Welcome to SPCALab v 0.1

Last updated: September 3, 2012

1 Introduction

SPCALab is a collection of MATLAB functions which implement various sparse principal component analysis algorithms. It also contains functions reproducing the figures and tables of related papers, e.g., [1, 2]. It is written in the spirit of reproducible research, see [3]. It includes all the routines of the previous ASPCALab v 0.2.

2 Installation

We assume that the user has installed Wavelab850 on his/her computer. (Otherwise, please do so before installing SPCALab.) If this is the case, please proceed as the following to install SPCALab:

1. Download `SPCALab.zip` and put it into some directory you would like to keep SPCALab for future use (referred to as `userdir` in the following);
2. Fire up MATLAB and *change the current directory to* `userdir`;
3. In MATLAB command line, successively type
   (a) `unzip SPCALab.zip;`
   (b) `cd SPCALab;`
   (c) `SPCAPath;`
4. If you want, you could now remove the `.zip` file.

The command `SPCAPath` will automatically install SPCALab for you. During its execution, you need to determine whether you want to modify your `startup.m` file so that MATLAB automatically loads SPCALab in future sessions. It is recommended that you do so.

3 Reproducing Paper Results

[1]: After SPCALab is successfully installed, all the figures in the paper could be reproduced by calling `JL09FigureX` (X is to be replaced by the actual Figure number, i.e., `JL09Figure1` for producing Fig.1 and so forth) and Table 1 could be reproduced by calling `JL09Table1`. Boaz Nadler's routine suggested in his discussion on [1] is called `CORR_PCA_Algorithm`. The routine for plotting the figure in the rejoinder is `JL09RejoinderFig`.

[2]: Figure 1 and 2 could be reproduced by calling `Ma11FigureX` (X = 1 or 2). Table 1 and 2 could be reproduced by calling `Ma11TableX` (X = 1 or 2).

4 Dependence

1. Most sparse PCA routines depend on the Wavelab850 toolbox, which is available at: `http://www-stat.stanford.edu/~wavelab/`;
2. The routine `SmoothPCA` depends on the MATLAB standard splines toolbox.

5 Contributors

Contributors to the current version of SPCALab include:

- Iain M. Johnstone (Stanford University),
- Arthur Y. Lu (Renaissance Technologies),
- Zongming Ma (University of Pennsylvania),
- Boaz Nadler (Weizmann Institute of Science),
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6 Feedback and Comments

If you have any comment or encounter any problem while using SPCALab, please write to Zongming Ma: zongming@wharton.upenn.edu.

7 Copyright and Warranty

For copyright and warranty information, see `COPYRIGHT.m` and `WARRANTY.m` in the Documentation folder or type `help('COPYRIGHT')` and `help('WARRANTY')` after you have installed SPCALab.

References

[1] Iain M. Johnstone and Arthur Y. Lu. On consistency and sparsity for principal components analysis in high dimensions (with discussion). *To appear in JASA*, 2009.

[2] Zongming Ma. Sparse principal component analysis and iterative thresholding. *Revised manuscript*, 2012.

[3] David L. Donoho, Arian Maleki, Inam Ur Rahman, Morteza Shahram, Victoria Stodden. Reproducible Research in Computational Harmonic Analysis. *Computing in Science and Engineering*, vol. 11, no. 1, pp. 8-18, 2009.