

GELKEYS-2D: WEB-BASED LIMS FOR 2D GEL IMAGE STORAGE, MARKUP, AND SHARING

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Novelty:

An easy to deploy open-source LIMS management system for 2D-Gel data storage and analysis

Introduction:

Protein identification and quantitation by 2D-Gel and peptide mass fingerprint (PMF) typically represents the first pass proteomics characterization of samples due to the inherent simplicity, cost effectiveness, rapidity of the experiment and ease of application of the methodology to large numbers of samples typically handled by a core laboratory. Dissemination of such datasets including images, MS data, and metadata can be challenging in a core-centered environment. Here we present a multi-user open-source web-based tool for storing 2D gels and associated MS data. Novelties include a fast, simple user interface, the capability to link and download files in various formats, and extensibility for future expansion.

Methods:

The software was developed in Ruby using ActiveState Komodo 4.2, and uses the Ruby on Rails web application framework. The database schema has variable input for patient, sample, gel, and spot identification, and includes fields for tissue type, treatment condition, and preparation stage. Image manipulation is accomplished using the RMagick and ImageMagick libraries. All images and data are stored in a MySQL database, and hosted on an Apache 2.0 web server secured by SSL.

Results:

Test images and MS data files were obtained from ongoing projects at BUSM. The software provides an easy-to-use interface for storing and labeling spots on 2D gel images, and associating files containing the results from the MS analysis performed after in-gel digestion of the spots. For every uploaded image, a patient identifier is assigned, and spots can be labeled by clicking on a representation of the gel. For each labeled spot, multiple files can be stored. Saved images and files can be configured to restrict access to specific groups or users, allowing for collaboration prior to public release of the data. As the application is web-based, groups can share data wherever they can access the Internet. Images can be uploaded in a variety of formats, and can also be downloaded with or without markup. Support for multiple users and a robust security model allow for sharing of data between individuals and groups. The project is easily extendible as it uses the Rails web application framework; new models and controllers can be introduced through migrations. The software is considered open-source and the source code will be available for download. GelKeys-2D provides an alternative to printing out and marking up images of gels, while simultaneously saving and organizing data for presentation.

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