

A Recursive Application of a Support Vector Machine for Protein Spot Detection in 2-Dimensional Gel Electrophoresis

Gary D. Boetticher
Department of Computer Science

Hisham Al-Mubaid
Department of Computer Science

Karen Frasier-Scott
Department of Computer Science



Hisham Al-Mubaid and Gary Boetticher

Abstract—Two-dimensional polyacrylamide gel electrophoresis (2-D PAGE) analysis remains the core of proteomic technology because it is currently the most powerful method for analyzing large collections of proteins. Advances in electrophoresis equipment are making this technique more accessible, but effective computer assisted protein spot detection remains a very labor-intensive endeavor. Protein spot analysis is still time consuming, requires human intervention and is in need of further development. This study explores a technique for recursively applying a Support Vector Machine (SVM) in identifying protein. An SVM is a powerful learner capable of optimizing differences between classes. In this context, the different classes correspond to the presence or absence of a protein. Different experiments are conducted to assess these differences in class formation in the context of a normal image and a highly saturated image.

INAUGURAL RESEARCH IN THE APPLICATION OF SUPPORT Vector Machines applied to two-dimensional polyacrylamide gel electrophoresis (2-D PAGE) analysis has contributed to the hiring of a research associate, Mr. Mahi Dasika, in the summer of 2004. He is extending the initial research to develop new mechanisms for protein identification. This work will be completed during the summer of 2005.

Publications

Al-Mubaid, H. and S. Nagula. "Machine Learning Approach for Context-Sensitive Error Detection," Second International Conference on Intelligent Computing and Information Systems, Cairo, Egypt, 2005.

Boetticher, G., H. Al-Mubaid, and K. Frasier-Scott, "Automated Hybridization of Machine Learners for Recursive Spot Identification, Optimization, and Gel Matching of 2-Dimensional Gel Electrophoresis," *J. Comp. Sci.* (2005) (*in review*).

Funding and Proposals

Al-Mubaid, H. "Literature Profiling: An Automatic Extraction of Information from Biomedical Literature," FRSF, UHCL, Dec. 2004, \$4,900.

Boetticher, G. "Applying a Distributed Support Vector Machine for Protein Spot Detection in 2-Dimensional Gel Electrophoresis," FRSF, UHCL, Summer 2004, \$5,000.