Global Proteomics Conference

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Proteomics Meeting 2017
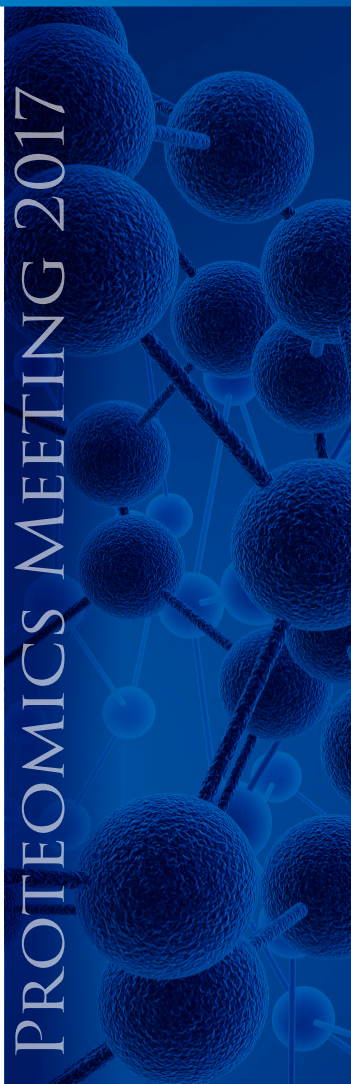
Protein sequence detection: Recent developments and a new algorithm

There is a flurry of algorithms for sequence detection and analysis aimed particularly at proteomics. These algorithms almost invariably try to measure the similarity between sequences of symbols drawn from finite sets of such symbols but with different cardinalities. They are in two broad classes: deterministic and stochastic. Deterministic algorithms are often hard to implement and are slow in practice. Stochastic algorithms, on the other hand, are relatively easier to implement and are efficient. However, they do not guarantee to find the correct solution even when it exists. This greatly reduces their applicability particularly where it is essential to know the exact solution as in medical situations. The inherent uncertainty in the outcomes of non-deterministic approaches is exacerbated by the need to arbitrarily set a number of parameters on which they depend. Default values of these parameters are often inappropriate outside the context in which they were estimated. There is, therefore, room for deterministic algorithms particularly when the time constraint is soft. In my talk, I will highlight the limitations of stochastics algorithms and illustrate them on probably the most prominent genomics search tool, namely the Basic Local Search Tool or BLAST. We then present our algorithm which is deterministic and has a strong mathematical basis. Furthermore, we will show that it is easy to understand and implement. We illustrate it on shotgun proteomics data and compare it with a number of other well-known sequence comparison algorithms such as the Needleman-Wunch and Smith-Waterman algorithms.
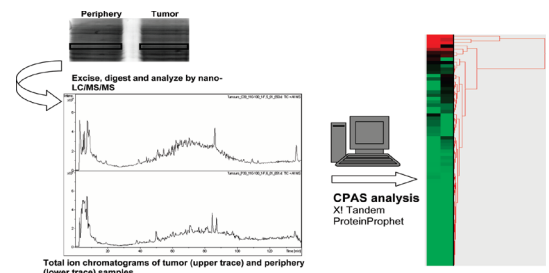

Figure-1: Shotgun proteomics data generation

Recent Publications

1. Kheniche A, Brahimi N and Salhi A (2015) A Deterministic Algorithm for Alpha-Numeric Sequence Comparison with Application to Protein Sequence Detection. *Journal of Algorithms and Computational Technology*; 9(3): 323-338.

2. Mashwani W K and Salhi A (2014) Multi-Objective Memetic Algorithm Based on Decomposition. *Applied Soft Computing*; 21: 221-243.

Biography

Abdellah Salhi is a Professor of Operational Research in the Department of Mathematical Science of Essex University, UK. He has obtained his PhD on Interior-Point Methods from the University of Aston in Birmingham, UK. His research interests are in the design, analysis, implementation and application of OR algorithms. He has led a number of research projects and contributes to the ESRC funded Business and Local Government Data Research Centre. He has published over 80 peer-reviewed papers. He has worked as the Head of the Department of Mathematical Sciences from 2010 t0 2016.

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