Zoe Xi

For my senior thesis, I plan to do research in algorithms. My advisor is Bill Kuszmaul, a computer science PhD student at MIT whose research focuses mostly on the design and theoretical analysis of algorithms. Bill is in a research group headed by Professor Charles E. Leiserson.

As an example, I plan to research means of measuring similarity between strings, which include the well-known edit distance and dynamic time warping distance (DTW). Edit distance finds the total cost of insertions, deletions, and substitutions needed to turn one string into another. And DTW measures similarity between time sequences. Both edit distance and DTW have many real-world applications (e.g., spelling error detection, speech recognition, signature verification, bioinformatics). I plan to study edit distance and DTW on run-length encoded (RLE) strings, strings in which runs of letters are compressed (e.g., aaabb becomes a3b2).

Please find some closely related papers listed below:

Vincent Froese, Brijnesh Jain, Maciej Rymar, and Mathias Weller. Fast exact dynamic time warping on run-length encoded time series. *arXiv preprint arXiv:1903.03003*, 2020.
https://arxiv.org/pdf/1903.03003.pdf

Raphaël Clifford, Paweł Gawrychowski, Tomasz Kociumaka, Daniel P. Martin, and Przemysław Uznański. RLE edit distance in near optimal time. *arXiv preprint arXiv:1905.01254*, 2019.
https://arxiv.org/pdf/1905.01254.pdf

William Kuszmaul. Dynamic time warping in strongly subquadratic time: algorithms for the low-distance regime and approximate evaluation. *arXiv preprint arXiv:1904.09690*, 2019.
https://arxiv.org/pdf/1904.09690.pdf