



# Improving the discovery potential of 2D PAGE proteomic projects by introducing a new image analysis system.

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## The problem

The application of two-dimensional electrophoresis (2DGE) technology to proteomics projects has often been disappointing in terms of actual discovery potential. One contributing factor is the erroneous image analysis of such projects where interesting protein regulations remain undiscovered due to sub-optimal analysis procedures.

### Common problems in 2D gel image analysis:

- ➔ Low discovery potential
- ➔ High false positive rate
- ➔ Personal bias in analysis
- ➔ Lab-to-lab variability
- ➔ Severe bottleneck

Using conventional software researchers are left to do 2D gel image analysis until it "looks good". As a control of the reliability of the results the mean-CV can be calculated. But recently, mean-CV has been shown not to correlate very well with either a high discovery potential or a low error rate in 2D gel image analysis.

Thus, a better way of performing 2D gel image analysis is needed that minimizes personal bias, eliminates lab-to-lab variability, optimizes discovery potential, and decreases error rate.

## Testing the solution: The study

In this study we investigated and compared the image analysis results of nine real-life 2DGE projects provided by different proteomics groups around the world. These projects have been previously analyzed using conventional software such as PDQuest, Decyder, Progenesis, Progenesis SameSpots, and ImageMaster.

These same projects were also analyzed using the Ludesi Image Analysis Center and the outcome of all 18 image analyses were measured in terms of...

- the number of true positives
- the false positive rate
- Combined Correctness

...which we believe to be indicators of a successful outcome of 2D gel image analysis.

The goal was to establish which system provides the greatest discovery potential for 2DGE projects based on these parameters.

## Summary

The evidence collected in this study strongly indicates that by employing the Ludesi system for 2DGE image analysis researchers are able to dramatically increase the discovery potential of their 2D gel proteomics projects.

Both the number of true positives as well as the ratio of false positives were improved in every project in this study.

By centralizing all image analysis to a professional image analysis center with standardized working procedures and well-defined quality metrics the issues of inter-lab and inter-person variability as well as personal bias are significantly minimized.

Although the success of 2DGE projects is dependent on optimizing all stages of the process from study design, to sample collection, to sample pre-fractionation, all the way to gel running procedures, we believe that the dramatic improvements in image analysis made possible by the Ludesi image analysis system are a crucial step towards unravelling the true potential of 2DGE technology.

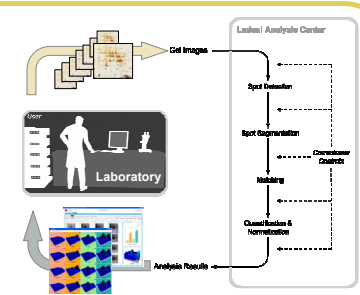
## Proposing a solution: The Ludesi system

We have devised a new system for analyzing 2D gel images that we believe addresses the before-mentioned problems.

This system comprises the following elements:

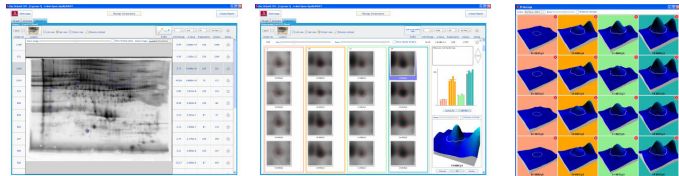
1.

A professional image analysis center with standardized working procedures and well-defined quality metrics using proprietary software that allows optimizing Combined Correctness.



2.

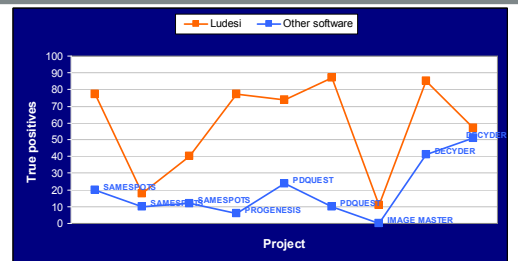
A powerful, user-friendly, and workflow-driven software that enables the uploading of images and the subsequent exploring of results. This facilitates a seamless integration of the system into the scientists 2D gel proteomics workflow.



## Testing the solution: The results

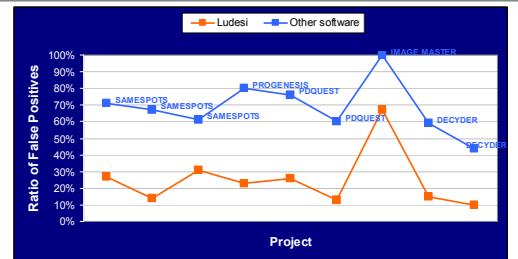
### Number of True Positives

The Ludesi Analysis Center increased the number of true positives **more than 4 times on average** compared to when the analysis was done using conventional software.



### Ratio of False Positives

The Ludesi Analysis Center reduced the false positive rate by **40% on average** compared to when the analysis was done using conventional software.



### Combined Correctness

The Ludesi Analysis Center on average **doubled** the Combined Correctness in the image analysis compared to when the analysis was done using conventional 2D gel image analysis software.

