Homework_1: Linear-search Steepest Gradient Descent

1. Requirement

- The code is written by python 3.8.
- Two packages should be installed in advance: numpy==1.21.2, matplotlib==3.4.3
- The code has been tested in Ubuntu 20.04

2. Run

- You need firstly find the code under the dir `/code/optimize.py`
- You can see the help by input the following code in your Terminal.

```
python optimize.py -h
```

- To run the code, you need input one parameter. The parameter explanation is given bellow.

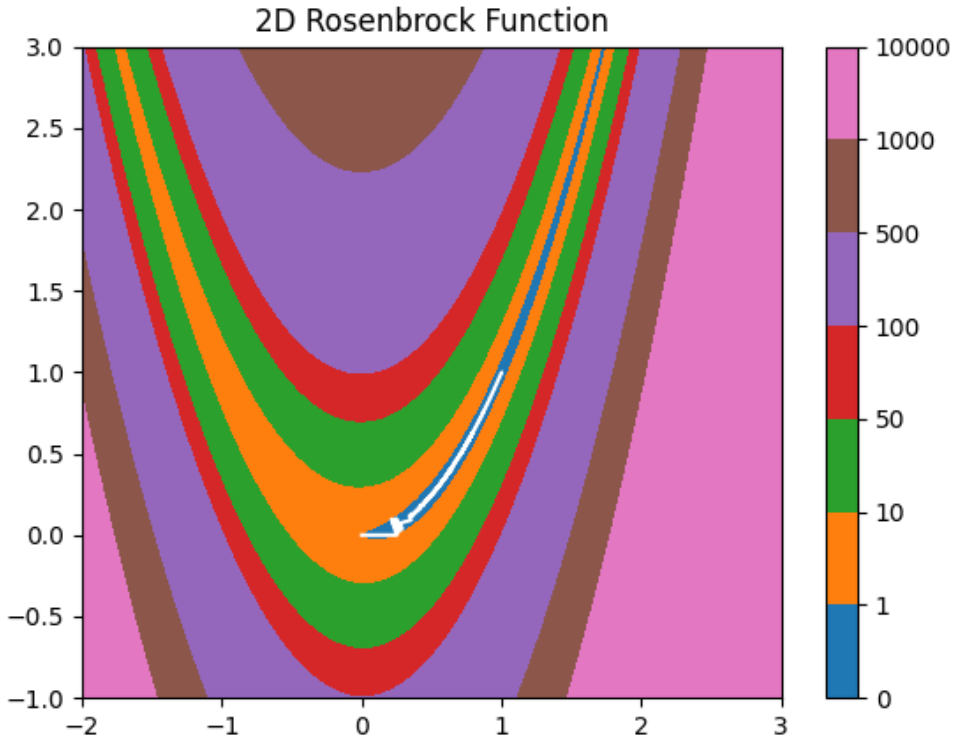
```
Linear-search Steepest Gradient Descent

positional arguments:
  dimension    Dimension of Rosenbrock Function, type=int
```

- You can run the code as follow

```
python optimize.py 10
```

3. Result

- The program will firstly show the visualization of a 2D Rosenbrock function and its optimization result.
- The program will secondly print the information of the optimization algorithm for a N dimension Rosenbrock function.
- An example is shown bellow which is the result of `python optimize.py 10`




```
********** Linear-search Steepest Gradient Descent **********
constant:  0.001
dimension of Rosenbrock function:  2
start position:  [0. 0.]
iteration number:  5750
duration:  0.5583736896514893
final position:  [0.99876871 0.9975366 ]
final gradient:  [-0.00153141 -0.00046616]
minimum:  1.5166190749349858e-06
********** Linear-search Steepest Gradient Descent **********
constant:  0.001
dimension of Rosenbrock function:  10
start position:  [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
iteration number:  5750
duration:  1.2914996147155762
final position:  [0.99876871 0.9975366  0.99876871 0.9975366  0.99876871 0.9975366
 0.99876871 0.9975366  0.99876871 0.9975366 ]
final gradient:  [-0.00153141 -0.00046616 -0.00153141 -0.00046616 -0.00153141 -0.00046616
 -0.00153141 -0.00046616 -0.00153141 -0.00046616]
minimum:  7.583095374674929e-06
```