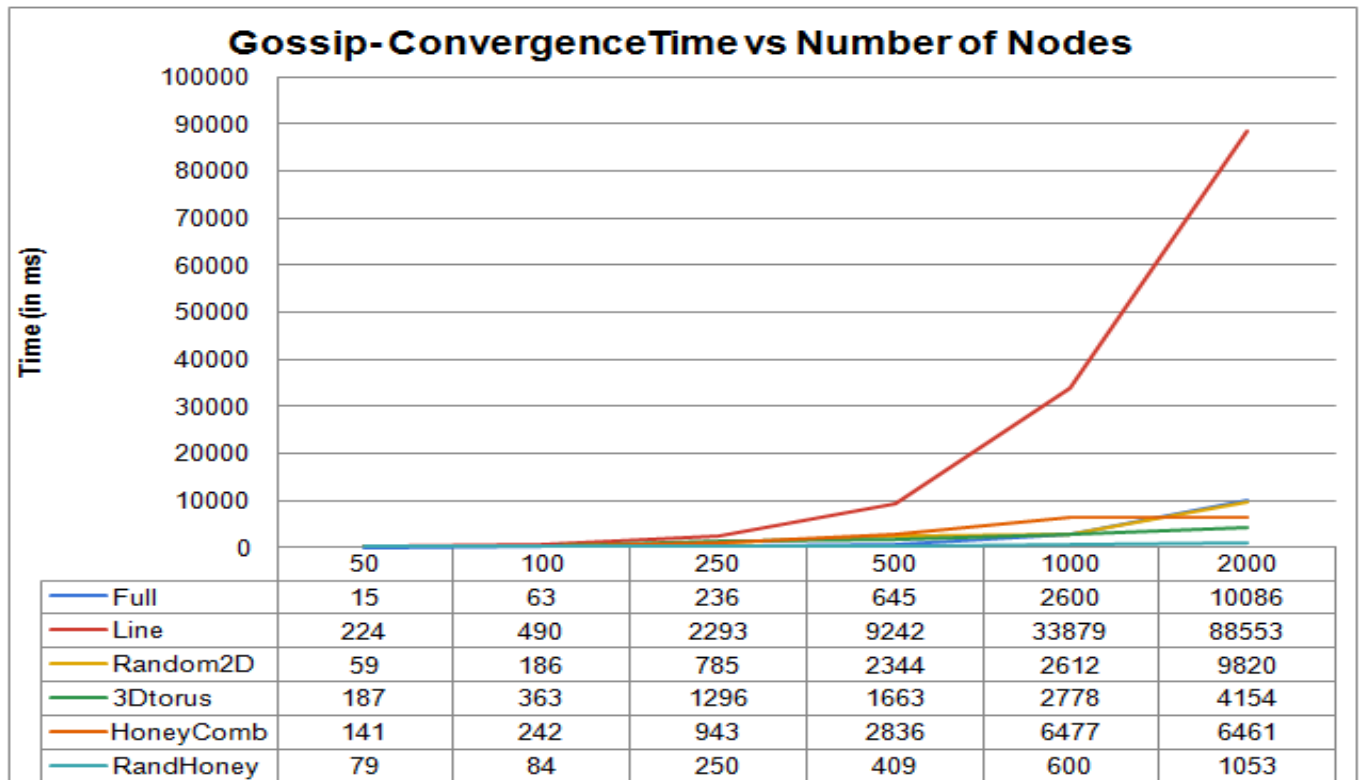
Group Members: (1) Gurpreet Singh Nagpal (UFID: 0698-9051)

(2) Anushri Jain (UFID: 8764-6425)

Goal of the Project:

To determine the convergence of algorithms (Gossip Algorithm and Push-Sum Algorithm) for multiple topologies such as Full Network Topology, Line Topology, Random2D Topology, 3Dtorus Topology, Honeycomb Topology, RandomHoneycomb Topology.

GOSSIP ALGORITHM							
S.No.	CONVERGENCE TIME (ms)						
	Number of Nodes ->>>	50	100	250	500	1000	2000
1)	Full	15	63	236	645	2600	10086
2)	Line	224	490	2293	9242	33879	88553
3)	Random 2D	59	186	785	2344	2612	9820
4)	3Dtorus	187	363	1296	1663	2778	4154
5)	Honeycomb	141	242	943	2836	6477	6461
6)	HoneycombR	79	84	250	409	600	1053



Practical Observation: For Gossip Algorithm:

The time of convergence for the topologies follows the below order:

Order: *RandHoney* < *3Dtorus* < *Honeycomb* < *Random 2D* < *Line* < *Full*

The following are the fascinating things that we have observed from the above graph and table :

- 1) Here, RandHoney is the best topology or an efficient one and performs the best among the topologies.
- 2) After that 3Dtorus is following the RandHoney.
- 3) Another thing we find that Line topology is an inefficient topology following the Honeycomb topology.
- 4) The reason behind the line topology for behaving in an inefficient way is that it has only two neighbors, i.e. left and right neighbor.

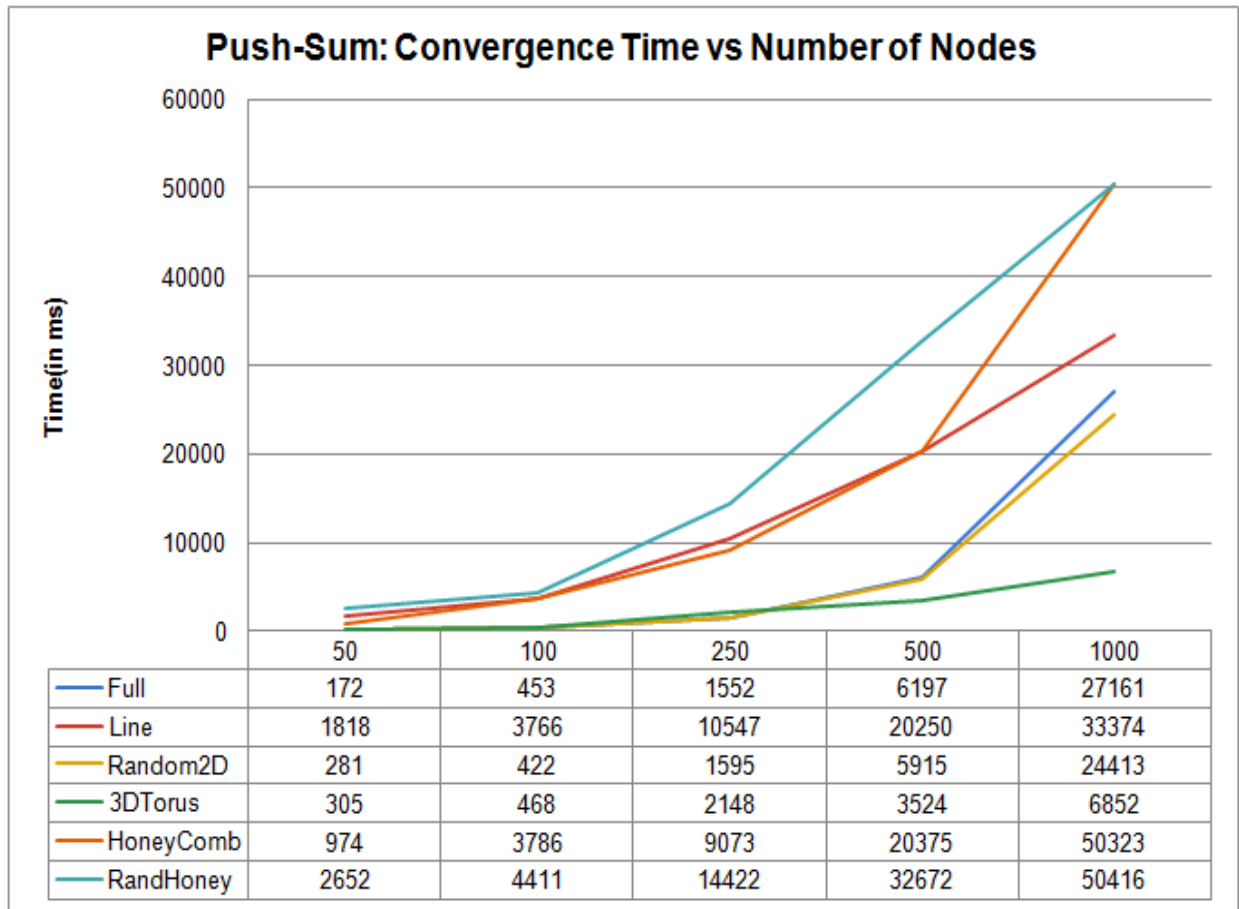
- 5) In addition, Full Topology takes maximum time to converge and we can also see that Full Topology and Random2D Topology is behaving in the similar way or takes the same time for convergence.

Interesting Observation (for Gossip):

Name of Topology	Number of Nodes	Convergence Time(ms)
3Dtorus	15000	86101
RandHoney	15000	40938

The most fascinating thing that we have observed here is that RandHoney topology converges in 40938 ms (~40 sec) for 15000 nodes following the 3Dtorus topology.

PUSH-SUM ALGORITHM						
CONVERGENCE TIME (ms)						
S.No.	Number of Nodes ->>>	50	100	250	500	1000
1)	Full	172	453	1552	6197	27161
2)	Line	1818	3766	10547	20250	33374
3)	Random 2D	281	422	1595	5915	24413
4)	3Dtorus	305	468	2148	3524	6852
5)	Honeycomb	974	3786	9073	20375	50323
6)	HoneycombR	2652	4411	14422	32672	50416



Practical Observation: For Push-Sum Algorithm:

Order: *3DTorus* < *Random2D* < *Full* < *Line* < *Honeycomb* < *RandHoney*

- 1) Here, we observe that RandHoney takes the maximum time to converge and is performing in an inefficient way or the worst topology following the HoneyComb topology.
- 2) Random2D topology and Full topology is behaving in the same way or takes almost same time to converge.
- 3) Among these topologies, 3DTorus topology is the best one and takes only 6852 ms (~6.8 sec) to converge and this is really an interesting finding.
- 4) For this algorithm, RandHoney converges faster than the HoneyComb following the Line topology.

Interesting Observations:

- (1)** The most fascinating thing that we have observed here is that **3dtorus topology: Push-Sum Algorithm** converges in **394297 ms (~394 sec)** for **10648** nodes.
- (2)** 3Dtorus topology is performing significantly well in both the algorithms