

This is the README file for using PRIMA under MATLAB.

Prerequisites

PRIMA supports MATLAB R2018a and later releases. To use PRIMA, you need first set up the MEX of your MATLAB so that it can compile Fortran (N.B.: the setup of MEX is a pure MATLAB usage problem and it has nothing to do with PRIMA).

To see whether your MEX is ready, run the following code in MATLAB:

```
mex('-setup', '-v', 'fortran'); mex('-v', fullfile(matlabroot, 'extern', 'examples', 'refbo
```

If this completes successfully, then your MEX is ready. Otherwise, it is not, and you may try the `setup_mex` package at

https://github.com/equipez/setup_mex

It will help you to set MEX up on Windows or macOS (the setup of MEX is trivial on Linux). In case `setup_mex` does not work, you need to consult a local MATLAB expert or the technical support of MathWorks about “how to set up MEX”, which is **not** part of PDFO.

Installation

Download and decompress the source code package of PRIMA, or clone it from GitHub or Gitee. You will obtain a folder containing `setup.m`. Place this folder at the location where you want PRIMA to be installed. In MATLAB, change the directory to this folder, and execute the following command:

```
setup
```

If this command runs successfully, PRIMA is installed. You may execute the following command in MATLAB to verify the installation:

```
testprima
```

Usage

PRIMA provides a MATLAB function `prima`, which can solve general constrained or unconstrained optimization problems without using derivatives.

The `prima` function can automatically identify the type of your problem and then call one of Powell’s solvers, namely COBYLA, UOBYQA, NEWUOA, BOBYQA, and LINCOA. The user can also specify the solver by setting the `solver` field of the options passed to `prima`.

The `prima` function is designed to be compatible with the `fmincon` function available in the Optimization Toolbox of MATLAB. You can call `prima` in exactly the same way as calling `fmincon`.

For detailed syntax of `prima`, use the standard `help` command of MATLAB:

`help prima`

Uninstall

PRIMA can be uninstalled using the `setup.m` script by executing the following command in MATLAB:

`setup uninstall`

References

- [1] M. J. D. Powell, A direct search optimization method that models the objective and constraint functions by linear interpolation, In *Advances in Optimization and Numerical Analysis*, eds. S. Gomez and J. P. Hennart, pages 51–67, Springer Verlag, Dordrecht, Netherlands, 1994
- [2] M. J. D. Powell, UOBYQA: unconstrained optimization by quadratic approximation, *Math. Program.*, 92(B):555–582, 2002
- [3] M. J. D. Powell, The NEWUOA software for unconstrained optimization without derivatives, In *Large-Scale Nonlinear Optimization*, eds. G. Di Pillo and M. Roma, pages 255–297, Springer, New York, US, 2006
- [4] M. J. D. Powell, The BOBYQA algorithm for bound constrained optimization without derivatives, Technical Report DAMTP 2009/NA06, Department of Applied Mathematics and Theoretical Physics, Cambridge University, Cambridge, UK, 2009

Remark: LINCOA seeks the least value of a nonlinear function subject to linear inequality constraints without using derivatives of the objective function. Powell did not publish a paper to introduce the algorithm.