ICA and PLS Modeling for functional analysis and drug sensitivity for DNA microarray signals

Kuejun Liao, Nilanjan Dasgupta, Simon M. Lin* and Lawrence Carin

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JET-Pro: Biomedical Signal Processing

Introduction

DNA microarray technique offers an ability to analyze the expression profile of a genome.

A pair of modeling schemes to recognize the functional identities of the known genes.

Partial Least Squares (PLS) approach identifies clusters of genes that work together in a common biological function.

Objective of PLS

PLS is a statistical method that extends linear regression.

Objective - Assuming the signals in y are independent, estimate A and dl from X.

ICA Model - the Mixing Equation

Where, subscripts:

Independent signal:

Squared cross correlation (SCC) of X:

ICA Results

Results: ICA results from the compact Rosetta dataset consisting of 150 selected genes covered in 50 conditions.

ICA Results contd......

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