SEEM5020 2023 Fall: Individual Project

This project is due at 8:00 pm, 26/Nov 2023. Please submit it via Blackboard.

Total weight: 20%

(1) **Frequency Estimation Algorithms Implementation [6 marks]:**
- Implement the following frequency estimation algorithms:
  - **Classic Mode** (each time a new element arrives):
    * Misra-Gries algorithm
    * Space-Saving algorithm
  - **Both Classic and Turnstile Mode** (as detailed in Lec 3 slides):
    * Count-Min Sketch
    * Count-Sketch
- Compare their performance in terms of relative error for each mode.

(2) **Range-based Frequency Estimation [6 marks]:**
- Implement the range-based frequency estimation framework using the dyadic tree for all four methods. Compare their performance in terms of relative error under different ranges under each mode [5%]

(3) **Report on Experimental Results [5 marks]:**
- Document your findings in a comprehensive report that:
  - Presents the experimental results.
  - Summarizes the advantages and disadvantages of each method.

(4) **Advanced Solution Design [3 marks]:**
- Propose and design an enhanced solution that outperforms the previously learned methods in terms of achieving a smaller error in frequency estimation.