COP5615

Gossip simulator

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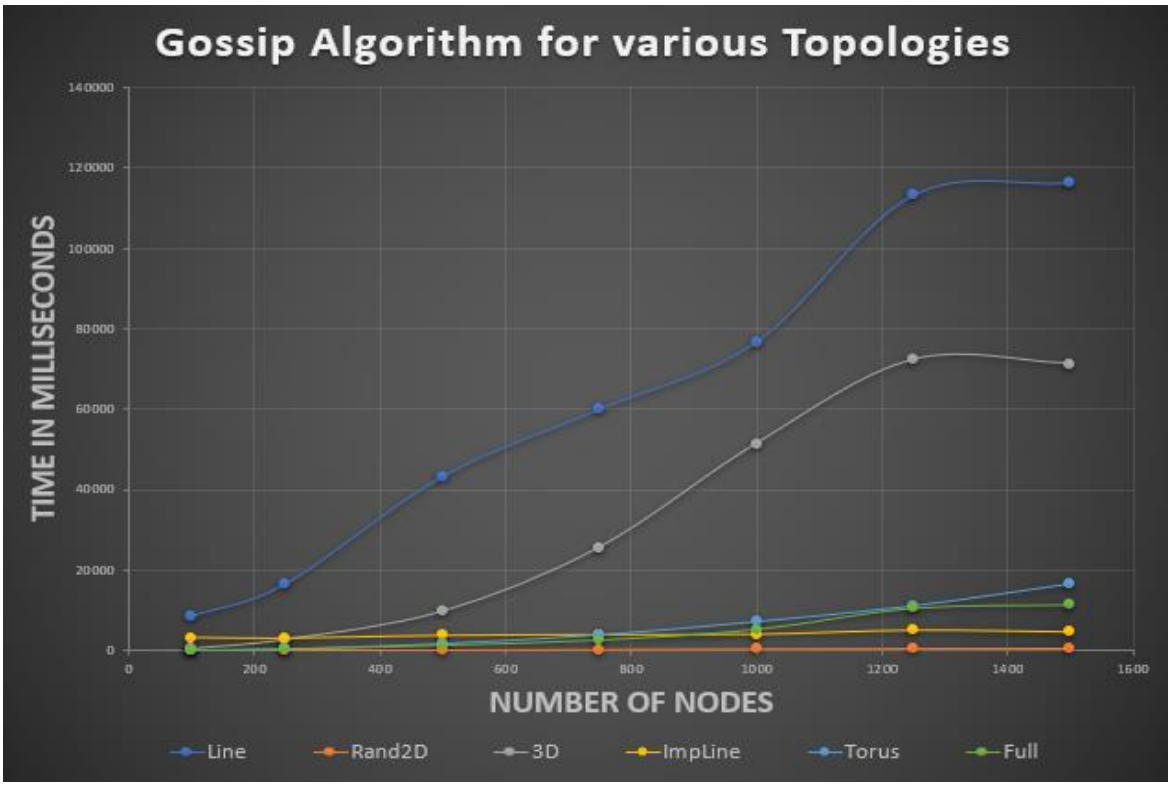
Project Report

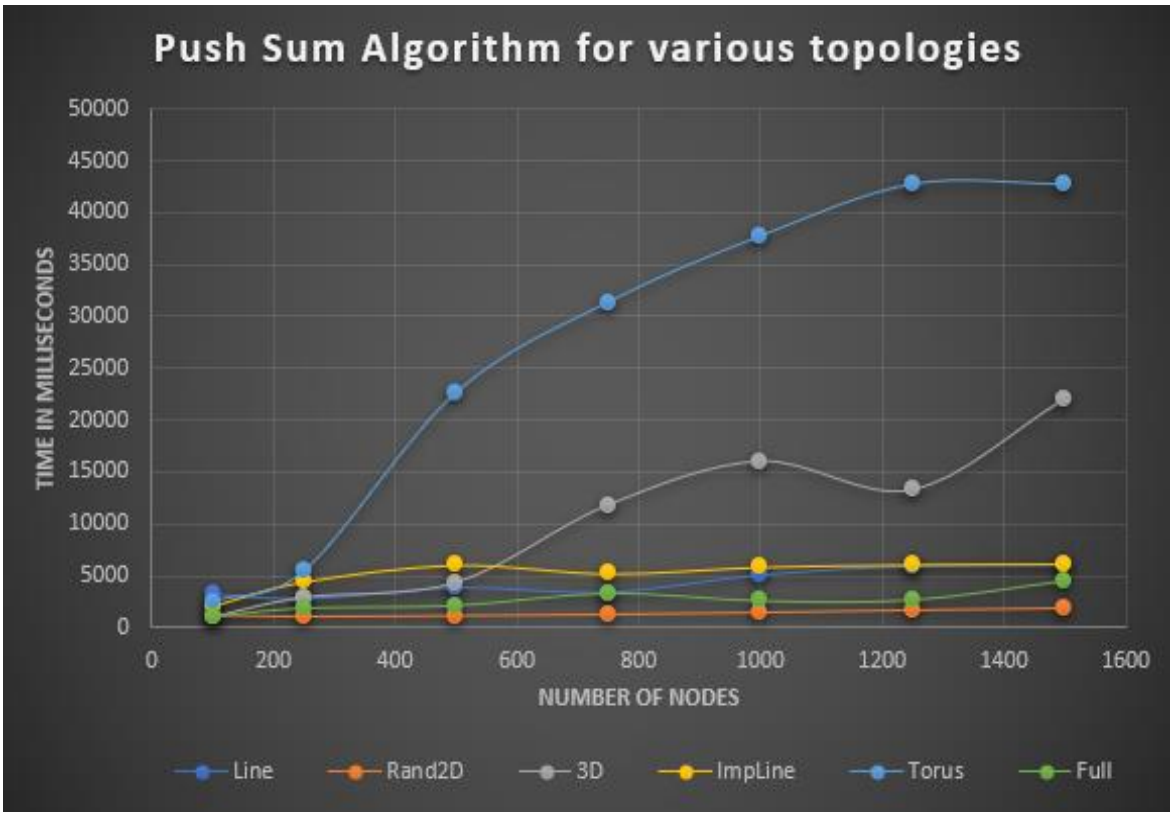
The implementation covers both Gossip and Push Sum algorithms over the following topologies: *Fully Connected, Line, 3D Grid, Torus, Imperfect Line, Random 2D Grid.* Below are the findings of the project.

	Topologies for Gossip (Time in Milliseconds for convergence)					
Number of Nodes	**Line**	**Rand2D**	**3D**	**ImpLine**	**Torus**	**Full**
100	8469	125	328	3203	188	93
250	16531	109	2609	3078	484	360
500	43250	125	9625	3719	1829	1328
750	59953	234	25547	3937	3985	2641
1000	76684	375	51344	4000	7297	5282
1250	113223	469	72265	5015	11203	10609
1500	116391	532	71297	4597	16672	11469

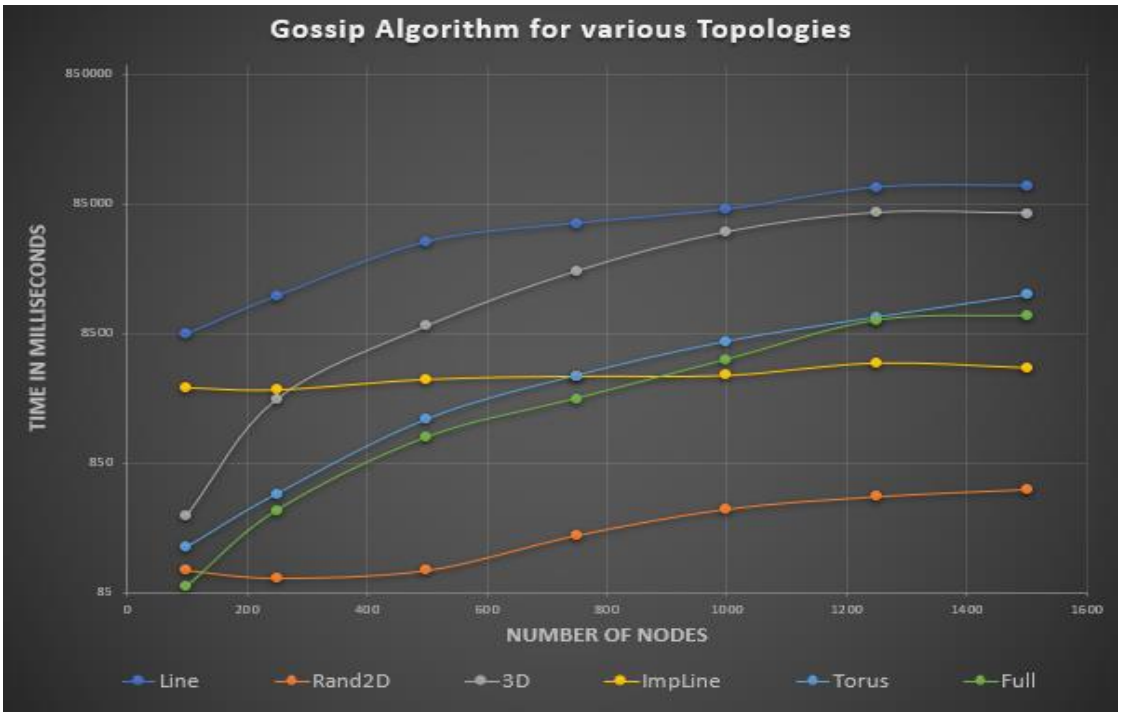
	Topologies for push-sum (Time in Milliseconds for convergence)					
Number of Nodes	**Line**	**Rand2D**	**3D**	**ImpLine**	**Torus**	**Full**
100	3234	1125	1031	2172	2484	1141
250	2782	1000	2891	4468	5485	1922
500	3844	1078	4345	6063	22688	2172
750	3406	1203	11844	5238	31406	3312
1000	5078	1407	16047	5875	37765	2609
1250	5953	1641	13288	6110	42785	2687
1500	6085	1844	22047	6172	42782	4484

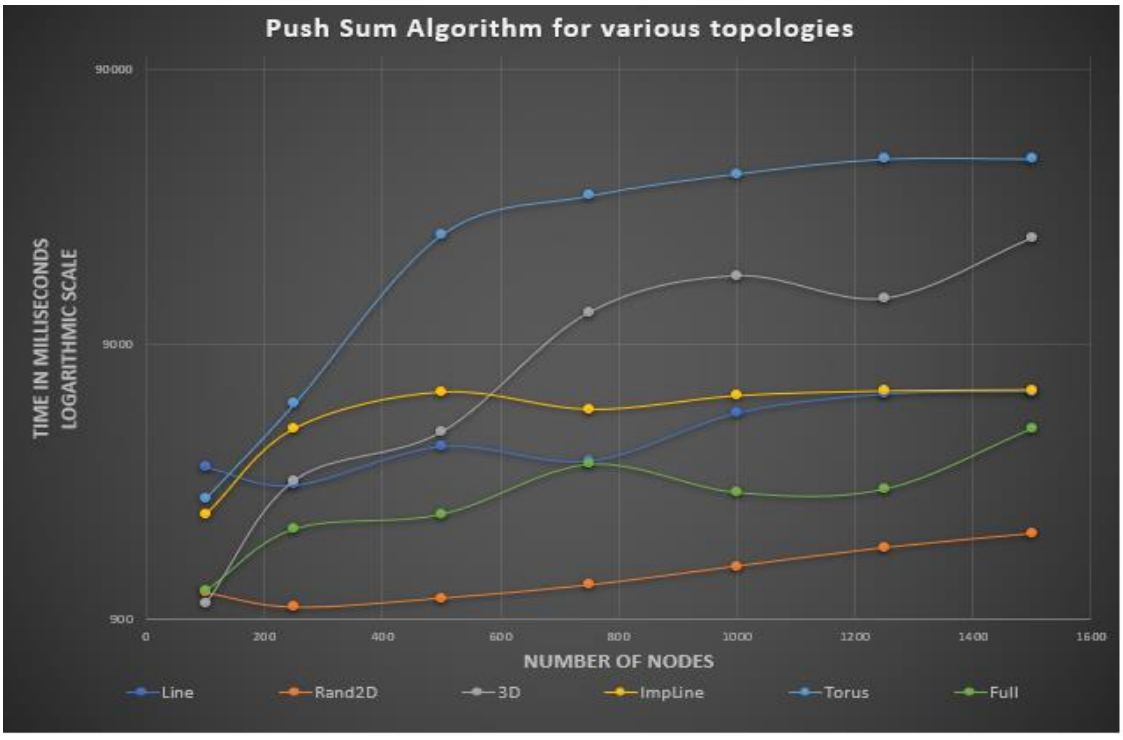
Normal scale





Logarithmic scale





*** All the topologies are working as expected.**

*** The least time-consuming algorithm turns out to be random 2D. It converges faster than all others for higher number of nodes. The maximum number of nodes that converged without any failures: 3000.**

*** The above mentioned number is bound by constraints imposed by system limitations because the time taken to run is quite low: 7.85 seconds (averaged over 10 runs). The system runs 3000 processes at a time with the given implementation in place and considerable sluggishness in the system is observed. If run on a system with better configuration, it should be able to churn more number of nodes.**

*** The line topology works the slowest in gossip. It was hard to converge the line topology in case of push-sum but the convergence times were lesser than 3D grid, Imperfect Line and Torus. The reason behind it lies in the implementation. As a means of failure control in line topology, after convergence of its neighbours the isolated actor sends value to itself and converges on its own. This is essential because then otherwise the entire system would've been left in a halted/hanging state.**

*** The imperfect line topology in this project has 3 neighbours instead of two.Two adjacent ones and one random. Interestingly, we found that it works better than most other topologies beacuse of a hint of randomization. It works even better than the fully connected system for both gossip and pushsum.**

*** Toroid topology works mostly like the fully connected topology, but for pushsum it strangely takes a lot of time to converge. We decided to make the grid length optimal by always taking a square 2D for Toroid to extract the least possible time for convergence.**