Setting up our Matlab optimization environment

September 5, 2018

1. Install Matlab (version 7 (R2014) or later is necessary)
2. Install Matpower version 6.0
3. Install YALMIP
4. Install MOSEK version 8.0

1 Installing Matlab (v7 or later)

You should make sure you have Matlab version 7 (R2014) or later. You can download Matlab from `downloads.cc.dtu.dk`, following the instructions outlined there.

Please also make sure you have installed the Matlab Optimization Toolbox. A way to check this is from the command prompt:

```
v=ver
any(strcmp('Optimization Toolbox', {v.Name}))
```

If `ans = 1`, then it is already installed. If not, then you have to install it from the tab 'APPS'→'Get More Apps'.

1.1 Common Problems when Installing Matlab

- `Error finding installer class` : You have probably placed the installer file in a path where non-ASCII characters are present. Such characters are, e.g. . !@#$&^?, but **also** è, é, ë, à, ä, á, ò, ö, ó, ù, ü,

ú. Make sure you do not have these charaacters in the path where you have installed Matlab. If in doubt, please install Matlab under 'C:'. More info here: `https://bit.ly/2Q2hD1m`

2 Installing Matpower v6.0

Download Matpower from `http://www.pserc.cornell.edu/matpower/`

See the last two pages of this document, extracted from R. D. Zimmermann, C. E. Murillo-Sanchez, *Matpower 6.0 User's Manual*, PSERC, 2016, for instructions on how to install Matpower.

3 Installing YALMIP

Download YALMIP from `https://yalmip.github.io/download/`

See instructions here: `https://yalmip.github.io/tutorial/installation/` about how to install YALMIP, or see below (taken from the readme.txt file inside the installation):

```
****************************************
6 steps towards a successful installation
****************************************

1)Remove any old version of YALMIP

2) unzip yalmip.zip. This should create the structure

/yalmip
/yalmip/@sdpvar
/yalmip/extras
/yalmip/demos
/yalmip/solvers
/yalmip/modules
/yalmip/operators

3) Put the following paths in your MATLAB path
```

```
/yalmip
/yalmip/extras
/yalmip/demos
/yalmip/solvers
/yalmip/modules
/yalmip/modules/parametric
/yalmip/modules/moment
/yalmip/modules/global
/yalmip/modules/robust
/yalmip/modules/sos
/yalmip/operators

Most easily done either via the gui or addpath(genpath('yourlocation/yalmip'))

4) Make sure to have the desired solvers in your path.

5) Restart Matlab, or at least type "clear classes".

6) Run yalmiptest.m and everything should work (as long as you have the
necessary solvers).


Learn more at
http://users.isy.liu.se/johanl/yalmip

Forum
https://groups.google.com/forum/?fromgroups#!forum/yalmip

****************************************
Comments and bug-reports are higly appreciated.
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```

4 Installing MOSEK

Download MOSEK from `https://www.mosek.com/downloads/` and install it.

Request a personal academic license from `https://www.mosek.com/products/academic-licenses/`. Make sure you use your DTU email.

Place the license file in a mosek folder, following the instructions in the email. Please note that you have to create a new mosek folder to which you will copy the license file. This folder must be in your user home directory.

Add the path of the Mosek installation (not of the license file!) in the Matlab path. Matlab: Set Path → Add with Subfolders → "Mosek installation path", i.e. probably `C:\Program Files\Mosek`

Run `mosekdiag` in the Matlab command prompt, to make sure Mosek has been installed correctly.

Run `yalmiptest` in the Matlab command prompt. Now yalmip must be using the mosek solvers for LP, QP, SOCP, and SDP problems.

Note: *for some computers,* you might need to add the mosek toolbox folder and the mosek license folder in the Matlab path.

4.1 For MacOS

If after running `mosekdiag` you get the error 'Warning: MOSEK Fusion is not configured correctly; check that mosek.jar is added to the javaclasspath.', then you need to run the following command in the Matlab prompt: `javaaddpath('/full/path/to/mosekmatlab.jar');`. In my computer, it is for example under `javaaddpath('/Users/Spyros/Documents/MATLAB/mosek/8/ tools/platform/osx64x86/bin/mosekmatlab.jar');`

5 Instructions on installing Matpower

See the following two pages, extracted from R. D. Zimmermann, C. E. Murillo-Sanchez, *Matpower 6.0 User's Manual*, PSERC, 2016, for instructions on how to install Matpower.

2.2 Installation

Installation and use of MATPOWER requires familiarity with the basic operation of MATLAB, including setting up your MATLAB path.

Step 1: Follow the download instructions on the MATPOWER home page[7]. You should end up with a file named `matpowerXXX.zip`, where `XXX` depends on the version of MATPOWER.

Step 2: Unzip the downloaded file. Move the resulting `matpowerXXX` directory to the location of your choice.[8] These files should not need to be modified, so it is recommended that they be kept separate from your own code. We will use <*MATPOWER*> to denote the path to this directory.

Step 3: Add the following directories to your MATLAB path:

- <*MATPOWER*> – core MATPOWER functions
- <*MATPOWER*>`/t` – test scripts for MATPOWER
- <*MATPOWER*>`/most-` core MOST functions
- <*MATPOWER*>`/most/t` – test scripts for MOST
- (optional) sub-directories of <*MATPOWER*>`/extras` – additional functionality and contributed code (see Appendix E for details).

Step 4: At the MATLAB prompt, type `test_matpower` to run the test suite and verify that MATPOWER is properly installed and functioning.[9] The result should resemble the following, possibly including extra tests, depending on the availablility of optional packages, solvers and extras.

[7] http://www.pserc.cornell.edu/matpower/

[8] Do *not* place MATPOWER's files in a directory named `'matlab'` or `'optim'` (both case-insensitive), as these can cause MATLAB's built-in `ver` command to behave strangely in ways that affect MATPOWER.

[9] The MOST test suite is run separately by typing `test_most`. See the MOST User's Manual for details.

```
>> test_matpower
t_test_fcns.............ok
t_nested_struct_copy....ok
t_feval_w_path..........ok
t_mpoption..............ok
t_loadcase..............ok
t_ext2int2ext...........ok
t_jacobian..............ok
t_hessian...............ok
t_margcost..............ok
t_totcost...............ok
t_modcost...............ok
t_hasPQcap..............ok
t_mplinsolve............ok (2 of 4 skipped)
t_mips..................ok
t_qps_matpower..........ok (288 of 360 skipped)
t_miqps_matpower........ok (240 of 240 skipped)
t_pf....................ok
t_cpf...................ok
t_islands...............ok
t_opf_model.............ok
t_opf_mips..............ok (125 of 250 skipped)
t_opf_mips_sc...........ok (125 of 250 skipped)
t_opf_dc_mips...........ok
t_opf_dc_mips_sc........ok
t_opf_userfcns..........ok
t_opf_softlims..........ok
t_runopf_w_res..........ok
t_dcline................ok
t_get_losses............ok
t_makePTDF..............ok
t_makeLODF..............ok
t_printpf...............ok
t_vdep_load.............ok
t_total_load............ok
t_scale_load............ok
t_apply_changes.........ok
t_psse..................ok
t_off2case..............ok
t_auction_mips..........ok
t_runmarket.............ok
All tests successful (4830 passed, 780 skipped of 5610)
Elapsed time 17.56 seconds.
```