INSTALL INSTRUCTIONS for *NumOpt* v1.12

These instructions describe how to build and install the artifact *NumOpt* v1.12, a numerical optimization framework from Software Engineering Group of Nanjing University.

The artifact is available at: http://seg.nju.edu.cn/eytang/numopt/, which is mainly written in Python 3.6, and fully tested and evaluated under a brand new Ubuntu 16.04.5-LTS-AMD64 Desktop System. We strongly recommend reviewers use the same system and environment. The installer is at http://releases.ubuntu.com/16.04/ubuntu-16.04.5-desktop-amd64.iso.

Installation Steps

1. We assume a brand new AMDx64 Linux system (such as the Ubuntu 16.04.5-LTS-AMD64.)

2. Install required packages with the ***root*** account in Ubuntu:

```
apt-get install build-essential
apt-get install m4
apt-get install autoconf
apt-get install libtool
add-apt-repository ppa:jonathonf/python-3.6
apt-get update
apt-get install python3.6
apt-get install curl
curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py
python3.6 get-pip.py
pip3 install antlr4-python3-runtime==4.7.1
pip3 install sympy==1.1.1
apt-get install clang
```

3. Download *NumOpt* v1.12:

```
mkdir ~/NumOpt
cd ~/NumOpt
wget -c http://seg.nju.edu.cn/eytang/numopt/numopt_v1.12.tar.gz
```

4. Build and Install:

```
cd ~/NumOpt
tar -zxvf numopt_v1.12.tar.gz
cd ~/NumOpt/NumoptFramework
bash make.sh
```

Executing `make.sh` needs less than 20 minutes on an Intel 3.0GHz workstation with 8GB memory. The script will create libraries and binaries. Then users can reproduce our results of the

28 classic benchmarks by running our pre-composed scripts: `bash bench_eval.sh`. `bench_eval.sh` optimizes the benchmarks by executing `main.py`, which is a python script that invokes the `optimize` function to complete the numerical optimization. Users can also customized their optimization by invoking the `optimize` function directly. After optimization, the optimized program is located by default at `Binary/OptimizedCode/`, and the corresponding numerical error is evaluated and stored by default in `Result/`.