COP 5615 - Project 2

The goal of this project is to implement convergence of gossip algorithm

Group Info

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Sample Input

Sample input mix run project2.exs 700 3Dtorus push-sum

Here 700 is the total number of nodes

3Dtorous is the topology

And push-sum is the algorithm

Sample Output

```
^CShashis-MacBook-Pro:project2 shashi$ mix run project2.exs 700 3Dtorus push-sum
Total nodes converged = 1/729
Total nodes converged = 2/729
Total nodes converged = 3/729
Total nodes converged = 4/729
Total nodes converged = 5/729
Total nodes converged = 6/729
Total nodes converged = 7/729
Total nodes converged = 8/729
Total nodes converged = 9/729
```

.
.
.

```
Total nodes converged = 508/729
Total nodes converged = 509/729
Total nodes converged = 510/729
Total nodes converged = 511/729
Total nodes converged = 511/729
Finished. Time taken: 61.841805
```

A converge of 70% is set as termination condition for the Gossip algorithm. However, there are times when Line and rand2D fail to reach this convergence and the program fails to stop execution. To move forward, we start a new iex session and repeat program execution. For line topology consensus is not attained in most of the cases. Because if the node terminates it acts as a breakpoint in the network. For rand 2D grid consensus is not attained for smaller number of nodes. However it is attained for larger nodes.

Working

Gossip Algorithm

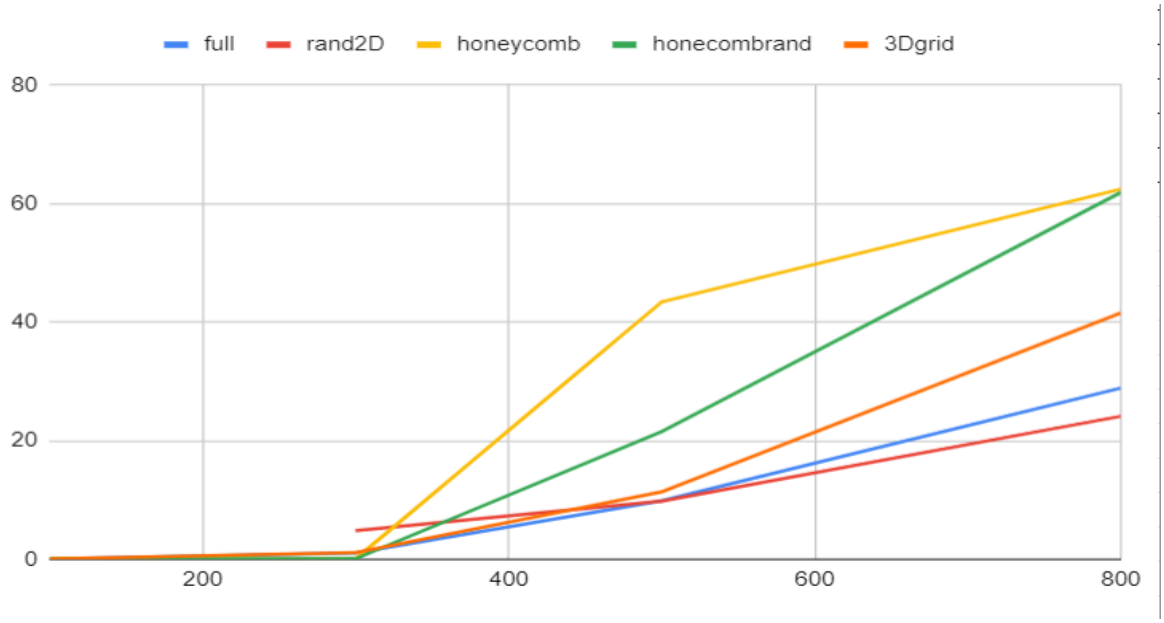
- Upon hearing a rumour the node becomes active and gossips every 50 milliseconds. (This could be made lesser to reduce overall running times)
- l All active nodes gossip in each cycle.
- l Node stops transmitting on hearing the rumour 10 times
- l Program termination condtion: 70% of the nodes receive the rumour

Push Sum Algorithm

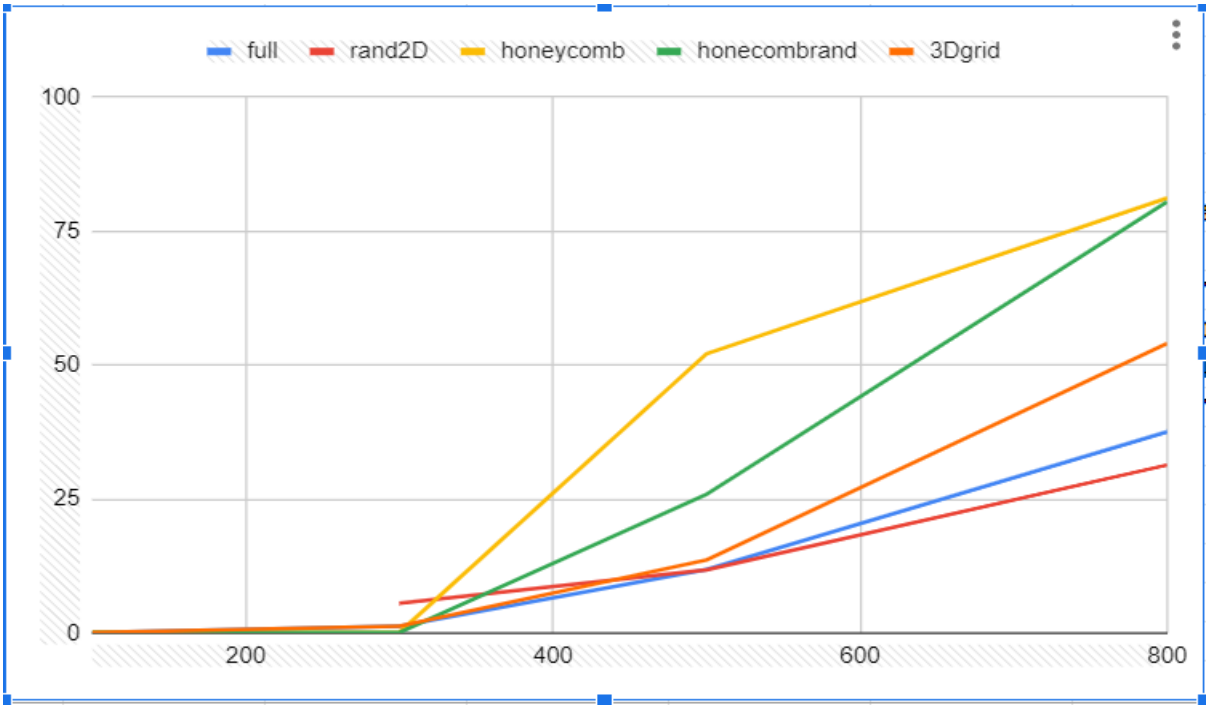
- Only one node transmitting in each cycle
- l Node records convergence when delta(s/w) < 10^-10 for 3 consecutive rounds
- l Node continues transmitting after convergence to ensure convergence of neighbouring nodes
- Program termination condition: All nodes reach convergence

Conclusions & Observations

Gossip Algorithm



Push-Sum Algorithm



Observation:

- For line topology consensus is not attained in most of the cases. Because if the node terminates it acts as a breakpoint in the network.
- For random 2D grid consensus is not attained for smaller number of nodes. However it is attained for larger nodes.
- For random 2D grid and full network , these took approximately same time for execution. And they both took minimum time for execution
- Honeycomb took the largest time for execution.
- For both types of algorithm nature across topologies remain same however push sum takes more time to converge than gossip algorithm.