
系统开发工具基础实验报告



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1 实验练习内容

1.1 命令行环境

学会使用shell命令行使用一些方法改善自己的工作流

学习如何同时执行多个不同的进程并追踪它们的状态、如何停止或暂停某个进程以及如

何使进程在后台运行

学会通过定义别名来提高自己的shell工作效率

1.2 Python基本运用和视觉应用

学会python基本语法和应用

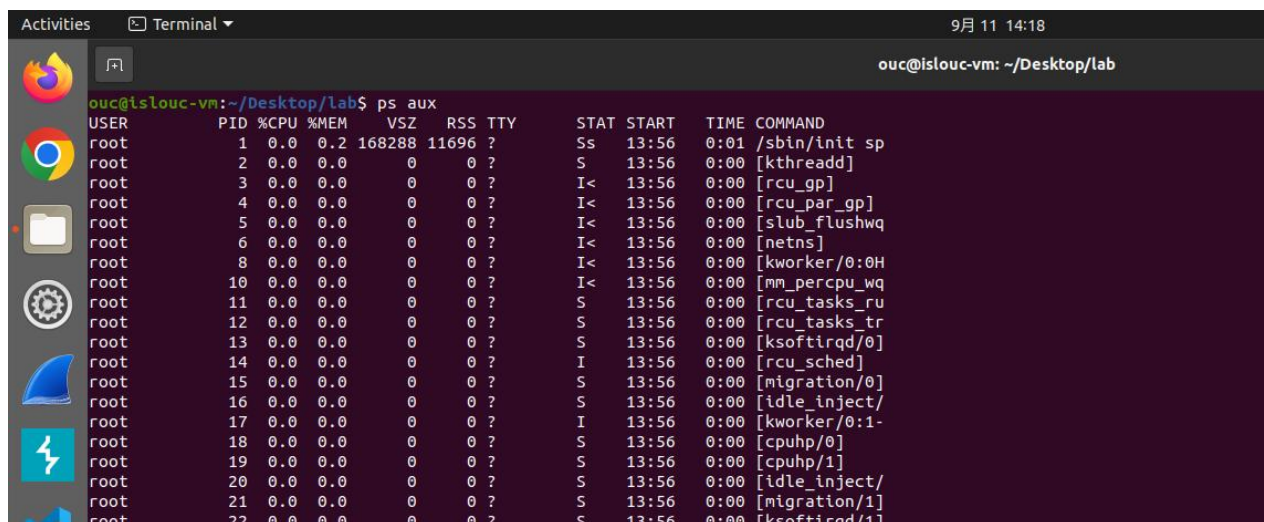
学会python视觉的应用, 学会基本的图像处理操作

2 实验结果展示

2.1 命令行环境

1. 查看当前运行的进程

Ps aux



```
ouc@islouc-vm: ~/Desktop/lab$ ps aux
USER          PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root             1  0.0  0.2 168288 11696 ?        Ss   13:56   0:01 /sbin/init sp
root             2  0.0  0.0      0     0 ?        S    13:56   0:00 [kthreadd]
root             3  0.0  0.0      0     0 ?        I<   13:56   0:00 [rcu_gp]
root             4  0.0  0.0      0     0 ?        I<   13:56   0:00 [rcu_par_gp]
root             5  0.0  0.0      0     0 ?        I<   13:56   0:00 [slub_flushwq]
root             6  0.0  0.0      0     0 ?        I<   13:56   0:00 [netns]
root             8  0.0  0.0      0     0 ?        I<   13:56   0:00 [kworker/0:0H]
root            10  0.0  0.0      0     0 ?        I<   13:56   0:00 [mm_percpu_wq]
root            11  0.0  0.0      0     0 ?        S    13:56   0:00 [rcu_tasks_ru]
root            12  0.0  0.0      0     0 ?        S    13:56   0:00 [rcu_tasks_tr]
root            13  0.0  0.0      0     0 ?        S    13:56   0:00 [ksoftirqd/0]
root            14  0.0  0.0      0     0 ?        I    13:56   0:00 [rcu_sched]
root            15  0.0  0.0      0     0 ?        S    13:56   0:00 [migration/0]
root            16  0.0  0.0      0     0 ?        S    13:56   0:00 [idle_inject/]
root            17  0.0  0.0      0     0 ?        I    13:56   0:00 [kworker/0:1-]
root            18  0.0  0.0      0     0 ?        S    13:56   0:00 [cpuhp/0]
root            19  0.0  0.0      0     0 ?        S    13:56   0:00 [cpuhp/1]
root            20  0.0  0.0      0     0 ?        S    13:56   0:00 [idle_inject/]
root            21  0.0  0.0      0     0 ?        S    13:56   0:00 [migration/1]
root            22  0.0  0.0      0     0 ?        S    13:56   0:00 [ksoftirqd/1]
```

2. 结束一个进程

Kill [PID]

若无法中止可用kill -9 [PID]强制关闭

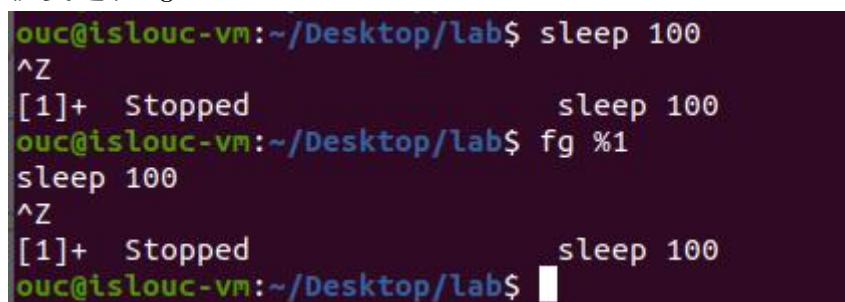


```
ouc@islouc-vm: ~/Desktop/lab$ kill -9 2911
ouc@islouc-vm: ~/Desktop/lab$
```

3. 暂停和恢复后台进程

暂停进程Ctrl-z

恢复进程fg %1



```
ouc@islouc-vm: ~/Desktop/lab$ sleep 100
^Z
[1]+  Stopped                  sleep 100
ouc@islouc-vm: ~/Desktop/lab$ fg %1
sleep 100
^Z
[1]+  Stopped                  sleep 100
ouc@islouc-vm: ~/Desktop/lab$
```

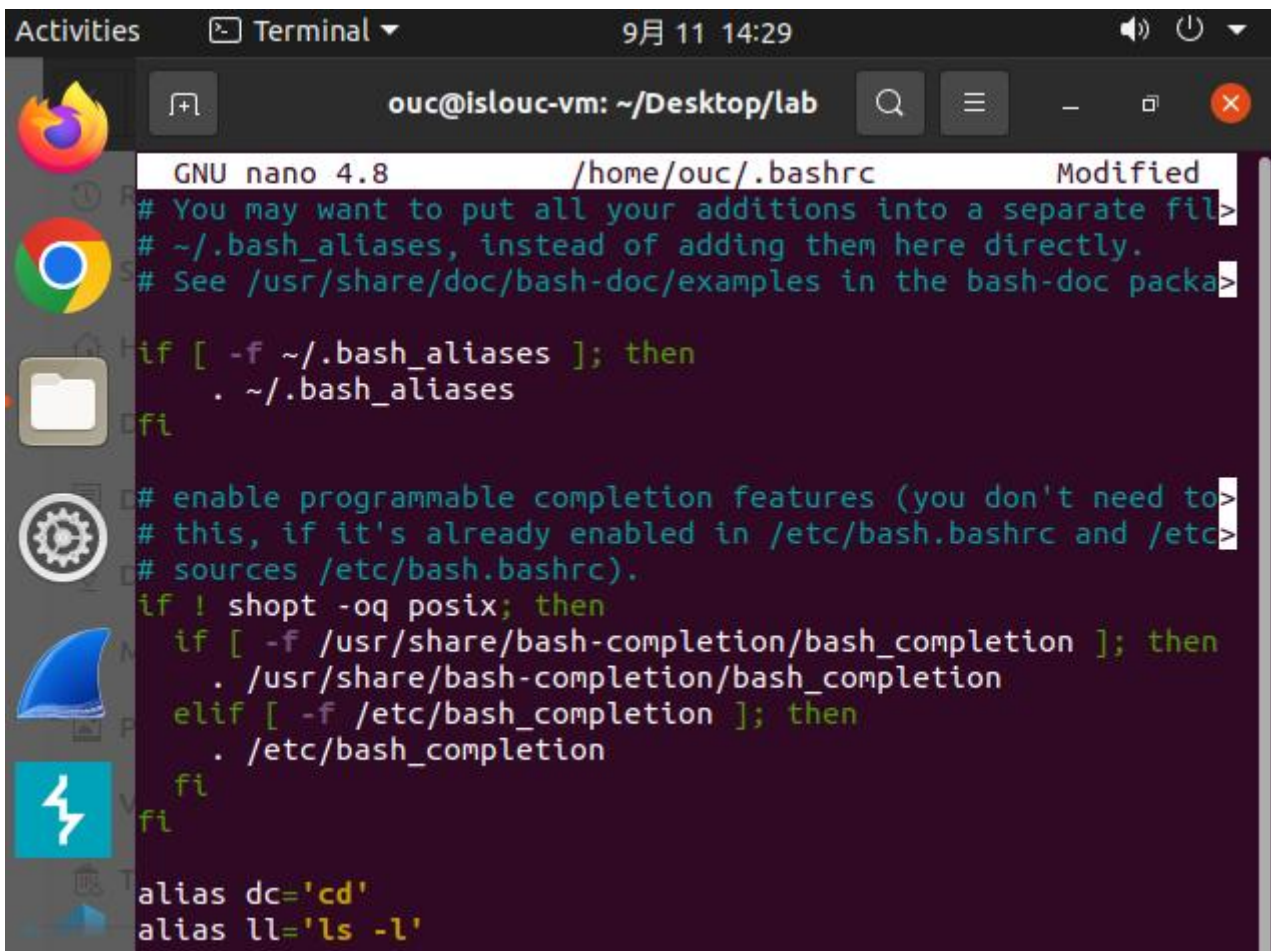
4. 设置别名

Alias ll='ls -l'

```
ouc@islouc-vm:~/Desktop/lab$ alias ll='ls -l'
ouc@islouc-vm:~/Desktop/lab$ ll
total 24
-rw-rw-r-- 1 ouc ouc 22 9月 5 20:01 char.txt
-rw-rw-r-- 1 ouc ouc 98 9月 5 19:38 count.sh
-rwxrwxr-x 1 ouc ouc 315 9月 6 09:28 marco.sh
-rw-rw-r-- 1 ouc ouc 73 9月 5 20:46 test2.txt
-rw-rw-r-- 1 ouc ouc 73 9月 5 20:40 test.txt
-rwxrwxr-x 1 ouc ouc 197 9月 6 09:31 times.sh
ouc@islouc-vm:~/Desktop/lab$ ls -l
total 24
-rw-rw-r-- 1 ouc ouc 22 9月 5 20:01 char.txt
-rw-rw-r-- 1 ouc ouc 98 9月 5 19:38 count.sh
-rwxrwxr-x 1 ouc ouc 315 9月 6 09:28 marco.sh
-rw-rw-r-- 1 ouc ouc 73 9月 5 20:46 test2.txt
-rw-rw-r-- 1 ouc ouc 73 9月 5 20:40 test.txt
-rwxrwxr-x 1 ouc ouc 197 9月 6 09:31 times.sh
ouc@islouc-vm:~/Desktop/lab$
```

5. 查看和编辑别名

nano ~/.bashrc



```
Activities Terminal 9月 11 14:29
ouc@islouc-vm: ~/Desktop/lab
GNU nano 4.8 /home/ouc/.bashrc Modified
# You may want to put all your additions into a separate file>
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc packa>
if [ -f ~/.bash_aliases ]; then
. ~/.bash_aliases
fi
# enable programmable completion features (you don't need to>
# this, if it's already enabled in /etc/bash.bashrc and /etc>
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
if [ -f /usr/share/bash-completion/bash_completion ]; then
. /usr/share/bash-completion/bash_completion
elif [ -f /etc/bash_completion ]; then
. /etc/bash_completion
fi
fi
alias dc='cd'
alias ll='ls -l'
```

6. 使用pgrep来查找pid并使用pkill结束进程而不需要手动输入pid

先使用ctrl-z暂停后bg继续, 后使用pkill来直接结束进程而不需要输入pid

```
ouc@islouc-vm:~/Desktop/lab$ sleep 10000
^Z
[3]+  Stopped                  sleep 10000
ouc@islouc-vm:~/Desktop/lab$ bg
[3]+ sleep 10000 &
ouc@islouc-vm:~/Desktop/lab$ pgrep sleep
3444
3816
ouc@islouc-vm:~/Desktop/lab$ pkill -f sleep
[3] Terminated                sleep 10000
ouc@islouc-vm:~/Desktop/lab$
```

7. 如果您希望某个进程结束后再开始另外一个进程，应该如何实现呢？在这个练习中，我们使用`sleep 60 &`作为先执行的程序。一种方法是使用`wait`命令。尝试启动这个休眠命令，然后待其结束后再执行`ls`命令。

先启动60秒的休眠

后使用`wait`命令等待进程结束，然后输入`ls`完成任务

```
ouc@islouc-vm:~/Desktop/lab$ sleep 60 &
[9] 3894
[6] Done                  sleep 60
[8] Done                  sleep 60
ouc@islouc-vm:~/Desktop/lab$ jobs -l
[1] 3444 Stopped          sleep 100
[2]- 3463 Stopped (signal) nano ~/.bashrc
[7]+ 3886 Stopped          sleep 60
[9] 3894 Running           sleep 60 &
ouc@islouc-vm:~/Desktop/lab$ wait %9
ls
[9] Done                  sleep 60
ouc@islouc-vm:~/Desktop/lab$ ls
char.txt  count.sh  marco.sh  test2.txt  test.txt  times.sh
```

8. 创建新的 tmux 会话

`tmux new -s new_tmux`

```
ouc@islouc-vm:~/Desktop/lab$ tmux new -s new_tmux

ouc@islouc-vm:~/Desktop/lab$
```

[new tmux] 0:bash* "islouc-vm" 15:48 11-9月-24

9. 查看是否已经存在 SSH 密钥对

```
~/.ssh/
```

```
ouc@islouc-vm:~/Desktop$ ~/.ssh/
bash: /home/ouc/.ssh/: Is a directory
```

10. 使用 ssh-keygen 命令可以生成一对密钥

```
ouc@islouc-vm:~/Desktop$ ssh-keygen -o -a 100 -t ed25519 -f ~/.ssh/id_ed25519
Generating public/private ed25519 key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ouc/.ssh/id_ed25519
Your public key has been saved in /home/ouc/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:YQakusaBvztwzvaRpLxwV0z5mSpntd/A1HCvB2Uxeu0 ouc@islouc-vm
The key's randomart image is:
+--[ED25519 256]--+
|      .o      o  |
|      . o      . + |
|      . o + . o + . |
|      . . o + + + = . |
|      . o . o S . o . E |
|      . + . = o o + o |
|      . = 0 = + . o . . |
|      . + + = . o . . |
|      . + + . . . . |
+-----[SHA256]-----+
ouc@islouc-vm:~/Desktop$
```

2.2 Python基本运用和视觉应用

1. 安装Image

```
PS F:\py> pip install Image
Collecting Image
  Downloading image-1.5.33.tar.gz (15 kB)
  Installing build dependencies ... done
  Getting requirements to build wheel ... done
  Preparing metadata (pyproject.toml) ... done
Requirement already satisfied: pillow in c:\users\lenovo\appdata\local\programs\python\python311\lib\site-packages (from Image) (10.2.4)
Collecting django (from Image)
  Downloading Django-5.1.1-py3-none-any.whl.metadata (4.2 kB)
Requirement already satisfied: six in c:\users\lenovo\appdata\local\programs\python\python311\lib\site-packages (from Image) (1.16.0)
Collecting asgiref<4,>=3.8.1 (from django->Image)
  Downloading asgiref-3.8.1-py3-none-any.whl.metadata (9.3 kB)
Collecting sqlparse>=0.3.1 (from django->Image)
  Downloading sqlparse-0.5.1-py3-none-any.whl.metadata (3.9 kB)
Collecting tzdata (from django->Image)
  Downloading tzdata-2024.1-py2.py3-none-any.whl.metadata (1.4 kB)
Downloading Django-5.1.1-py3-none-any.whl (8.2 MB)
 8.2/8.2 MB 9.8 MB/s eta 0:00:00
Downloading asgiref-3.8.1-py3-none-any.whl (23 kB)
```

2. 导入图像

```
py > test.py > ...
1  from PIL import Image
2  pil_im = Image.open('empire.jpg')
```

3. 创建缩略图

使用thumbnail函数, 参数为大小比例

```
py > test.py > ...  
1  from PIL import Image  
2  pil_im = Image.open('empire.jpg').convert('L')  
3  pil_im.save('empire_gray.jpg')  
4  pil_im.thumbnail((128,128))  
5  pil_im.save('empire_gray_small.jpg')
```



4. 调整尺寸和旋转

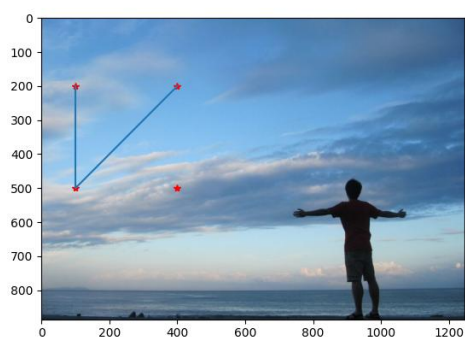
使用resize()方法和rotate()方法

```
pil_im.resize((128,128)).rotate(45)
```

5. 图的绘制

```
im = array(Image.open('test.jpg'))  
imshow(im)  
x = [100,100,400,400]  
y = [200,500,200,500]  
plot(x,y, 'r*') #绘制点  
plot(x[:3],y[:3])#绘制直线  
show()
```

Figure 1



6. 合并两个字典

```
py > test.py > ...
1 dict1 = {'name': 'Alice', 'age': 25}
2 dict2 = {'email': 'alice@example.com'}
3
4 # 使用 update() 方法合并字典
5 dict1.update(dict2)
6 print(dict1) # 输出 {'name': 'Alice', 'age': 25, 'email': 'alice@example.com'}
7

问题 输出 调试控制台 终端 端口

PS E:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe e:/py/test.py
{'name': 'Alice', 'age': 25, 'email': 'alice@example.com'}
PS E:\py>
```

7. python异常处理

使用try,except

```
py > test.py > ...
1 try:
2     number = int(input("Enter a number: "))
3     result = 10 / number
4     print(result)
5 except ZeroDivisionError:
6     print("不能除以零.")
7 except ValueError:
8     print("输入的不是数字.")

问题 输出 调试控制台 终端 端口

PS E:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe e:/py/test.py
Enter a number: 0
不能除以零.
PS E:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe e:/py/test.py
Enter a number: a
输入的不是数字.
PS E:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe e:/py/test.py
Enter a number: 10
1.0
PS E:\py> []
```

8. python字符串切片

```
py > test.py > ...
1 s = "Hello, World!"
2 print(s[7:-1]) #输出字符串第七个到倒数第一个的字符

问题 输出 调试控制台 终端 端口

PS E:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe e:/py/test.py
World
PS E:\py> []
```


9. 图像数组表示

```

19 show()
20
21 im = array(Image.open('test.jpg'))
22 print (im.shape, im.dtype)
23 im = array(Image.open('test.jpg').convert('L'),'f')
24 print (im.shape, im.dtype)

```

问题 输出 调试控制台 终端 端口

yield from self._plot_args(
 ^^^^^^^^^^^^^^^^^^^^^^^
 File "C:\Users\LENOVO\AppData\Local\Programs\Python\Python311\Lib\site-packages\matplotlib\axes_base.py", line 499, in _plot_args
 raise ValueError(f"x and y must have same first dimension, but "

ValueError: x and y must have same first dimension, but have shapes (1,) and (2,)

PS F:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe f:/py/图像/test.py
 PS F:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe f:/py/图像/test.py
 PS F:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe f:/py/图像/test.py
 PS F:\py> & C:/Users/LENOVO/AppData/Local/Programs/Python/Python311/python.exe f:/py/图像/test.py
 (886, 1246, 3) uint8
 (886, 1246) float32
 PS F:\py>

每行的第一个元组表示图像数组的大小（行、列、颜色通道），紧接着的字符串表示数组元素的数据类型

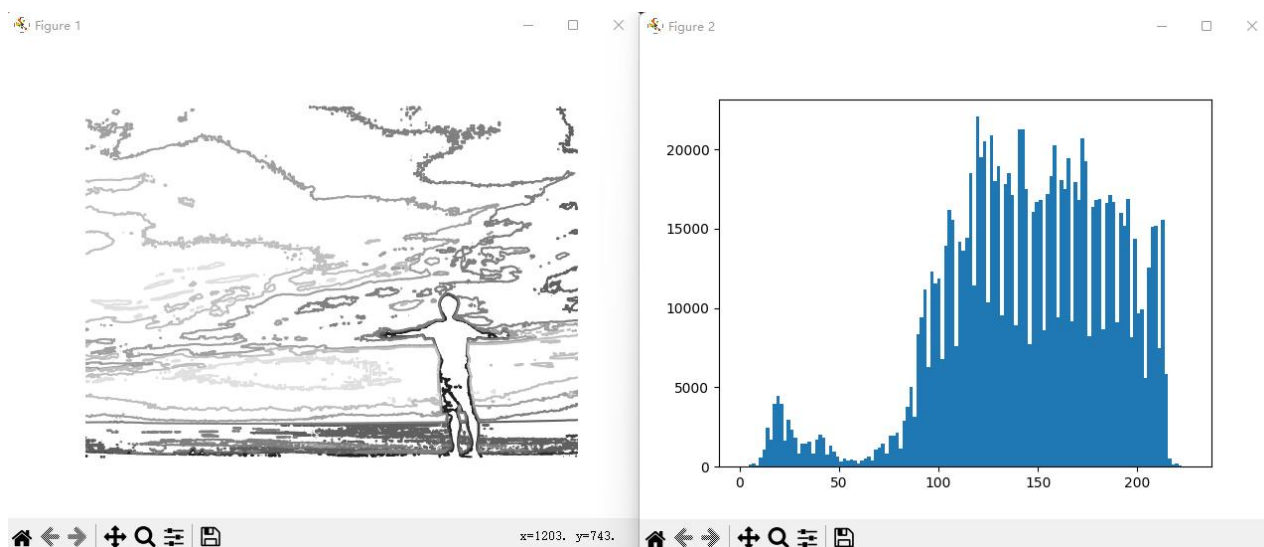
10. 图像轮廓和直方图

```

im = array(Image.open('test.jpg').convert('L'))
# 新建一个图像
figure()
# 不使用颜色信息
gray()
# 在原点的左上角显示轮廓图像
contour(im, origin='image')
axis('equal')
axis('off')

figure()
hist(im.flatten(),128)
show()

```



3 实验感悟

通过学习使用命令行环境配置, 了解更多关于命令行的技巧, 如别名, 暂停查看进程, 自行配置文件等, 这无疑提高了工作的效率, 如设置别名可以减少长指令的多次输入的时间, 也了解更多使用的技巧和工具, 让我的知识面和能力得到进一步的提升

再而, 通过学习python, 了解到了python编程语言的强大之处, 能够更高效的处理数据, 其次, python的拓展库给我们提供了更多简单的方法来完成任务, 进一步提高了工作效率

Python视觉应用的学习也让我了解到了计算机视觉方面的众多知识, 丰富了我的计算机知识体系, 也学会了更多的python使用技巧和拓展应用, 让我受益匪浅

Github地址:<https://github.com/ffffz1/labreport.git>