



黄冈师范学院  
HUANGGANG NORMAL UNIVERSITY

# 人工智能与机器学习

Artificial Intelligence and Machine Learning

章节：实验一 开发环境搭建与人脸检测识别

教师：刘重

学院：计算机学院

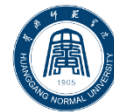
厚德 博学 力行 致远



黄冈师范学院  
HUANGGANG NORMAL UNIVERSITY

# 实验一：开发环境搭建与人脸检测识别

>>实验一 <<



## 一、实验目的

- 1) 掌握Anaconda的安装、配置方法
- 2) 掌握sklearn和OpenCV的安装方法
- 3) 了解检测摄像头范围内的人脸识别原理与编程

- 1) 自行上网查阅相关资料，学习Anaconda的下载与安装，学习图形化管理与命令行管理的概念，学习Anaconda里环境的概念，学习Anaconda下载源的更换，完成下载Anaconda3-2021.11-Windows-x86\_64.exe文件并安装，完成更换清华大学下载源，完成新建环境“ml”。
- 2) 自行上网查阅相关资料，学习在Anaconda下安装库，完成在ml环境中安装Python（3.9.7）、Sklearn（0.24.2）、OpenCV（4.5.5.64）等。
- 3) 编写代码实现检测摄像头范围内的人脸

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**2 检测摄像头范围内的人脸**





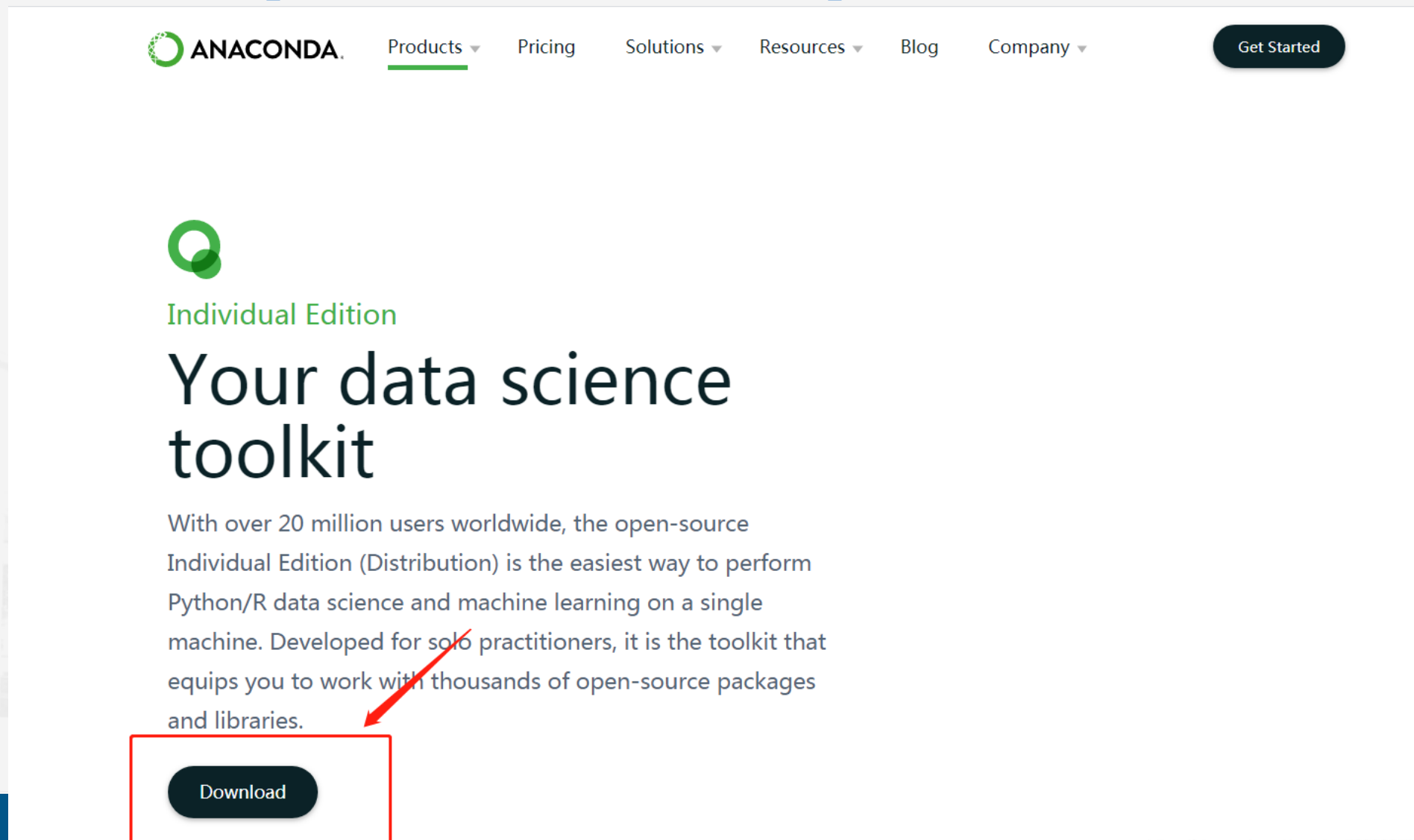
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# Anaconda的安装

- 一、Anaconda的官网下载地址
- 二、Anaconda安装步骤
- 三、配置环境
- 四、检验是否安装成功
- 五、Sklearn库的安装
- 六、OpenCV库的安装

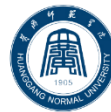
## 一、Anaconda的官网下载地址

- 下载地址：<https://www.anaconda.com/products/distribution>





## 2.选择自己电脑合适的版本进行下载



# Anaconda Installers

### Windows

#### Python 3.8

☒ 64-Bit Graphical Installer (466 MB)

32-Bit Graphical Installer (397 MB)

### MacOS

#### Python 3.8

64-Bit Graphical Installer (462 MB)

64-Bit Command Line Installer (454 MB)

### Linux

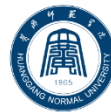
#### Python 3.8

64-Bit (x86) Installer (550 MB)

64-Bit (Power8 and Power9) Installer (290 MB)

[https://blog.csdn.net/weixin\\_50888378](https://blog.csdn.net/weixin_50888378)

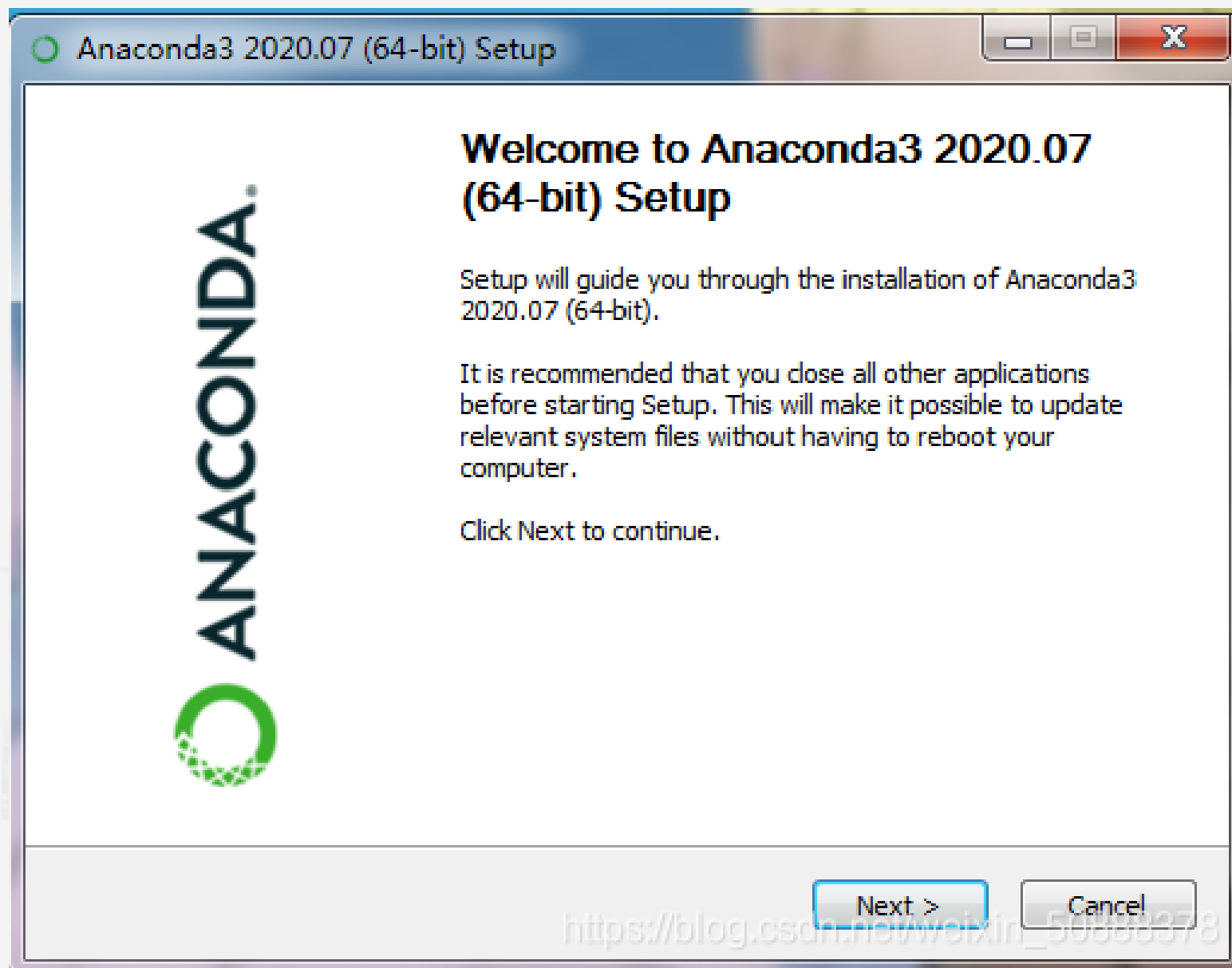
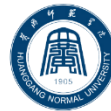
### 3.按照下载路径找到安装程序，并点击该安装程序进行安装



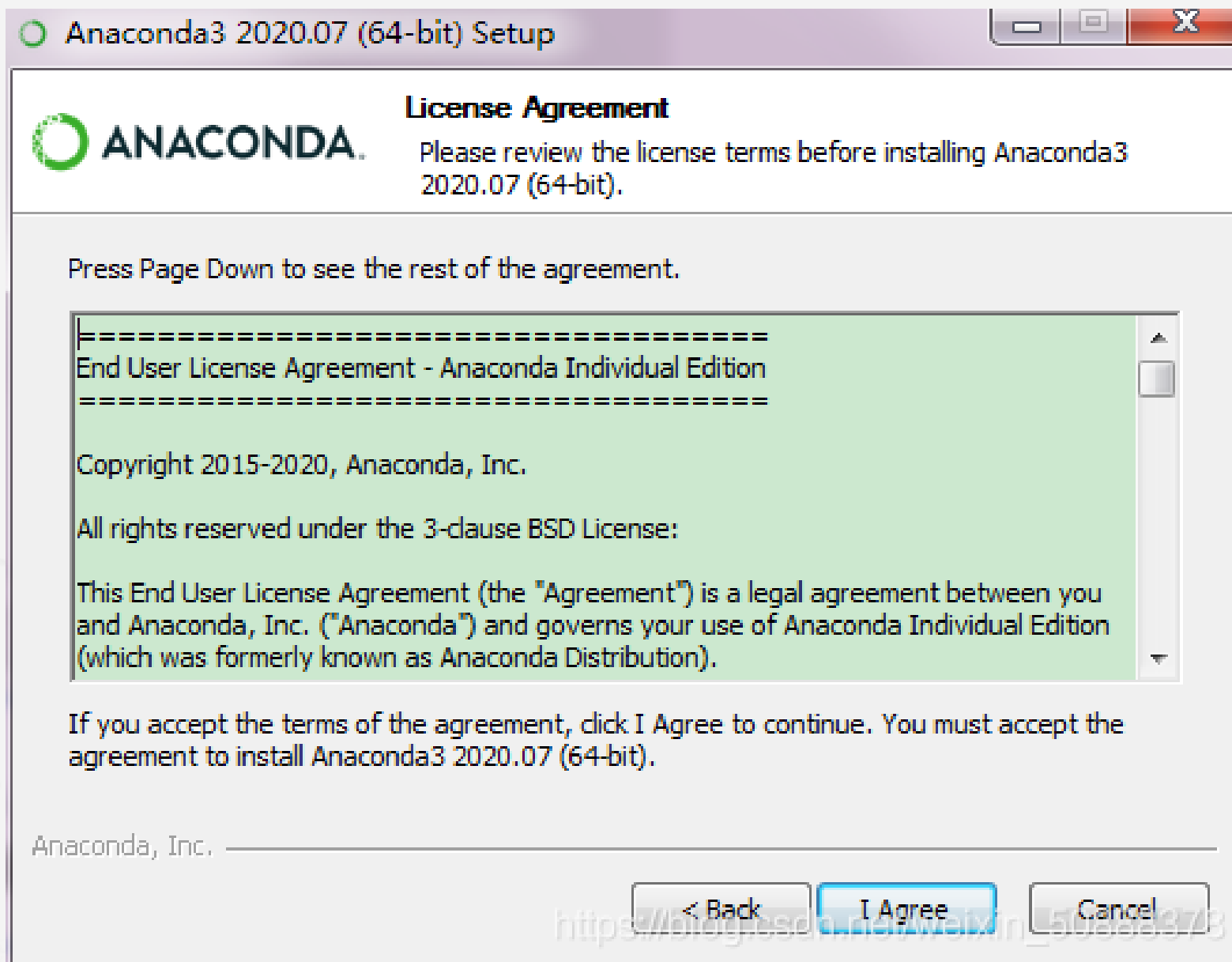
名称	修改日期	类型	大小
360浏览器	2018/10/12 15:33	文件夹	
AD17	2018/9/6 10:04	文件夹	
CAJ	2017/12/27 16:51	文件夹	
CNKI E-Study	2019/11/23 16:00	文件夹	
copytranslator	2020/9/23 17:25	文件夹	
CTEX	2018/4/4 20:12	文件夹	
Dict	2020/9/19 8:43	文件夹	
EndNoteX9_CHS	2020/9/19 17:27	文件夹	
Foxit Reader	2019/10/23 11:03	文件夹	
mathtype	2018/4/4 21:34	文件夹	
Microsoft VS Code	2020/9/19 15:39	文件夹	
NoteExpress 3.2.0.7409	2020/9/23 17:28	文件夹	
pdf转换器	2018/7/6 11:56	文件夹	
QQ	2020/9/15 14:04	文件夹	
sougou shurufa	2020/9/15 14:14	文件夹	
VC++ 6.0	2020/9/16 9:27	文件夹	
wechat	2020/10/12 8:55	文件夹	
winrar	2017/12/27 16:48	文件夹	
百度网盘	2020/9/19 10:02	文件夹	
暴风影音	2019/5/22 20:59	文件夹	
无线网卡	2017/12/27 11:10	文件夹	
Anaconda3-2020.07-Windows-x86_64	2020/10/12 10:14	应用程序	478,712 KB
copytranslator-setup-9.0.1	2020/9/23 14:57	应用程序	45,473 KB
python-3.8.5-amd64	2020/9/17 9:39	应用程序	27,212 KB
VSCodeSetup-x64-1.49.1	2020/9/19 11:00	应用程序	62,581 KB

[https://blog.csdn.net/weixin\\_50888378](https://blog.csdn.net/weixin_50888378)

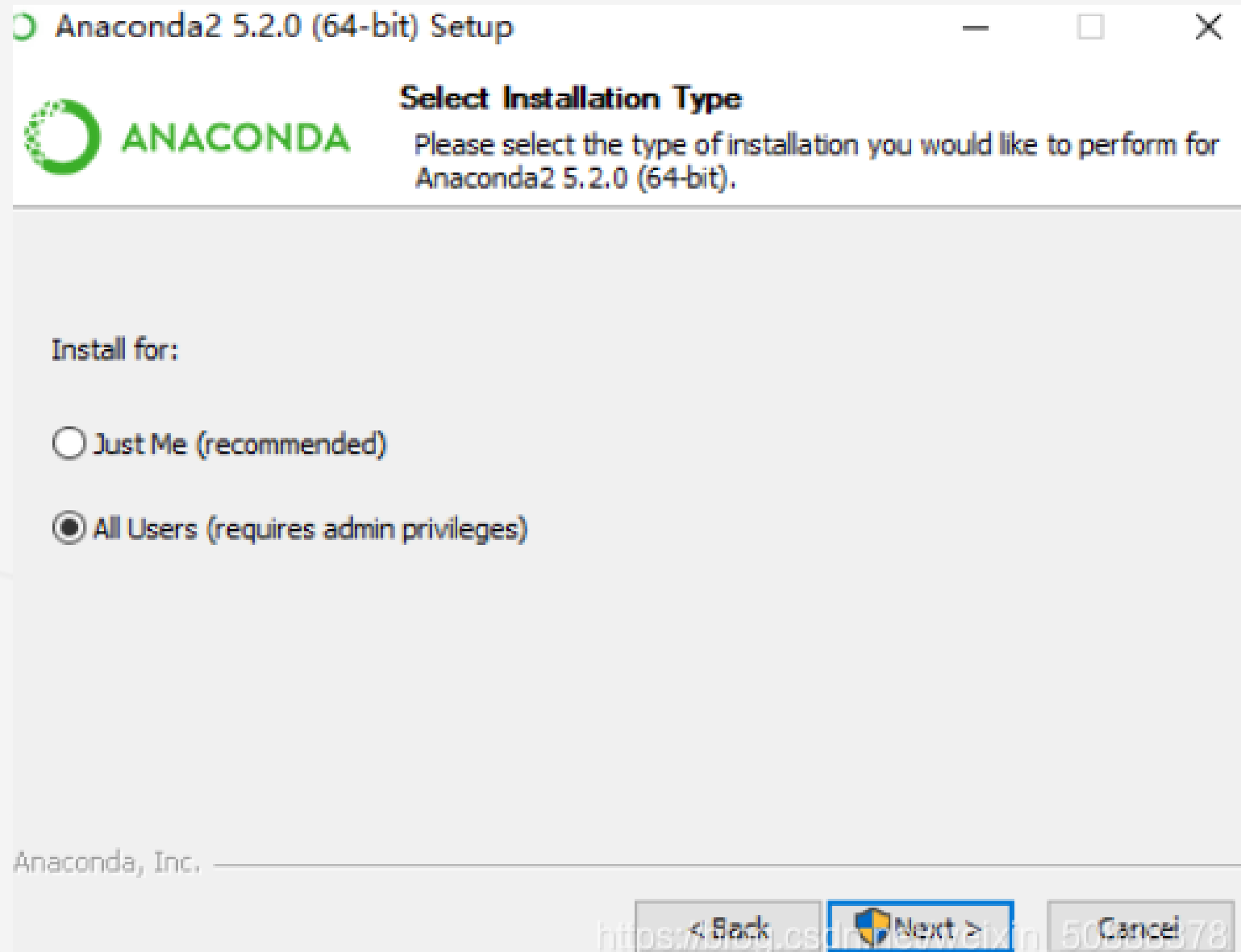
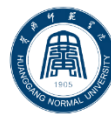
## 4.这是欢迎界面，点击下一步，即Next



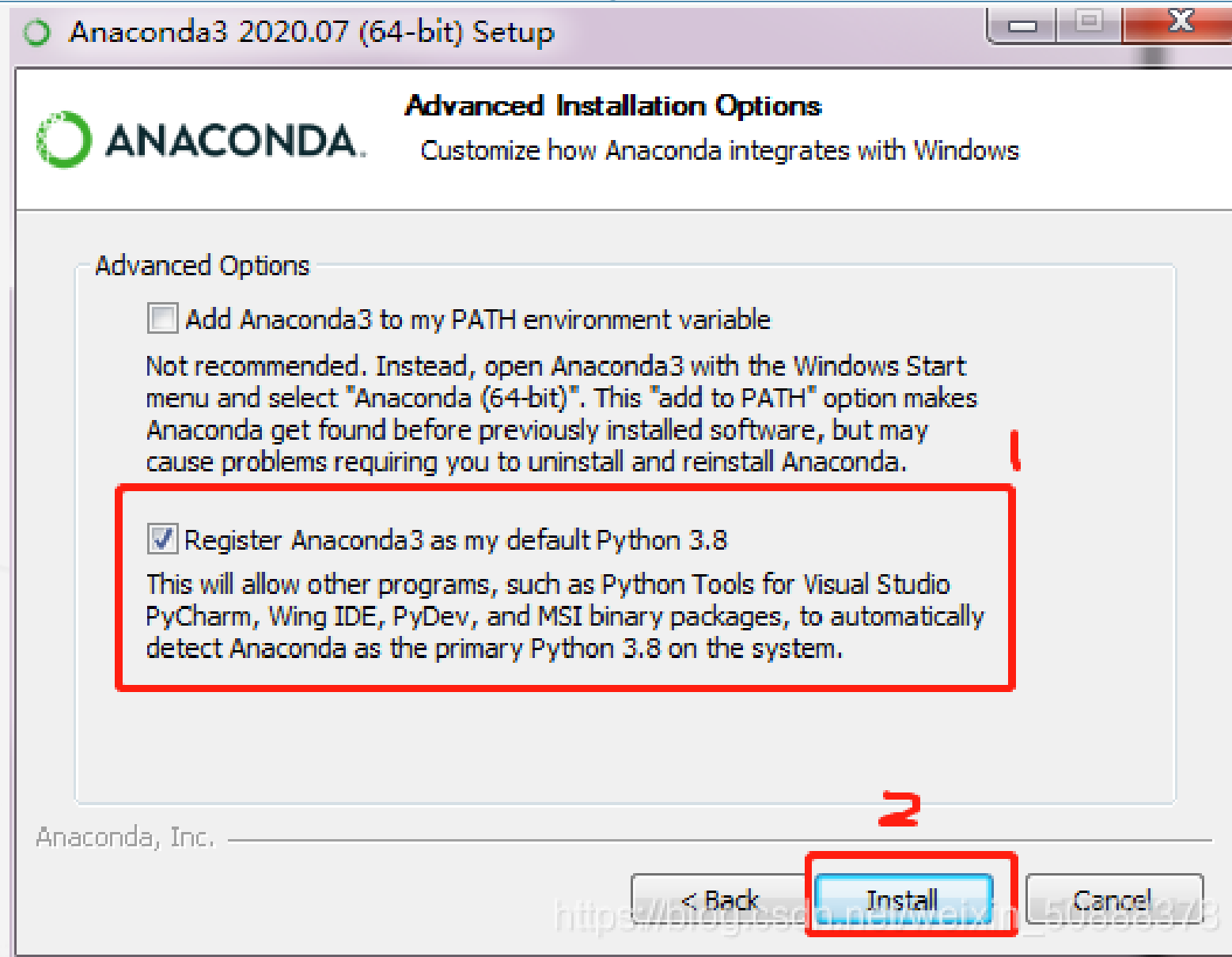
## 5. 点击 I Agree, 即同意Anaconda的协议



## 6. 建议选择All Users, 点击Next

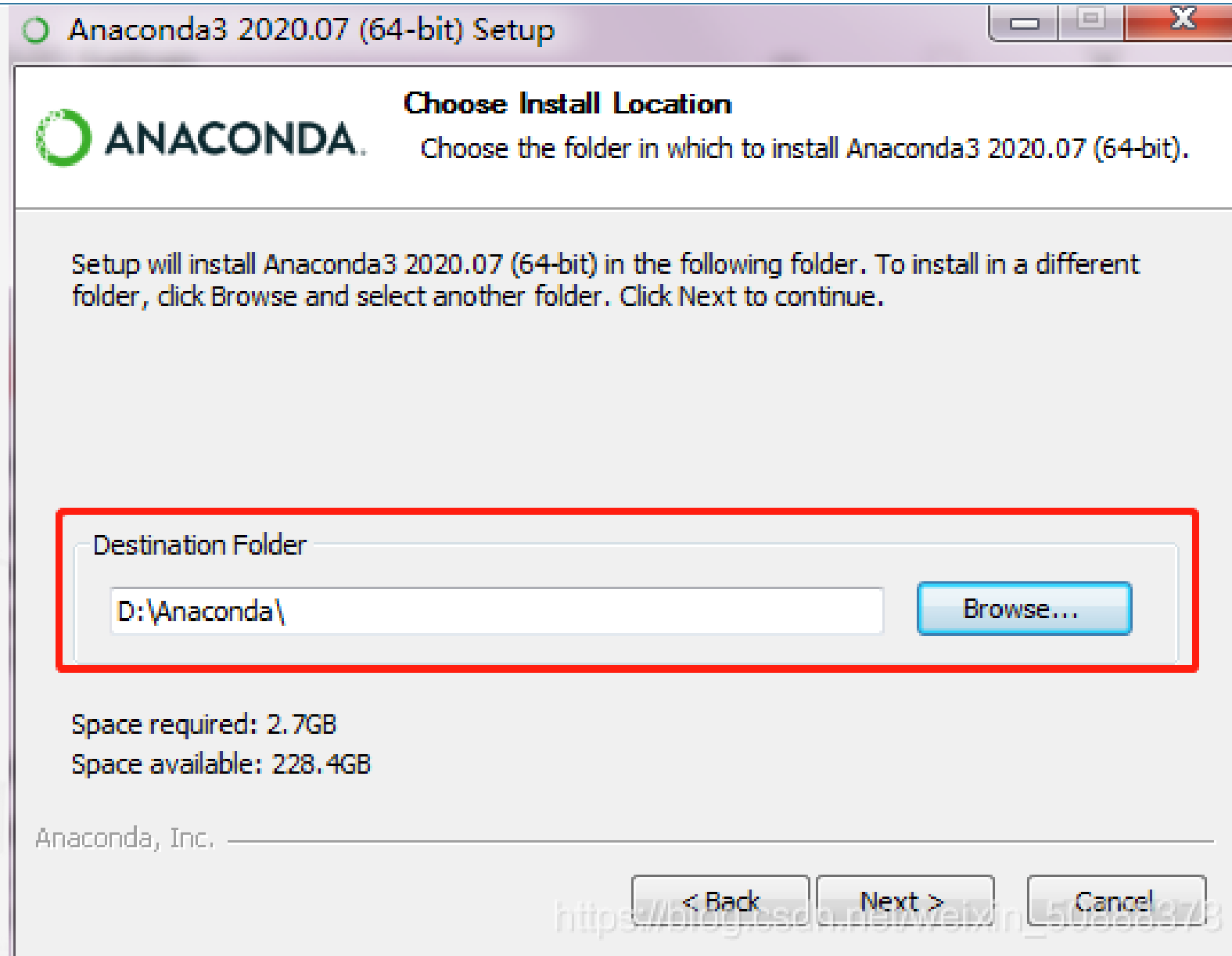
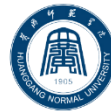


## 7.选择将Anaconda作为我的默认Python,并点击"Install"

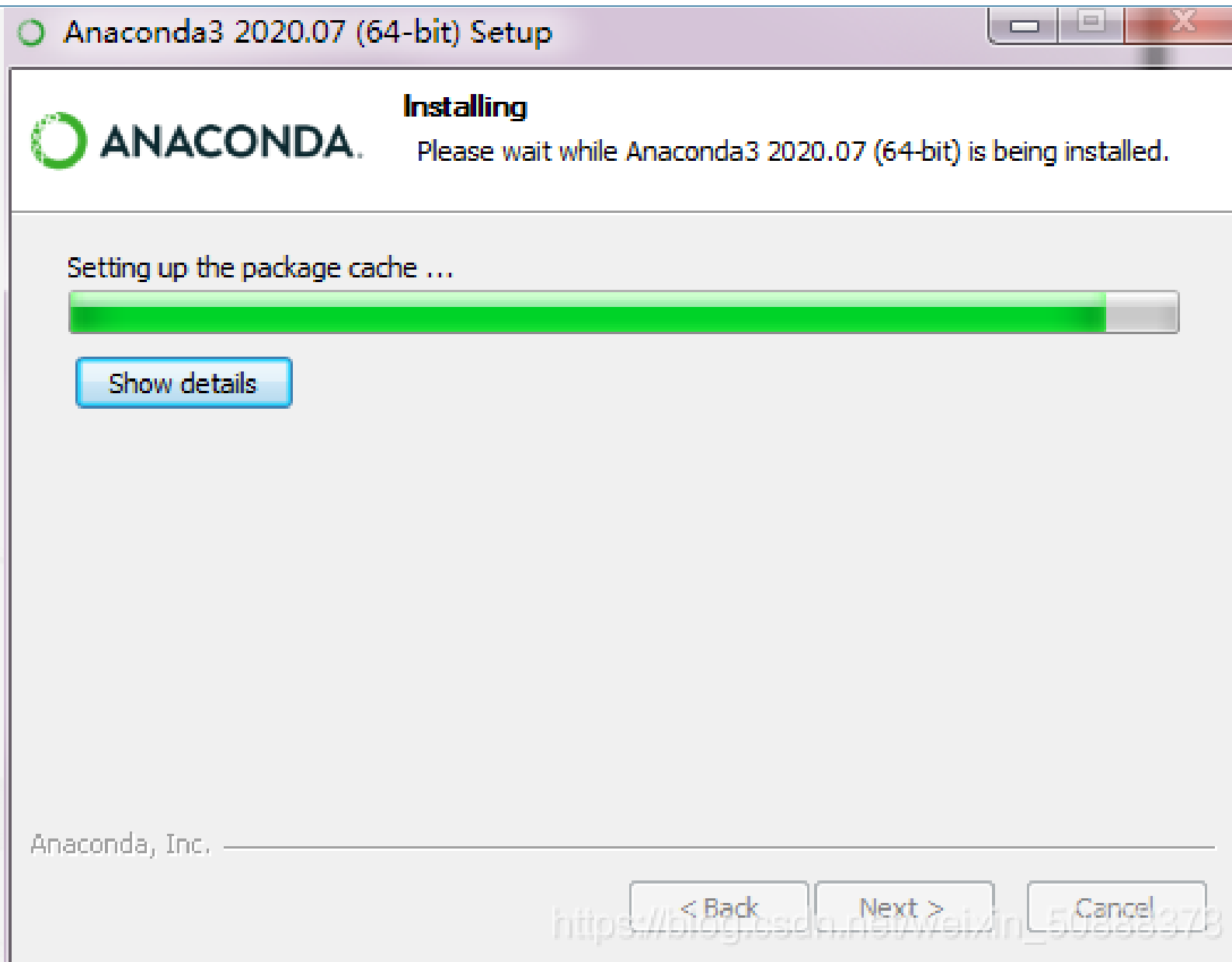
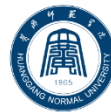




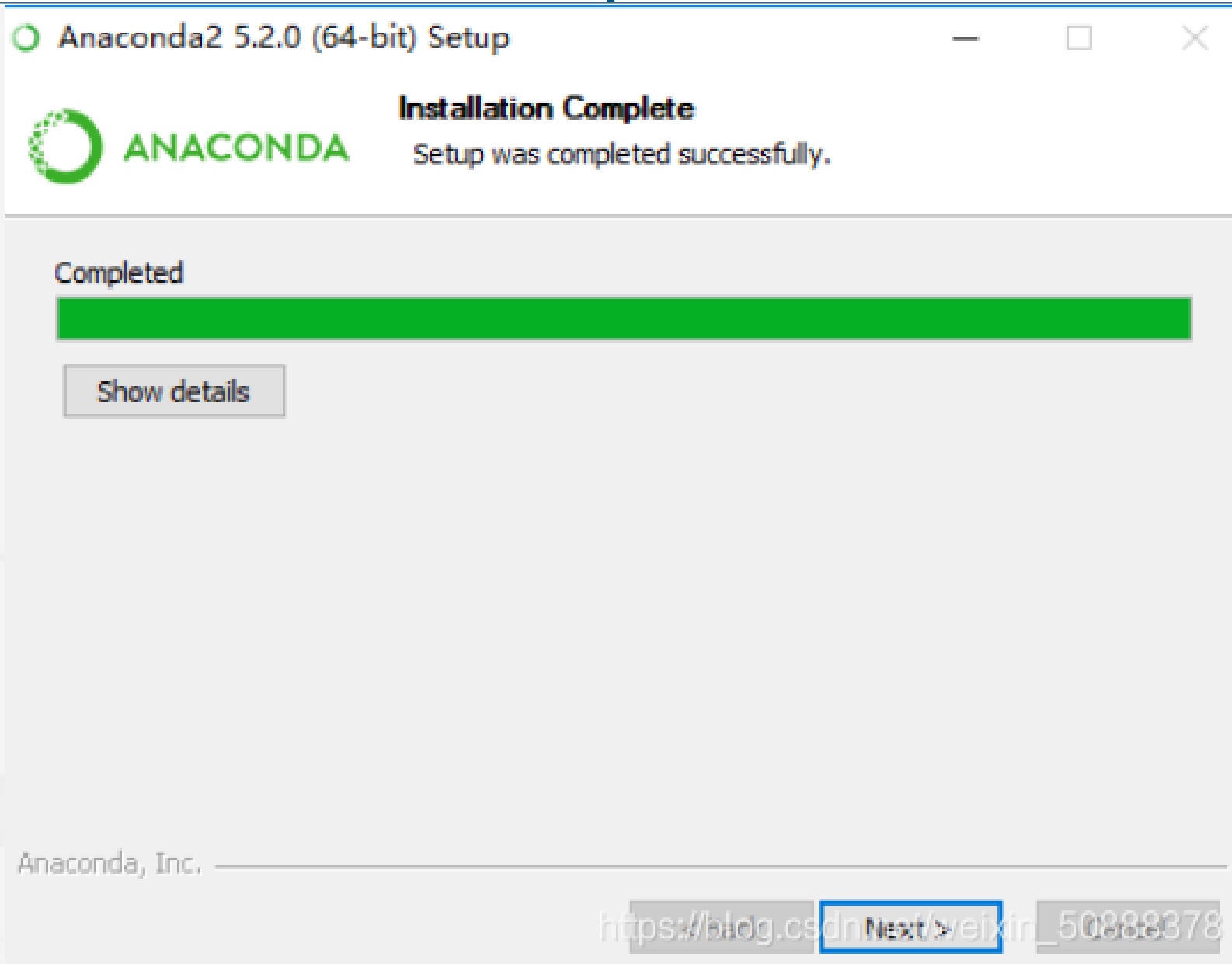
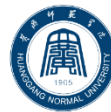
## 8.选择安装路径，并记住该路径！接下来点击“next”



## 9.正在安装

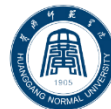


## 10.安装完成后界面上会显示“completed”，点击“Next”



[https://blog.csdn.net/weixin\\_50888378](https://blog.csdn.net/weixin_50888378)

## 11. 点击 “Next”



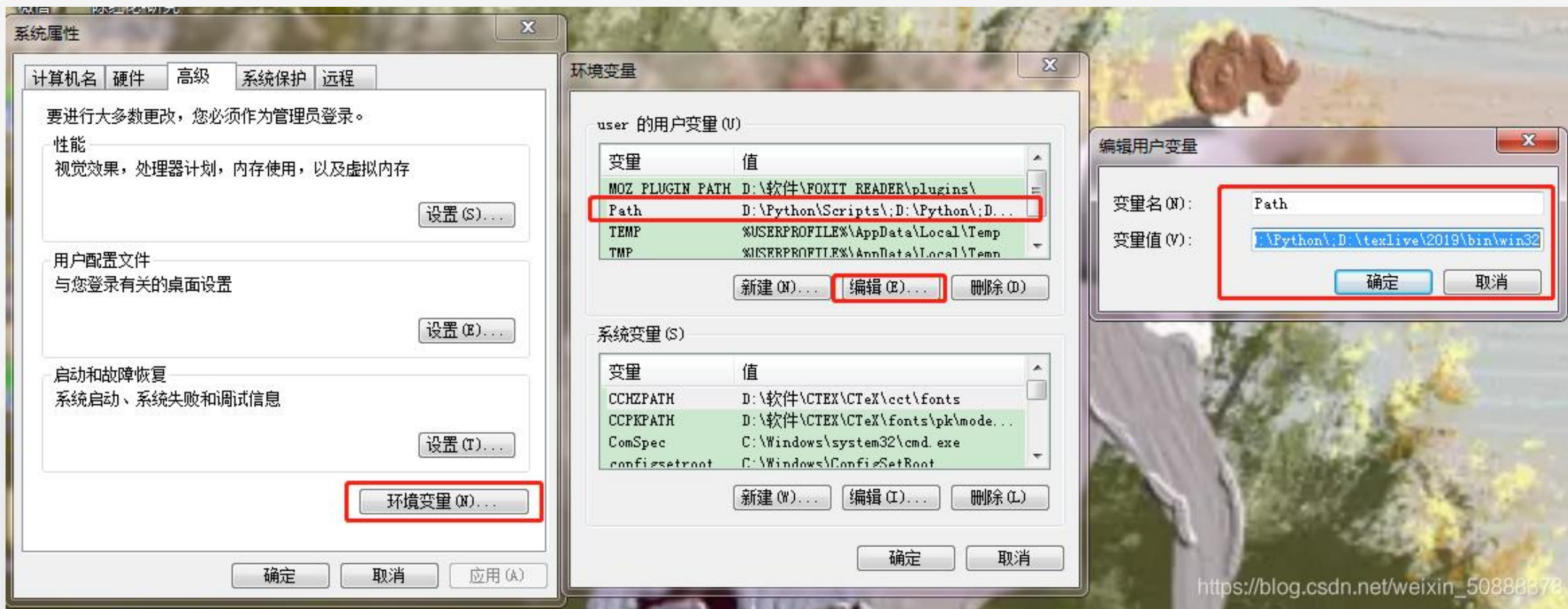
## 12.这两个选项建议不选，点击“Finish”，完成软件安装



- 1.打开 “系统属性-高级-环境变量-user的用户变量-选择Path-编辑”
- 即编辑Path的环境变量。
- 在变量值后面依次添加之前要求记住的自己的安装路径（例如我的）
- D:\Anaconda;
- D:\Python\Scripts;
- D:\Anaconda\Library\bin
- 即 D:\Anaconda;D:\Python\Scripts;D:\Anaconda\Library\bin（特别注意英文状态下的；分号不能漏了）

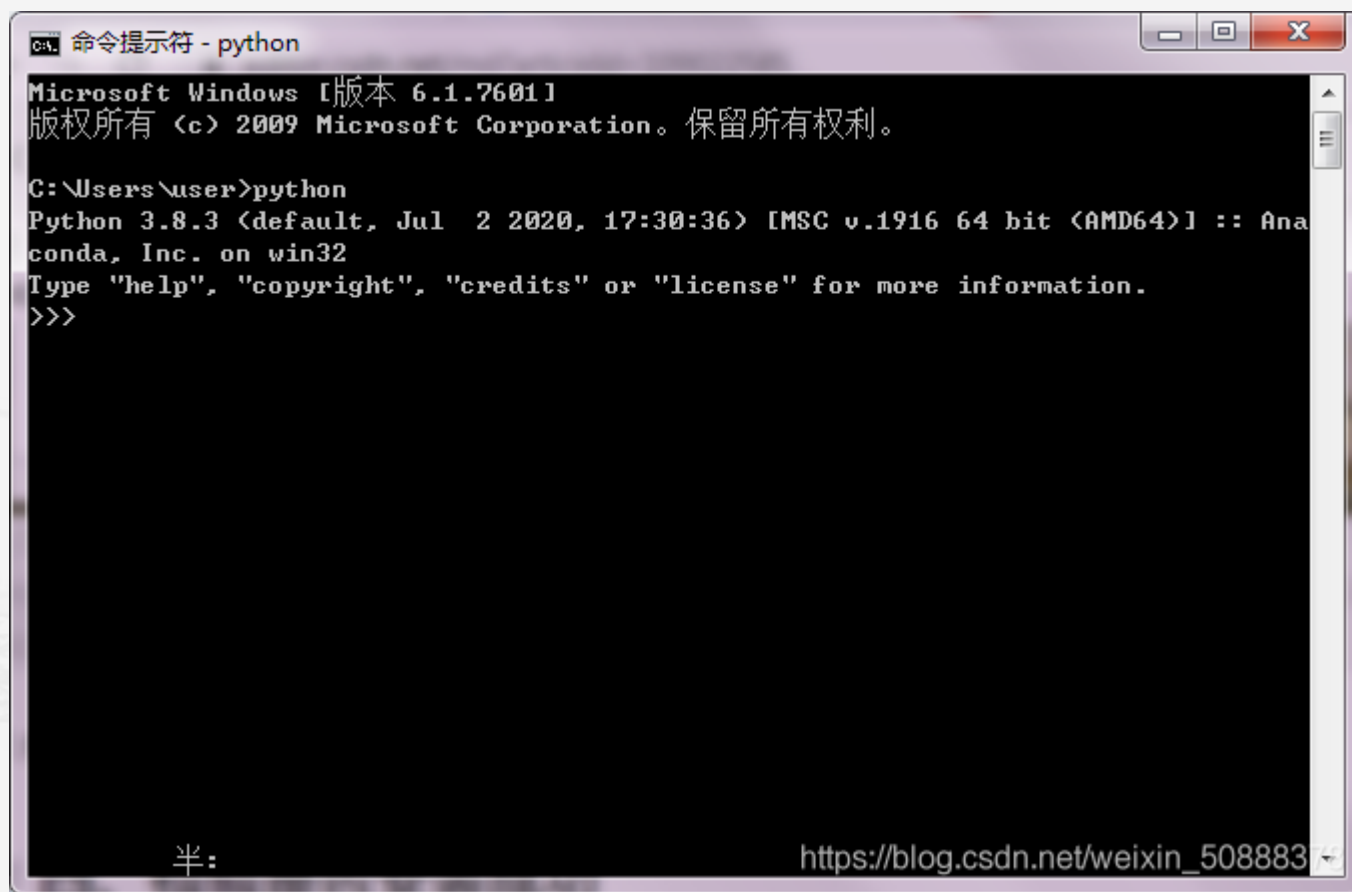


### 三、配置环境



## 四、检验是否安装成功

- 快捷键：Windows+R，或者Windows系统-运行-cmd
- 1、输入“python”，出现如图所示则没有问题



```
命令提示符 - python
Microsoft Windows [版本 6.1.7601]
版权所有 (c) 2009 Microsoft Corporation。保留所有权利。

C:\Users\user>python
Python 3.8.3 (default, Jul 2 2020, 17:30:36) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type 'help', 'copyright', 'credits' or 'license' for more information.
>>>
```

## 四、检验是否安装成功



- 2.输入“exit()”,退出python

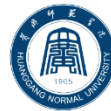
```
命令提示符
Microsoft Windows [版本 6.1.7601]
版权所有 (c) 2009 Microsoft Corporation。保留所有权利。

C:\Users\user>python
Python 3.8.3 (default, Jul 2 2020, 17:30:36) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> exit()

C:\Users\user>
```

半: [https://blog.csdn.net/weixin\\_50888379](https://blog.csdn.net/weixin_50888379)

## 四、检验是否安装成功



- 3.输入“conda”,出现如图所示则没有问题。检验完成。

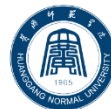
```
C:\WINDOWS\system32\cmd.exe
C:\Users\liuzh>conda
usage: conda-script.py [-h] [-V] command ...

conda is a tool for managing and deploying applications, environments and packages.

Options:
positional arguments:
  command
  clean                Remove unused packages and caches.
  compare              Compare packages between conda environments.
  config               Modify configuration values in .condarc. This is modeled after the git config command. Writes to the
                        user .condarc file (C:\Users\liuzh\.condarc) by default.
  create               Create a new conda environment from a list of specified packages.
  help                 Displays a list of available conda commands and their help strings.
  info                 Display information about current conda install.
  init                 Initialize conda for shell interaction. [Experimental]
  install              Installs a list of packages into a specified conda environment.
  list                 List linked packages in a conda environment.
  package              Low-level conda package utility. (EXPERIMENTAL)
  remove               Remove a list of packages from a specified conda environment.
  uninstall            Alias for conda remove.
  run                  Run an executable in a conda environment. [Experimental]
  search               Search for packages and display associated information. The input is a MatchSpec, a query language
                        for conda packages. See examples below.
  update               Updates conda packages to the latest compatible version.
  upgrade              Alias for conda update.

optional arguments:
  -h, --help           Show this help message and exit.
```

## 五、sklearn库的安装



# pip install -U scikit-learn

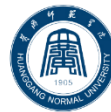
```
C:\Windows\system32\cmd.exe
Microsoft Windows [版本 10.0.19043.1586]
(c) Microsoft Corporation。保留所有权利。

C:\Users\李德华>pip install -U scikit-learn
Requirement already satisfied: scikit-learn in d:\anaconda3\lib\site-packages (0.24.2)
Collecting scikit-learn
  WARNING: Retrying (Retry(total=4, connect=None, read=None, redirect=None, status=None)) after connection broken by 'ConnectTimeoutError(<pip._vendor.urllib3.connection.HTTPSConnection object at 0x000001EE58F68AF0>, 'Connection to files.pythonhosted.org timed out. (connect timeout=15)')': /packages/0b/5f/f9a191519f6daf2c268256511c38e0cf638ff8e308bcadaf96a69e3e85af/scikit_learn-1.0.2-cp39-cp39-win_amd64.whl
  Downloading scikit_learn-1.0.2-cp39-cp39-win_amd64.whl (7.2 MB)
    | 7.2 MB 1.1 MB/s
Requirement already satisfied: threadpoolctl>=2.0.0 in d:\anaconda3\lib\site-packages (from scikit-learn) (2.2.0)
Requirement already satisfied: numpy>=1.14.6 in d:\anaconda3\lib\site-packages (from scikit-learn) (1.20.3)
Requirement already satisfied: scipy>=1.1.0 in d:\anaconda3\lib\site-packages (from scikit-learn) (1.7.1)
Requirement already satisfied: joblib>=0.11 in d:\anaconda3\lib\site-packages (from scikit-learn) (1.1.0)
Installing collected packages: scikit-learn
  Attempting uninstall: scikit-learn
    Found existing installation: scikit-learn 0.24.2
    Uninstalling scikit-learn-0.24.2:
      Successfully uninstalled scikit-learn-0.24.2
  Successfully installed scikit-learn-1.0.2

C:\Users\李德华>
```



## 五、sklearn库的安装



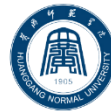
- conda list 验证是否安装成功

```
C:\Windows\system32\cmd.exe

regex                2021.8.3                py39h2bbff1b_0
requests             2.26.0                  pyhd3eb1b0_0
rope                  0.19.0                  pyhd3eb1b0_0
rtree                 0.9.7                   py39h2eaa2aa_1
ruamel_yaml          0.15.100                py39h2bbff1b_0
scikit-image         0.18.3                  py39h11a4ad_0
scikit-learn         1.0.2                   pypi_0          pypi
scikit-learn-intelex 2021.3.0                py39haa95532_0
scipy                 1.7.1                   py39nbe87c03_2
seaborn              0.11.2                  pyhd3eb1b0_0
send2trash           1.8.0                   pyhd3eb1b0_1
setuptools           58.0.4                  py39haa95532_0
simplegeneric         0.8.1                   py39haa95532_2
singledispatch       3.7.0                   pyhd3eb1b0_1001
sip                  4.19.13                 py39hd77b12b_0
six                  1.16.0                  pyhd3eb1b0_0
snappy               1.1.8                   h33f27b4_0
sniffio              1.2.0                   py39haa95532_1
snowballstemmer      2.1.0                   pyhd3eb1b0_0
sortedcollections    2.1.0                   pyhd3eb1b0_0
sortedcontainers     2.4.0                   pyhd3eb1b0_0
soupsieve            2.2.1                   pyhd3eb1b0_0
sphinx               4.2.0                   pyhd3eb1b0_1
sphinxcontrib        1.0                     py39haa95532_1
sphinxcontrib-applehelp 1.0.2                  pyhd3eb1b0_0
sphinxcontrib-devhelp 1.0.2                  pyhd3eb1b0_0
sphinxcontrib-htmlhelp 2.0.0                  pyhd3eb1b0_0
sphinxcontrib-jsmath 1.0.1                  pyhd3eb1b0_0
sphinxcontrib-qthelp 1.0.3                  pyhd3eb1b0_0
sphinxcontrib-serializinghtml 1.1.5                pyhd3eb1b0_0
```



## 六、OpenCV库的安装



- openCV下载地址：

<https://pypi.tuna.tsinghua.edu.cn/simple/opencv-contrib-python/>

### Links for opencv-contrib-python

[opencv-contrib-python-3.4.11.45.tar.gz](#)

[opencv-contrib-python-3.4.13.47.tar.gz](#)

[opencv-contrib-python-3.4.14.51.tar.gz](#)

[opencv-contrib-python-3.4.15.55.tar.gz](#)

[opencv-contrib-python-3.4.16.59.tar.gz](#)

[opencv-contrib-python-3.4.17.61.tar.gz](#)

[opencv-contrib-python-3.4.17.63.tar.gz](#)

[opencv-contrib-python-4.4.0.46.tar.gz](#)

[opencv-contrib-python-4.5.1.48.tar.gz](#)

[opencv-contrib-python-4.5.2.52.tar.gz](#)

[opencv-contrib-python-4.5.3.56.tar.gz](#)

[opencv-contrib-python-4.5.4.58.tar.gz](#)

[opencv-contrib-python-4.5.4.60.tar.gz](#)

[opencv-contrib-python-4.5.5.62.tar.gz](#)

[opencv-contrib-python-4.5.5.64.tar.gz](#)

[opencv\\_contrib\\_python-3.2.0.7-cp27-cp27m-macosx\\_10\\_6\\_intel.macosx\\_10\\_9\\_intel.macosx\\_10\\_9\\_x86\\_64.macosx\\_10\\_10\\_intel.macosx\\_10\\_10\\_x86\\_64.whl](#)

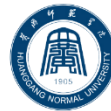
[opencv\\_contrib\\_python-3.2.0.7-cp27-cp27m-manylinux1\\_i686.whl](#)

[opencv\\_contrib\\_python-3.2.0.7-cp27-cp27m-manylinux1\\_x86\\_64.whl](#)

[opencv\\_contrib\\_python-3.2.0.7-cp27-cp27m-win32.whl](#)

[opencv\\_contrib\\_python-3.2.0.7-cp27-cp27m-win\\_amd64.whl](#)

## 六、OpenCV库的安装



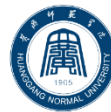
- 先查到自己的python版本，例如3.7.4，然后在网址中找到

[opencv\\_contrib\\_python-3.4.11.39-cp37-cp37m-macosx\\_10\\_13\\_x86\\_64.whl](#)  
[opencv\\_contrib\\_python-3.4.11.39-cp37-cp37m-manylinux2014\\_i686.whl](#)  
[opencv\\_contrib\\_python-3.4.11.39-cp37-cp37m-manylinux2014\\_x86\\_64.whl](#)  
[opencv\\_contrib\\_python-3.4.11.39-cp37-cp37m-win32.whl](#)  
[opencv\\_contrib\\_python-3.4.11.39-cp37-cp37m-win\\_amd64.whl](#)

- cp37意思是python3.7版本，然后第一个是macos系统，第二、三个是linux系统，第四、五个是win系统分别对应32位，64位。
- 下载后，把 .whl 文件复制，粘贴到anaconda中的site-packages文件夹中，如下图所示。

此电脑 > 新加卷 (D:) > anaconda > Lib > site-packages >

## 六、OpenCV库的安装



- 进入cmd命令行cd到whl文件所在目录，然后输入pip install \*\*\*.whl

```
管理员: 命令提示符
Microsoft Windows [版本 10.0.19043.1586]
(c) Microsoft Corporation. 保留所有权利。

C:\Windows\system32>cd D:\Anaconda3\Lib\site-packages

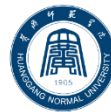
C:\Windows\system32>D:

D:\Anaconda3\Lib\site-packages>pip install opencv_python-4.5.3.56-cp39-cp39-win_amd64.whl
Processing d:\anaconda3\lib\site-packages\opencv_python-4.5.3.56-cp39-cp39-win_amd64.whl
Requirement already satisfied: numpy>=1.19.3 in d:\anaconda3\lib\site-packages (from opencv-python==4.5.3.56) (1.20.3)
Installing collected packages: opencv-python
Successfully installed opencv-python-4.5.3.56

D:\Anaconda3\Lib\site-packages>C:

C:\Windows\System32>conda list
```

## 六、OpenCV库的安装



- 输入“conda list”进行验证

```
cmd 选择管理员: 命令提示符
more-itertools      8.10.0          pyhd3eb1b0_0
mpmath               1.2.1          py39haa95532_0
msgpack-python      1.0.2          py39h59b6b97_1
msys2-conda-epoch   20160418       1
multipledispatch    0.6.0          py39haa95532_0
munkres              1.1.4          py_0
mypy_extensions     0.4.3          py39haa95532_0
navigator-updater   0.2.1          py39haa95532_0
nbclassic            0.2.6          pyhd3eb1b0_0
nbclient             0.5.3          pyhd3eb1b0_0
nbconvert            6.1.0          py39haa95532_0
nbformat             5.1.3          pyhd3eb1b0_0
nest-asyncio         1.5.1          pyhd3eb1b0_0
networkx             2.6.3          pyhd3eb1b0_0
nltk                 3.6.5          pyhd3eb1b0_0
nose                 1.3.7          pyhd3eb1b0_1006
notebook             6.4.5          py39haa95532_0
numba                0.54.1         py39hf11a4ad_0
numexpr              2.7.3          py39hb80d3ca_1
numpy                1.20.3         py39ha4e8547_0
numpy-base           1.20.3         py39hc2deb75_0
numpydoc             1.1.0          pyhd3eb1b0_1
olefile              0.46           pyhd3eb1b0_0
opencv-python        4.5.3.56       pypi_0         pypi
openjpeg             2.4.0          h4fc8c34_0
openpyxl             3.0.9          pyhd3eb1b0_0
openssl              1.1.11         h2bbff1b_0
packaging            21.0           pyhd3eb1b0_0
pandas               1.3.4          py39h6214cd6_0
pandocfilters        1.4.3          py39haa95532_1
```



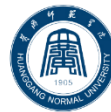
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# 实验1：检测摄像头范围内的人脸

- 整个实现过程比较简单，先通过OpenCV调用摄像头，从视频中分离每一帧画面；
- 再调用OpenCV预训练的模型face\_cascade对画面进行人脸检测，检测到人脸后，在对应帧画面上绘制绿色方框；
- 这里在人脸检测基础上还做了眼部检测，由于人脸已经检测到了，只需要将检测到的人脸单独提取出来，再调用eye\_cascade进行眼部检测，同样在检测到的眼部周围绘制绿色框。
- 完成检测和标记后，调用OpenCV进行显示。



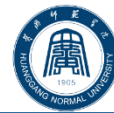
## 二、参考代码



```
9 import cv2
10
11 # 人脸检测函数
12 def face_rec(img):
13     # 转为灰度图
14     gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
15     # 加载人脸训练数据
16     face_cascade = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')
17     face_cascade.load('haarcascade_frontalface_default.xml')
18     # 加载人眼训练数据
19     eye_cascade = cv2.CascadeClassifier('haarcascade_eye.xml')
20     eye_cascade.load('haarcascade_eye.xml')
21     # 人脸检测
22     faces = face_cascade.detectMultiScale(gray,
23     .....: scaleFactor = 1.15,
24     .....: minNeighbors = 3,
25     .....: minSize = (3,3),
26     .....: flags = cv2.IMREAD_GRAYSCALE)
27     # 在人脸周围绘制方框
28     for (x,y,w,h) in faces:
29         img = cv2.rectangle(frame, (x,y), (x+w,y+h), (255,0,0), 2)
30     # 进行眼部检测
31     eyes = eye_cascade.detectMultiScale(gray, 1.1, 3, 0, (40,40))
32     for (ex,ey,ew,eh) in eyes:
33         # 绘制眼部方框
34         img = cv2.rectangle(frame, (ex,ey), (ex+ew,ey+eh), (0,255,0), 2)
35     cv2.imshow('result',img)
```

```
39 # 调整参数实现读取视频或调用摄像头
40 cap = cv2.VideoCapture(0)
41 while True:
42     ... # 读取摄像头中的帧
43     ... ret, frame = cap.read()
44     ... # 调用人脸识别函数
45     ... face_rec(frame)
46     ... c = cv2.waitKey(10)
47     ... # 当键盘按下‘ESC’退出程序
48     ... if c == 27:
49         ...     break
50     ...
51 cap.release()
52 cv2.destroyAllWindows()
```

此处省略



## 四、实验报告要求

- 1、实验目的
  - 2、实验内容
  - 3、实验原理
  - 4、实验代码
  - 5、运行截图
  - 6、实验小结
- 
- 说明：每个学生都要交电子版的实验报告，命名格式：
  - 01/02-XXXX（学号）-XXX（姓名）



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Q & A

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