# Report Project 2 Gossip & PushSum

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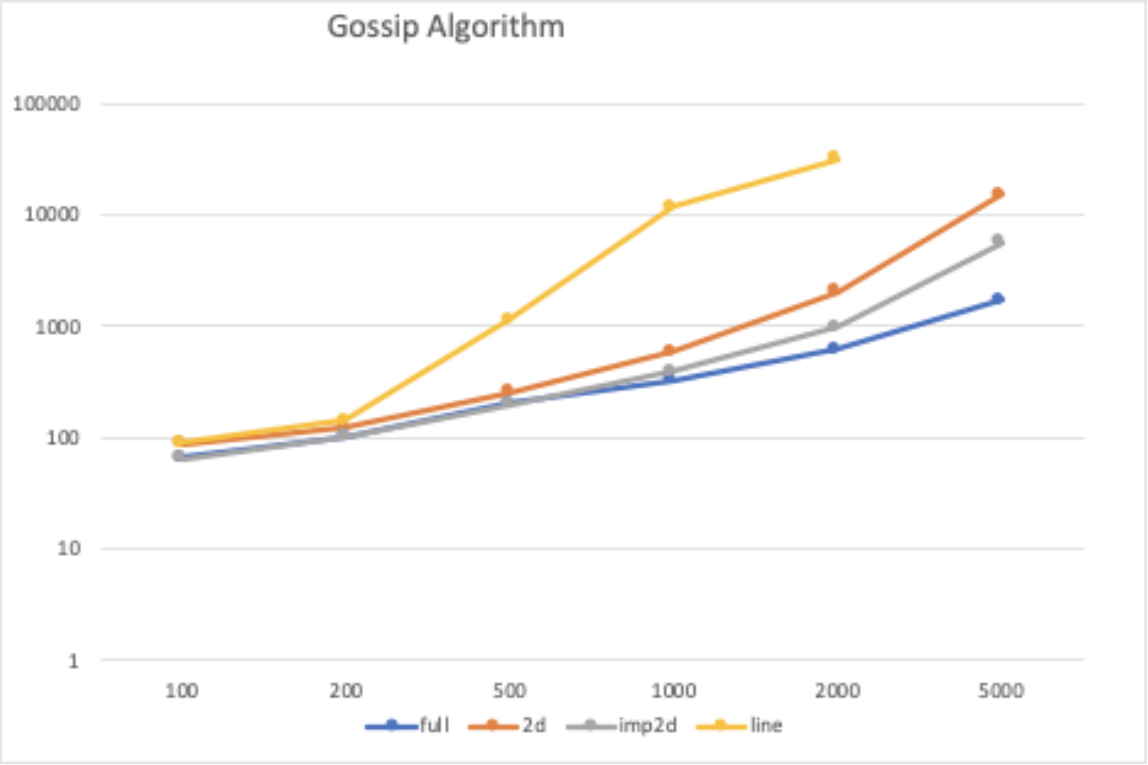
## Gossip Algorithm:

X-axis: Number of nodes
Y-axis: Total time for convergence in milliseconds.
The graph on the Y-axis was made logarithmic to the base 10.

Observations:

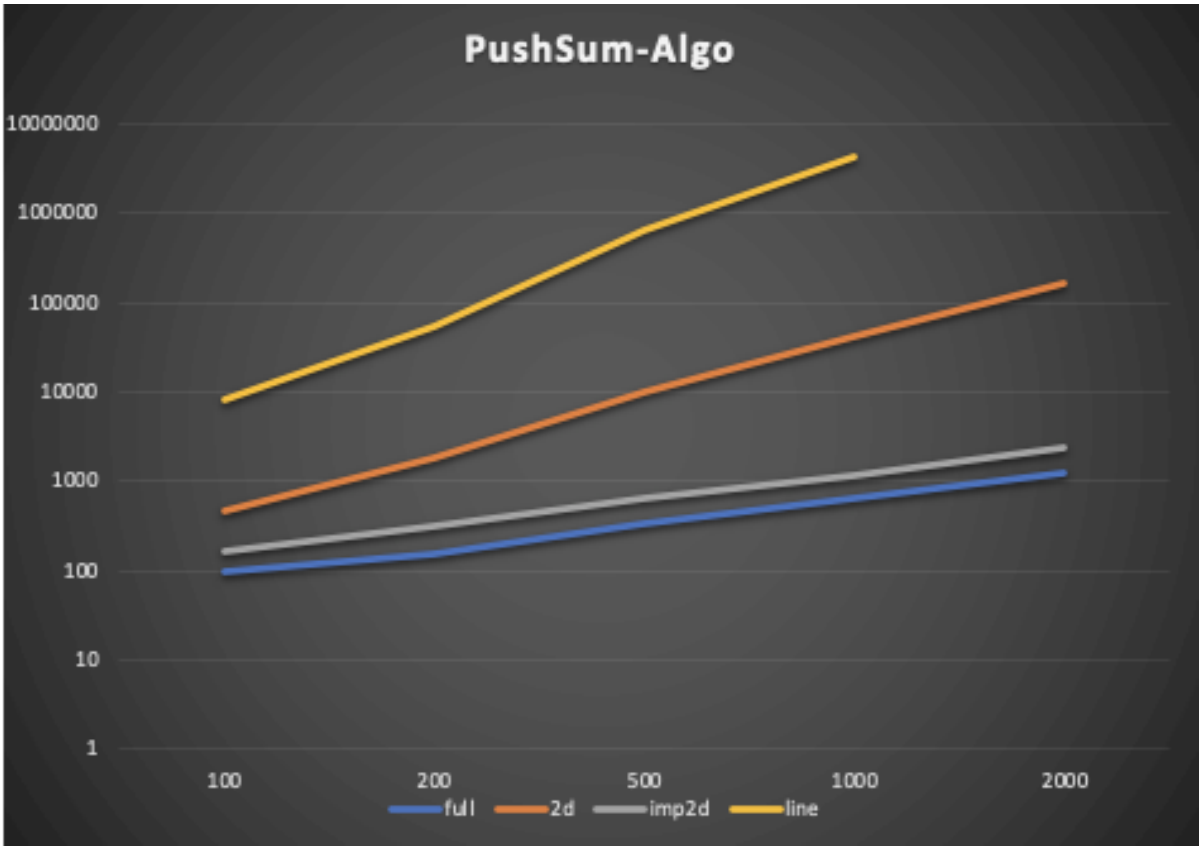
- Full topology is the fastest gossip algorithm.
- When the number of nodes is 200 or less all algorithms converge in approximately the same time.
- Imperfect2D topology is faster than 2D due to introduction of the random neighbour which behaves as an extra transmission point for the gossip.
- Line topology takes the longest time to converge as each node has only 2 neighbours and the graph also might disconnect if the middle node has received the message a certain number of times thus increasing the amount of time for execution.



| NumNodes | Full (ms) | 2d (ms) | Imp2d (ms) | Line (ms) |
|---|---|---|---|---|
| 100 | 66 | 88 | 68 | 90 |
| 200 | 102 | 123 | 102 | 143 |
| 500 | 202 | 200 | 200 | 1153 |
| 1000 | 327 | 591 | 388 | 11909 |
| 2000 | 613 | 2036 | 987 | 32000 |
| 5000 | 1730 | 15222 | 5632 | |

## Push-Sum Algorithm

- The timings work relatively similar to gossip.
- The amount of time for Push Sum Line exponentially increases.
- Full is the fastest algorithm.
- In this algorithm Imperfect2d is way faster than 2d and the graph was converted to logarithmic (base 10) form to clearly show the difference between the different topologies.
- The ratio approximately converges to (n+1)/2
- Line algorithm again takes the longest time as compared to the other algorithms.



| NumNodes | Full (ms) | 2d (ms) | Imp2d (ms) | Line (ms) |
|---|---|---|---|---|
| 100 | 100 | 470 | 160 | 8265 |
| 200 | 156 | 1876 | 322 | 54519 |
| 500 | 342 | 9982 | 634 | 648915 |
| 1000 | 647 | 40638 | 1169 | 4181645 |
| 2000 | 1242 | 169315 | 2415 | |