



South Bohemian  
Research Center  
of Aquaculture  
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of Hydrocenoses

**Name of software (Czech):** Expertomica Updopsi2dge Toolbox

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## Description

The software was originally developed for unsupervised probabilistic detection of protein spots in two-dimensional gel electrophoresis images as a toolbox for Matlab. 2DE gel images are processed for background thresholding as automatic evaluation of each pixel probability to decide if it is a meaningful signal. The method is based on evaluation of noise signal behavior. Presence of useful signal can be detected as a violation in the noise behavior. Background in 2DE gel should be considered as a special case of noise. The fitted distribution depends only on the type of electrophoresis separation. Processing of one 2.5-MB-pixel grayscale image takes approximately 150 s in Matlab. The output of our algorithm pinpoints protein spots with high probability (> 94%), and produces clear contours without blurred areas.

## Input Data

The toolbox processes the grayscale image loaded into Matlab workspace as image matrix using Matlab native function `imread` for common image files or mat matrix variable using Matlab native function `load`. Analysis supposes input grayscale images with darker background and lighter protein spots.

## Output

The OUTPUT of analysis (run of function `PROBFILTR.M` in Matlab environment) will contains in Matlab structure as following:

Ur: is original image (e.g `script_01.png` in report);

Ir: is temporary index vector;

t: is temporary index vector;

t\_old: is temporary index vector;

Urk: is image after row analysis (e.g `script_02.png` in report);;

cfP1: is probabilistic matrix of row filtration (e.g `script_03.png` in report);;

Us: is image after column analysis (e.g script\_04.png in report);  
Is: is temporary index vector;  
cfP2: is probabilistic matrix of whole analysis (e.g script\_05.png in report).

## Installation

You can download the last version of the software from <http://www.janurban.webs.com/2degels/index.htm>. Download UPDoPSi2DGE.zip and extract into selected directory. Then run your installed Matlab (R14 or higher with Statistics\_Toolbox required).

### The package contains:

Directory EXAMPLE\_DATASETS with two example grayscale images of 2DE gels as Matlab matrix `Im`.

Directory REPORTS with two reports of analysis done on example datasets.

File PROBFILTR.M as the main Matlab function for analysis of 2DE gels. It could be run in Matlab environment using command `OUTPUT = probfiltr(Im)`;

File SCRIPT.M do the same as the file PROBFILTR.M, however there is fixed load of one example.

Files COMPTH2.P, KILLNOISE2.P, SLIS.P, and FILTR.M are just necessary support function for the main analysis.

File READ.ME is an ascii text files user guide about the Expertomica Updopsi2dge toolbox.

## Requirements

**Operation system:** Windows XP, Vista (32 bit)

### Software:

installed Matlab (R14 or higher with Statistics\_Toolbox). MATLAB is a registered trademark of The MathWorks ([www.mathworks.com](http://www.mathworks.com)).

## Hardware

The software require at least 512 MB of memory (exact amount depend on the size of input files).

## Testing

Directory EXAMPLE\_DATASETS contains two example grayscale images of 2DE gels as Matlab matrix `Im`. Example could be load into Matlab environment using command `load('FILE_NAME')`;

Directory REPORTS contains two html reports of analysis done on example datasets. Reports were done running Matlab script SCRIPT.M, all steps are described in the reports.

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