Pervasive Positioning 1

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Contents

1 Introduction

In this project we have implemented the linear and the affine global alignment. The point of the project is to compare the two by running time performance. We have set up the experiments to try different sequences lengths, with the standard DNA alphabet of 'ACGT'.

Our implementations works without faults, completing the example data with the correct alignments, and correct scores. Our implementation also supports custom alphabets, and varying cost matrixes.

2 Implementation Details

Our implementation is done in Python3, using the Numpy library for handling tables, and the BioPy library for parsing FASTA-files. Everything was implemented using the pseudo-code from the slides from the lecture.

The algorithms operate on strings (instead of alternatives like arrays or lists). They use a row by row approach as opposed to recursive memoization. When we use affine backtracking we alternate between row and column, to ensure linear backtracking performance.

3 Conclusion

Through our work in this report, we have managed to implement different positioning schemes and distance measurements, and we have shown that it is possible to determine positions quite accurately from a set of signal strength readings. Finally, we have found a method of generating model-based data from theoretical models of wi-fi signal strength, and used this to experimentally compare the model-based solutions to the empirical, showing a noticeable but acceptable degradation of positioning accuracy.

References

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