Bonus

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We have implemented node and failure model for gossip algorithm and push – sum algorithm.
We have calculated the percentage spread i.e.,

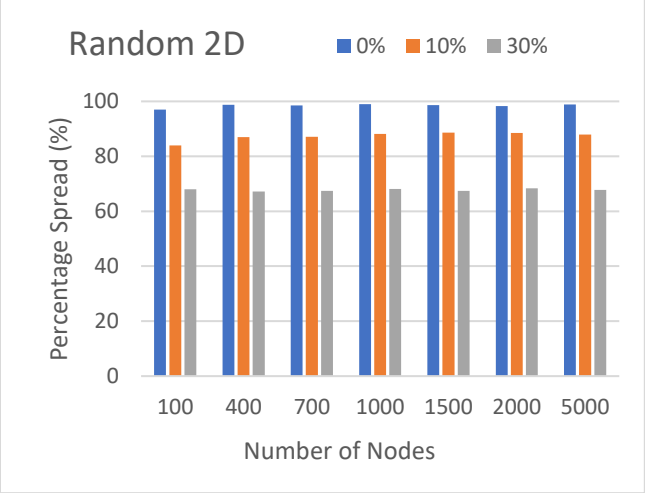
% Spread = Spread by number of nodes * 100

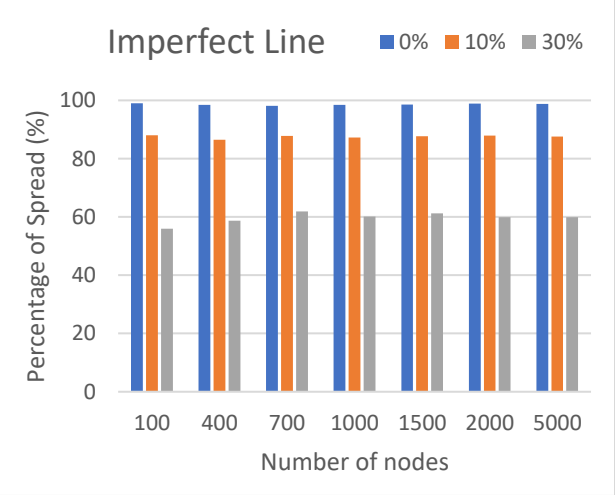
For the results included in this report, we considered 3 cases of failure nodes.

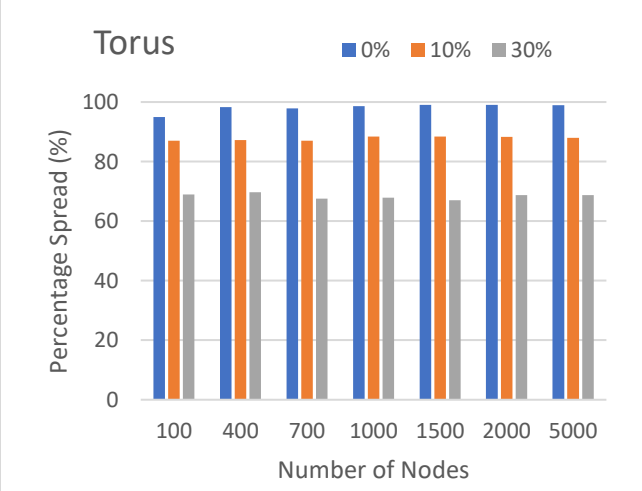
1. No failure.
2. 10% failed nodes.
3. 30% failed nodes.

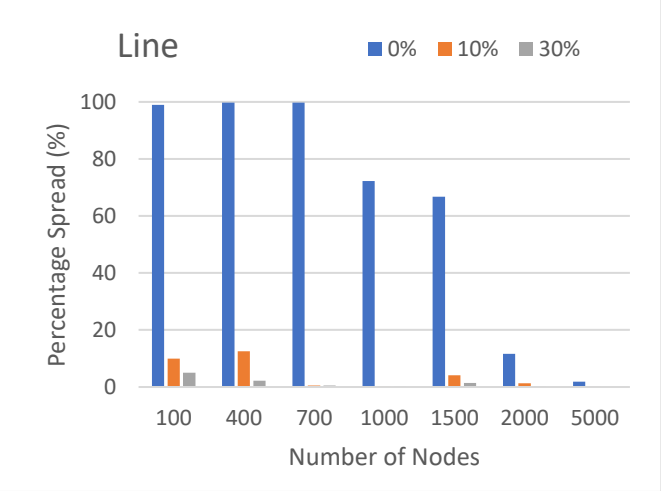
Graphs of Gossip and Push–Sum algorithms for various topologies.
The graph plots the %spread for the topology and algorithm vs the number of nodes.

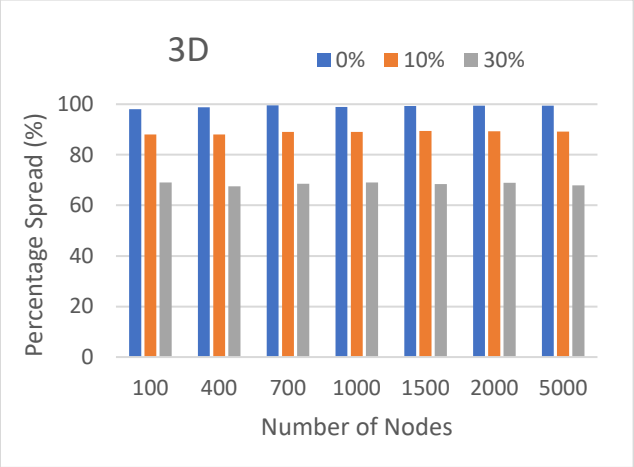
1. **Gossip Algorithm.**

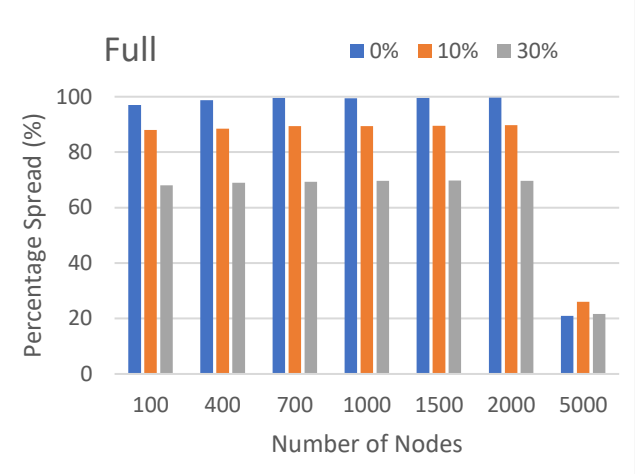




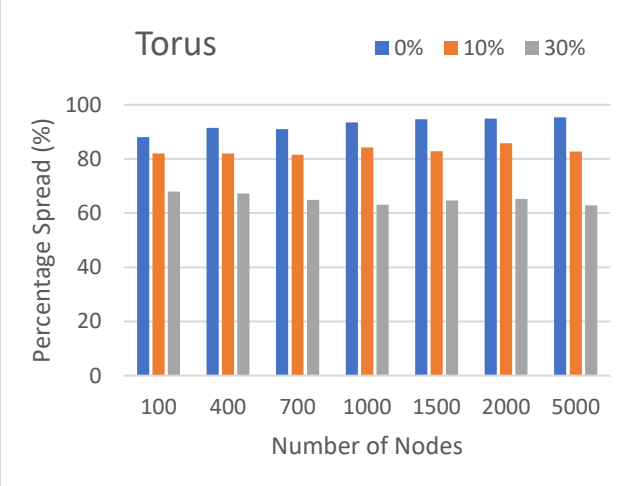


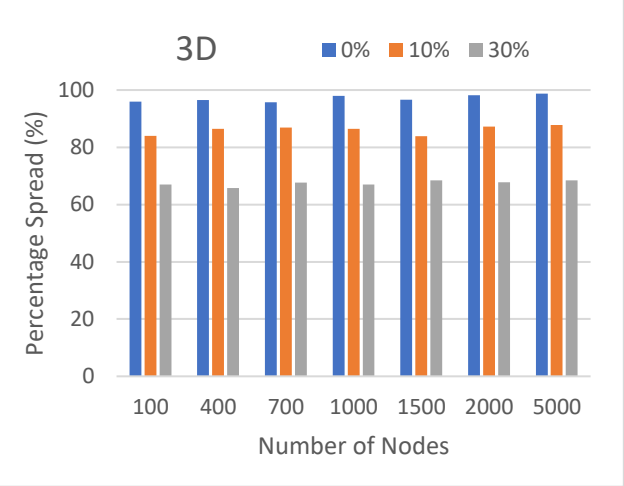


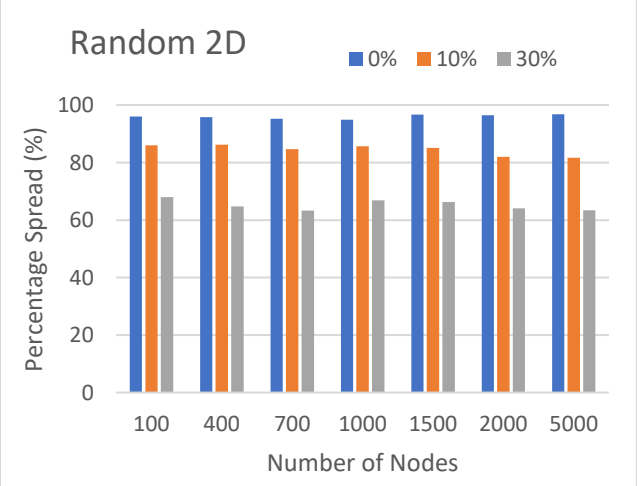


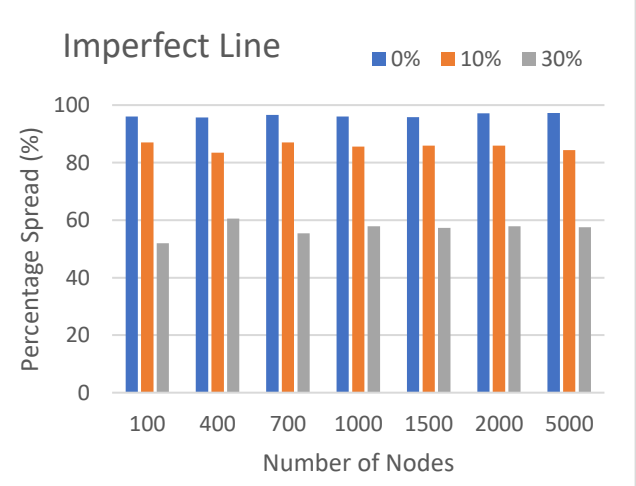


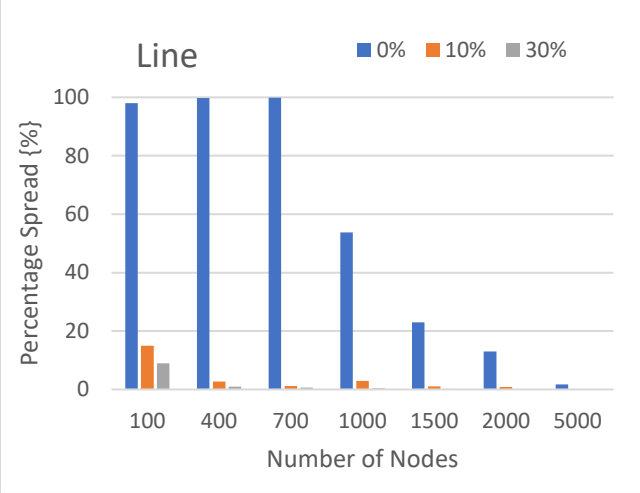
2. Push – Sum Algorithm

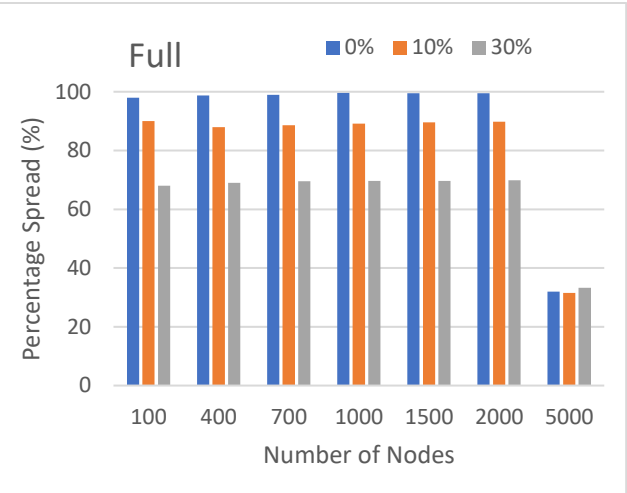












Observations:

1. The main disadvantage of the line topology is, the failure of one node results in failure of transmitting the message to the subsequent nodes. Thus, you can observe in the graph the decreasing %spread as the number of nodes increases. This behavior is the same for both the algorithms.
2. The basic protocol does not provide satisfactory results in terms of handling process failures. However, this updated protocol is more resilient to process failures. While it does cost us slightly in terms of time (to check for failed nodes), the recovery of information that was lost due to a small percentage of failed nodes is much better. As evident from the plots, with 10% failed nodes, the message delivery is not much affected even though the load on the other peer participants increases slightly. This resilience decreases as the percentage of failed nodes increases. This is apparent from the plots for 30% failed nodes.