BONUS PROJECT REPORT

GOSSIP SIMULATOR

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Failure Models:
1) **Node dies**: To simulate this model we have created a function which kills some specified number of nodes. This number acts as our parameter that will control the failure model.
2) **Connection dies**: To simulate this model we have created a function that selects random node suppose node3 and deletes one or more of its neighbors (suppose node4 and node5). This breaks the connection between node 3 and node 4 and node 3 and node 5. The no. of connections killed act as our parameter that will control the failure model.

Assumptions:
These are the two functions that we have implemented. For the time being we have commented one function call which is at line number 178. Please uncomment it, to test it (since only one function could work at a time i.e. either the nodes die or the connection dies).

```
killnodes(10,list) # <------------------------  KILL 10 NODES
killconnection(10,list) # <----------------------- KILL 10 CONNECTIONS
```

Observations:
As we can see below, on testing the failure model, the convergence time of the full is the largest while that of line is smallest. Our convergence condition is that the message passing should stop (in both gossip and push-sum) when the sending state remains same for multiple consecutive rounds. Thus, as per the above condition the line topology breaks because of failure nodes and stops sending and converges. Full topology takes longer because it is failure resilient as it is connected to every other node.

The below table shows some of the observations:

We have checked the below on a total of 500 nodes.

Kill Nodes ->	10	50	100	250
Full	25678	24986	26754	23456
Imperfect2D	14105	13722	16229	12754
2D	11437	9088	7956	10181
Line	5853	4413	5040	3500

Failure Model
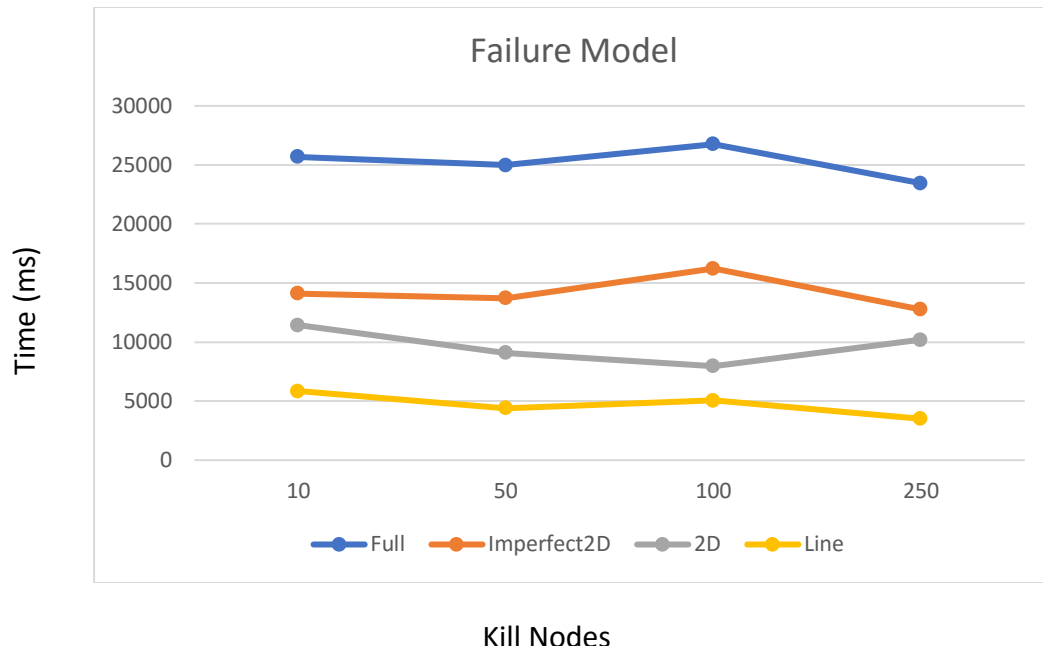
When we try to kill the connection, we have observed somewhat similar results as when we kill the nodes.