INF581 : FINAL PROJECT

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QUESTION 4

- Using the threads method, the computation cost will be $O(mk + n)$ with m the number of edges, k represents the number of iterations and n represents the number of nodes.
- For the MapReduce, the cost is:
  - for the first Mapper cost = $O(m + n)$.
  - for the first Reducer cost = cost to regroup the elements with the same key together (it can be $O(log(n))$ if we are using B-tree or it can be $O(log(\alpha))$ if we are using hash map) + $o(m)$.
  - for second Mapper cost = $O(m)$.
  - for second Reducer cost = cost to regroup the elements with the same key together + $O(m)$.

  Therefore, the final cost of using one map reduce is O(m)+ cost to regroup the elements with the same key together.
- Using one MapReduce, the computation cost is :
  - for the mapper cost = $O(n^2 + m)$.
  - for the reducer cost = $O(n^2)$ + cost to regroup the elements with the same key together.

Therefore, the overall cost of using one map reduce is O(n2) + cost to regroup the elements with the same key together.

The results show that the performance of TwoMapReduce algorithm is better than OneMapReduce algorithm.