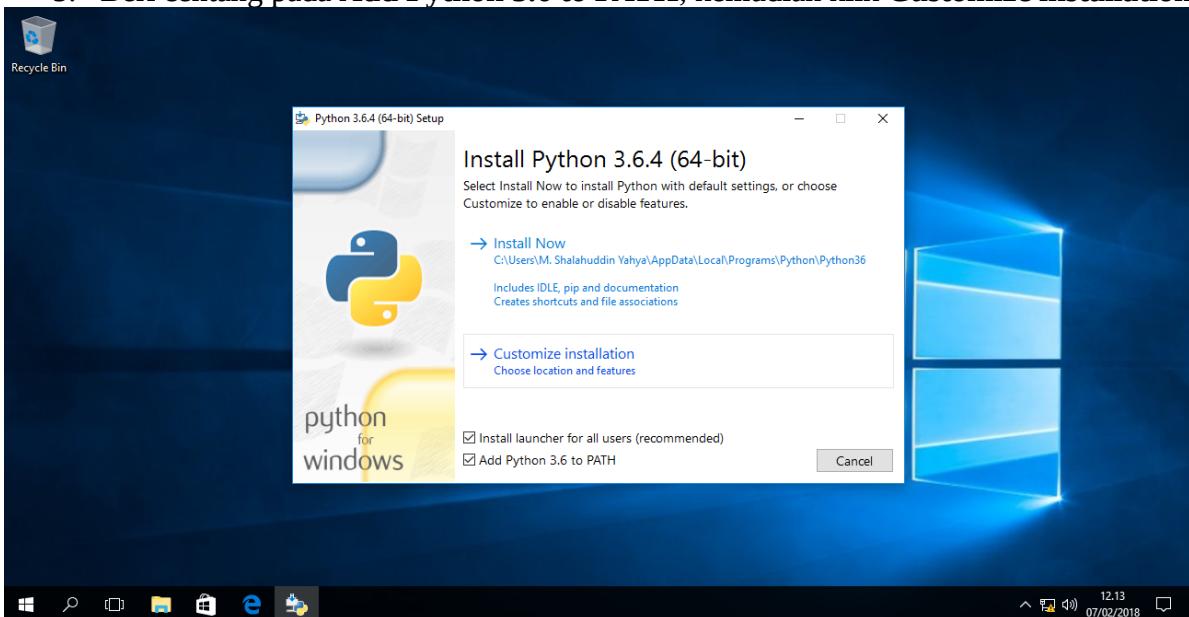


## INSTALASI OPENCV DAN PYTHON

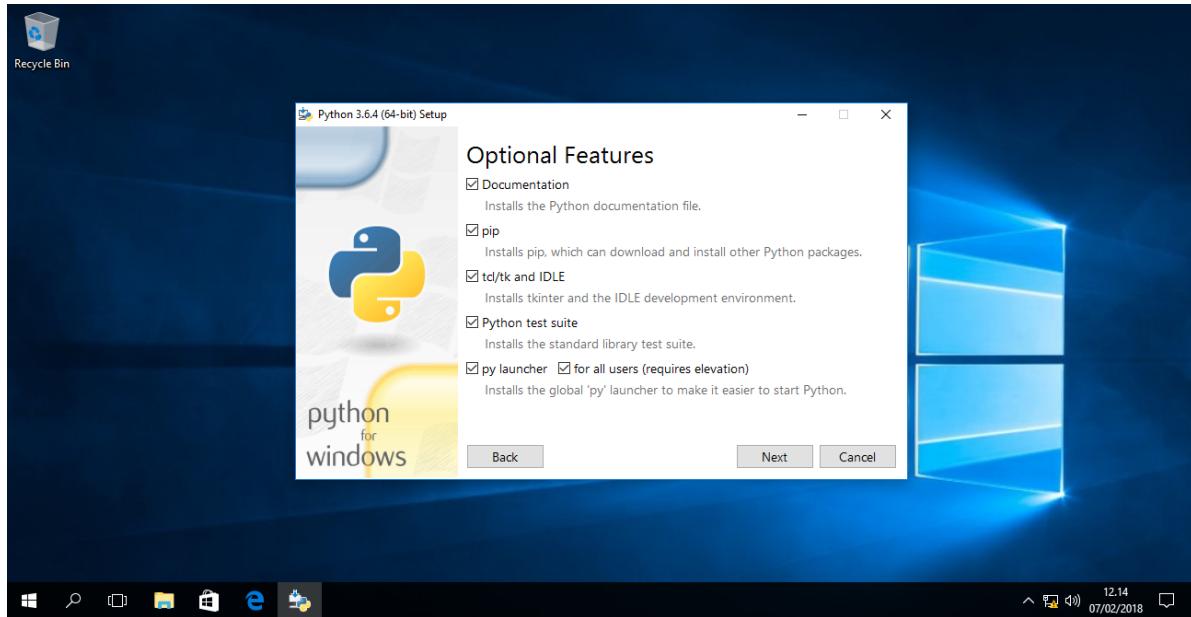
### Pengguna Windows

#### A. Instalasi Python

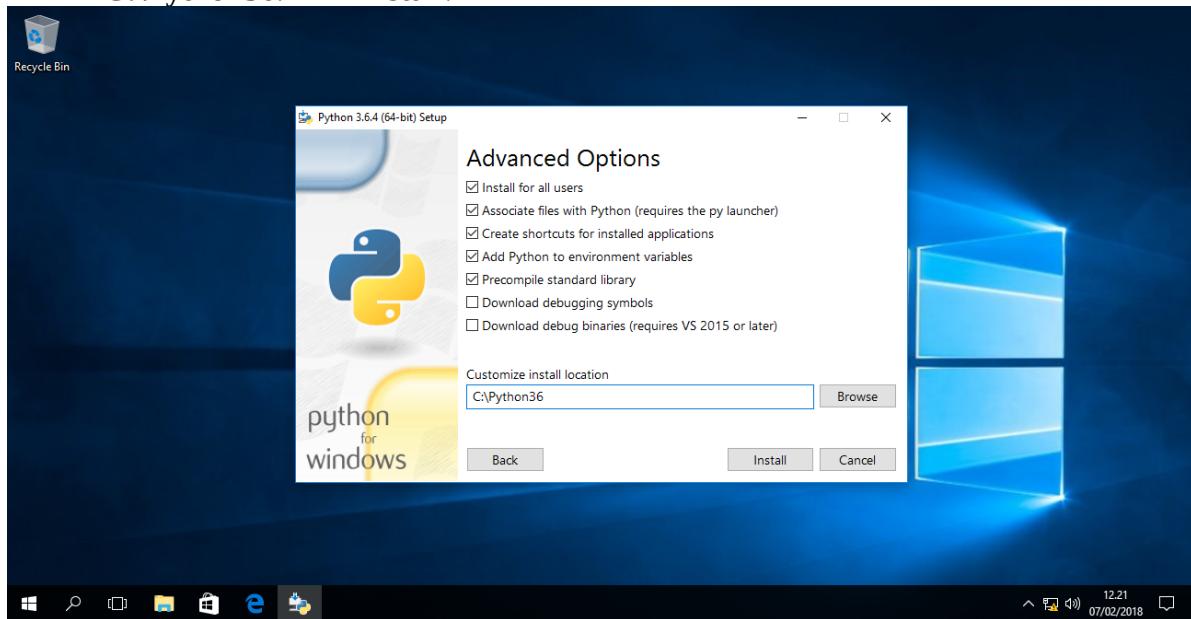
1. Unduh *installer Python 3.6.4* di <https://www.python.org/downloads/>, pilih versi Windows x86-64 untuk Windows 64-bit.
2. Unduh *package NumPy* terbaru di <https://pypi.python.org/pypi/numpy>, pilih versi cp36-none-win\_amd64 untuk Windows 64-bit.
3. (Opsional) Unduh *package Matplotlib* terbaru di <https://pypi.python.org/pypi/matplotlib>, pilih versi cp36-cp36m-win\_amd64 untuk Windows 64-bit. Matplotlib adalah pustaka *plotting* untuk Python yang menyediakan berbagai macam metode *plotting*. Citra yang ditampilkan menggunakan Matplotlib dapat di-zoom, disimpan, dan lain-lain.
4. Klik kanan *installer* yang telah diunduh, kemudian **jalankan sebagai administrator** untuk memasang Python.
5. Beri centang pada **Add Python 3.6 to PATH**, kemudian klik **Customize installation**.



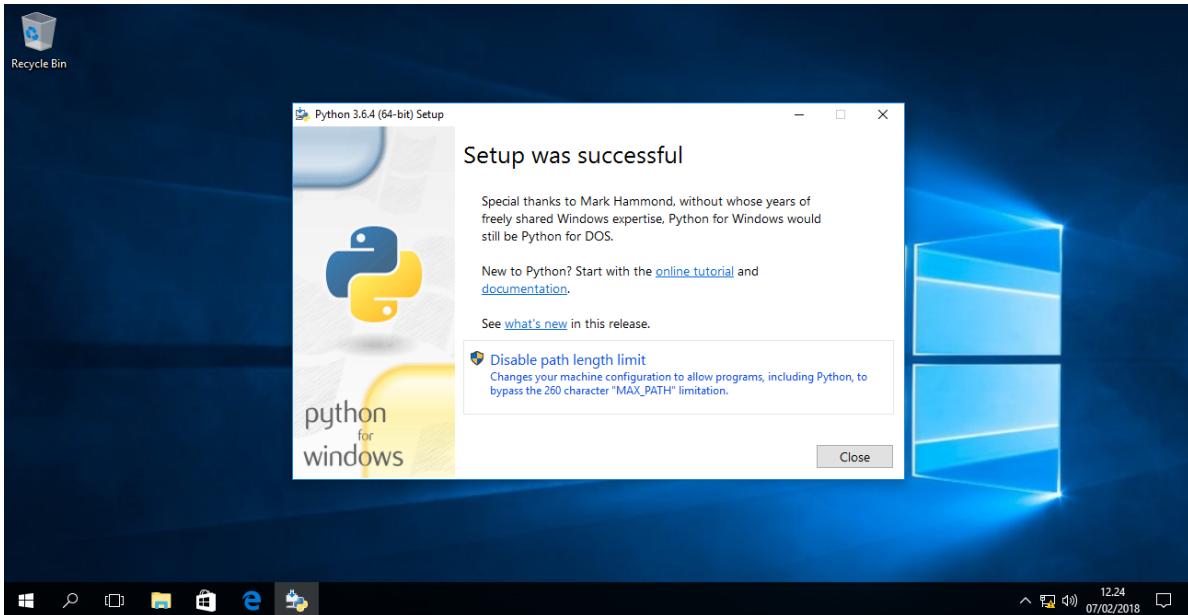
6. Pilih fitur opsional yang ingin dipasang. Pada tutorial ini dipilih semua fitur opsional dan secara *default* semua *checkbox* telah diberi centang. Klik **Next**.



7. Beri centang pada **Install for all users**, kemudian ubah lokasi instalasi Python ke folder **C:\Python36**. Klik **Install**.



8. Setelah instalasi selesai, klik **Disable path length limit**, kemudian klik **Close**.



9. Buka **Windows Command Prompt sebagai administrator**. Pasang NumPy dan Matplotlib dengan menggunakan perintah berikut.

- 1) cd <path>
- 2) pip install numpy-1.14.0-cp36-none-win\_amd64.whl
- 3) pip install matplotlib-2.1.2-cp36-cp36m-win\_amd64.whl

10. Ubah <path> ke lokasi *package* NumPy dan Matplotlib berada, misalnya C:\ (gunakan tanda kutip “” jika terdapat spasi pada path). Perlu diketahui untuk pemasangan Matplotlib dibutuhkan koneksi internet dikarenakan Matplotlib membutuhkan package lain yang akan diunduh dan dipasang secara otomatis. Tutup Windows Command Prompt.

```

Administrator: Command Prompt
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\>cd "C:\"
C:\>pip install numpy-1.14.0-cp36-none-win_amd64.whl
Processing c:\numpy-1.14.0-cp36-none-win_amd64.whl
Installing collected packages: numpy
Successfully installed numpy-1.14.0

C:\>pip install matplotlib-2.1.2-cp36-cp36m-win_amd64.whl
Processing c:\matplotlib-2.1.2-cp36-cp36m-win_amd64.whl
Collecting cycler>=0.10 (from matplotlib==2.1.2)
  Downloading cycler-0.10.0-py2.py3-none-any.whl (511kB)
Requirement already satisfied: numpy>=1.7.1 in c:\python36\lib\site-packages (from matplotlib==2.1.2)
Collecting pyparsing!=2.0.4,>=2.1.2,!2.1.6,>=2.0.1 (from matplotlib==2.1.2)
  Downloading pyparsing-2.2.0-py2.py3-none-any.whl (56kB)
    100% |██████████| 61kB 791kB/s
Collecting pytz (from matplotlib==2.1.2)
  Downloading pytz-2017.3-py2.py3-none-any.whl (511kB)
    100% |██████████| 512kB 936kB/s
Collecting six>=1.10 (from matplotlib==2.1.2)
  Downloading six-1.11.0-py2.py3-none-any.whl (194kB)
    100% |██████████| 194kB 1.3MB/s
Collecting python-dateutil>=2.1 (from matplotlib==2.1.2)
  Downloading python_dateutil-2.6.1-py2.py3-none-any.whl (194kB)
    100% |██████████| 194kB 1.3MB/s
Installing collected packages: six, cycler, pyparsing, pytz, python-dateutil, matplotlib
Successfully installed six-1.11.0 matplotlib-2.1.2 pyparsing-2.2.0 python-dateutil-2.6.1 pytz-2017.3
C:\>

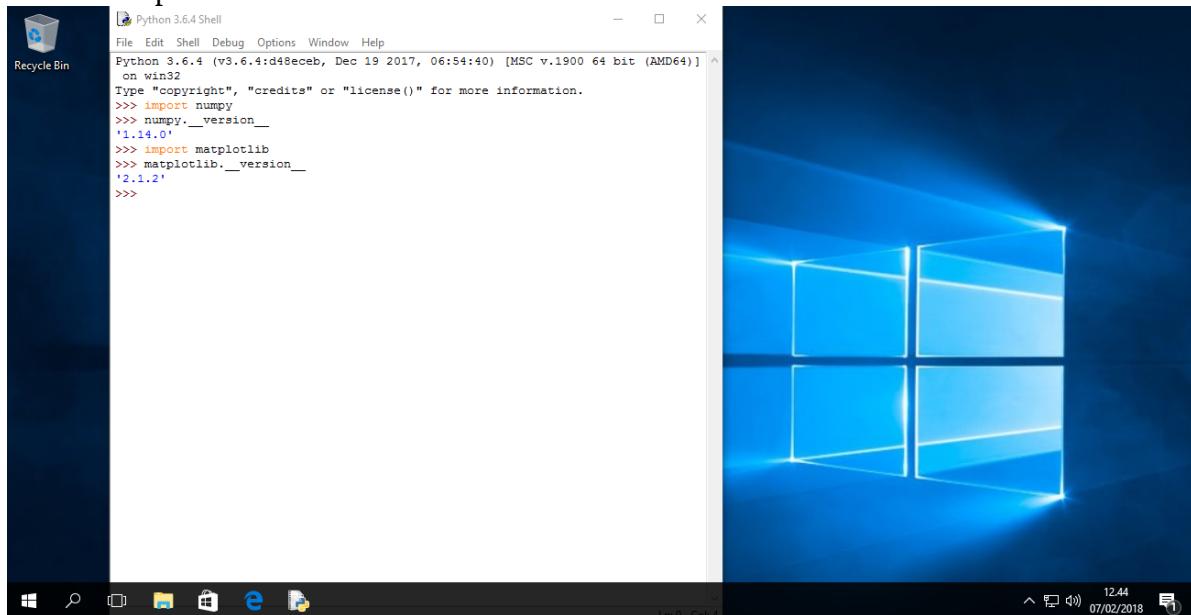
```

11. Buka **IDLE (Python 3.6 64-bit)** melalui Start Menu. Berikan perintah berikut pada Python Shell.

- 1) import numpy
- 2) numpy.\_\_version\_\_

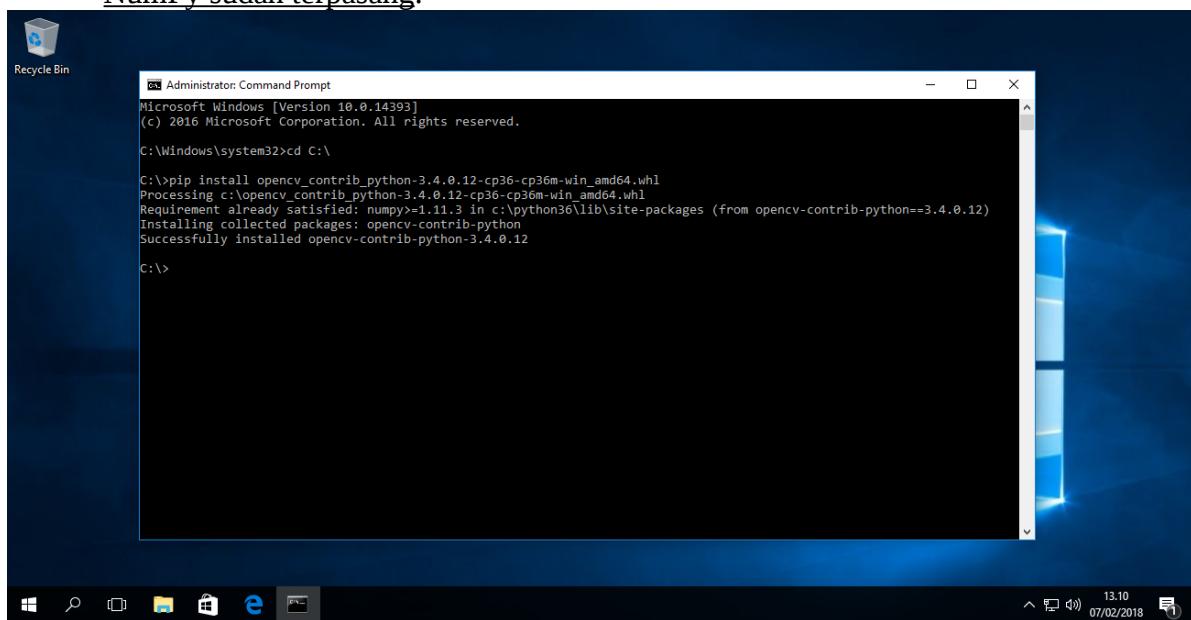
```
3) import matplotlib
4) matplotlib.__version__
```

Jika telah muncul tampilan seperti di bawah ini, maka instalasi Python, NumPy, dan Matplotlib telah berhasil.



#### B. Instalasi OpenCV

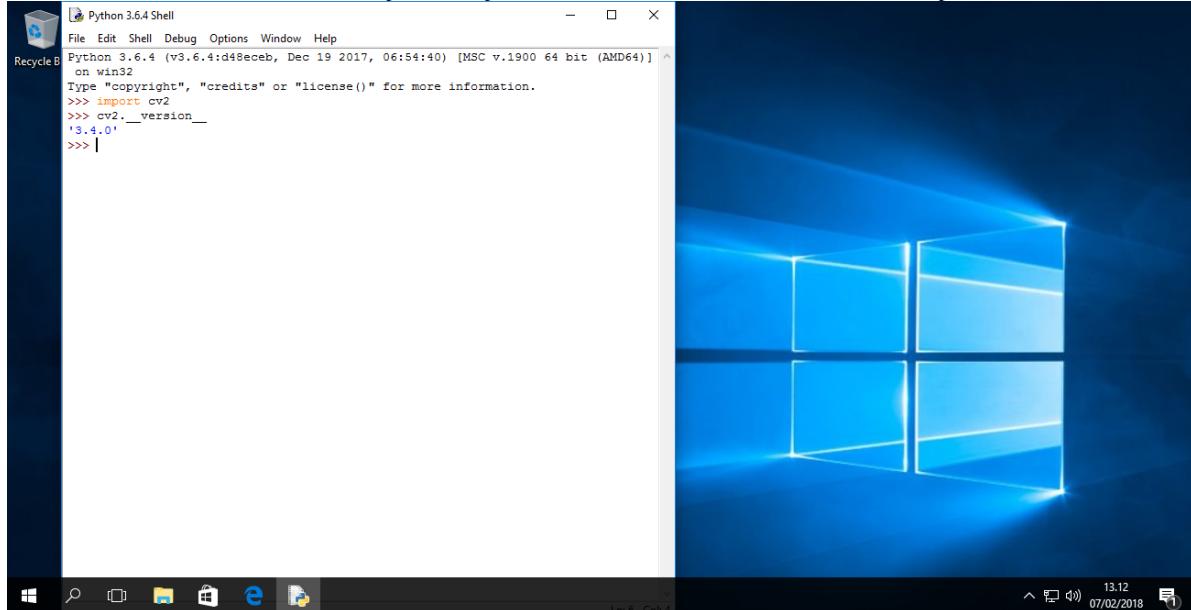
1. Unduh *package OpenCV 3.4.0* / versi terbaru di <https://pypi.python.org/pypi/opencv-contrib-python>, pilih versi cp36-cp36m-win\_amd64 untuk Windows 64-bit.
2. Buka **Windows Command Prompt sebagai administrator**. Pasang OpenCV dengan menggunakan perintah berikut.
  - 1) cd <path>
  - 2) pip install opencv\_contrib\_python-3.4.0.12-cp36-cp36m-win\_amd64.whl
 Ubah <path> ke lokasi *package* OpenCV berada, misalnya C:\ (gunakan tanda kutip "") jika terdapat spasi pada path). Perlu diketahui untuk pemasangan OpenCV dibutuhkan NumPy sudah terpasang.



3. Buka **IDLE (Python 3.6 64-bit)** melalui Start Menu. Berikan perintah berikut pada Python Shell.

```
1) import cv2  
2) cv2.__version__
```

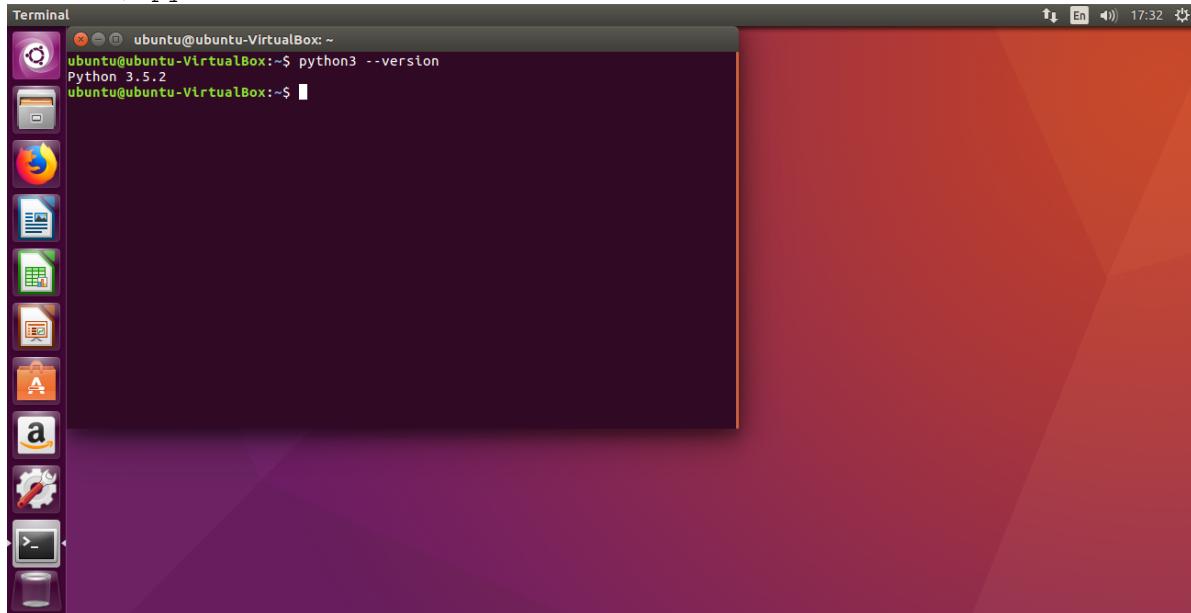
Jika telah muncul tampilan seperti di bawah ini, maka instalasi OpenCV telah berhasil.



## Pengguna Ubuntu

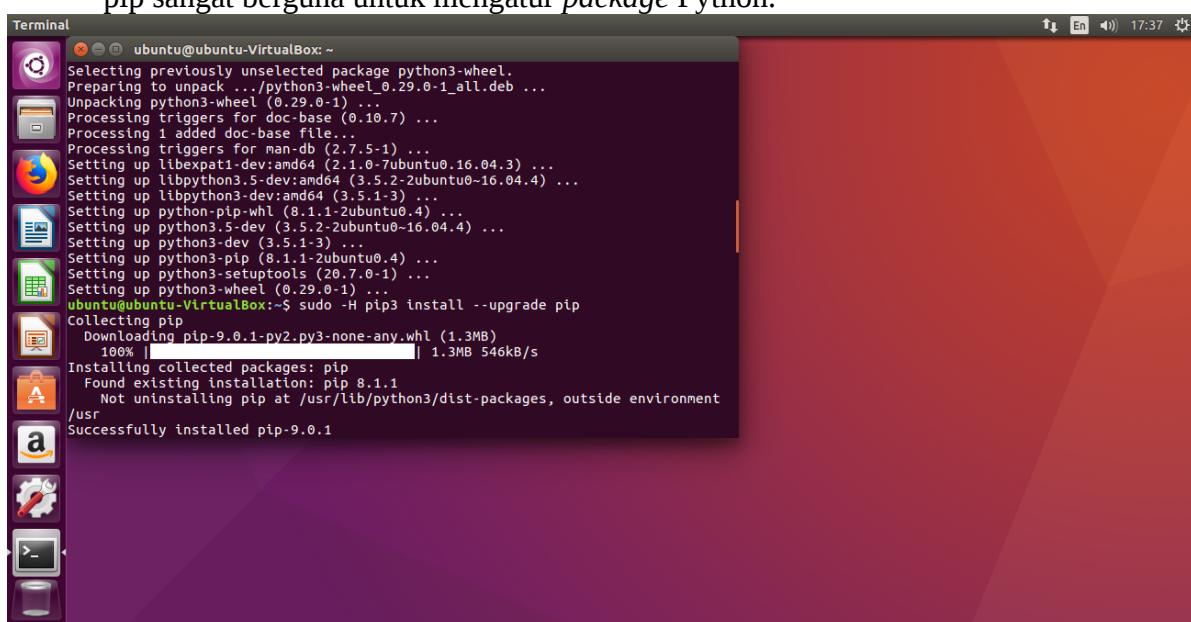
### A. Instalasi Python

1. Pastikan terhubung dengan internet. Buka Terminal, kemudian update Ubuntu dengan memberikan perintah berikut.
  - 1) sudo apt-get update
  - 2) sudo apt-get full-upgrade
  - 3) sudo apt-get autoremove
2. Secara *default* Python 3 otomatis sudah terpasang bersamaan dengan instalasi Ubuntu. Berikan perintah berikut untuk memastikan Python 3 sudah terpasang dan mengetahui versi Python 3.
  - 1) python3 --version



3. Pasang **Python Package Index (pip)** dengan memberikan perintah berikut.

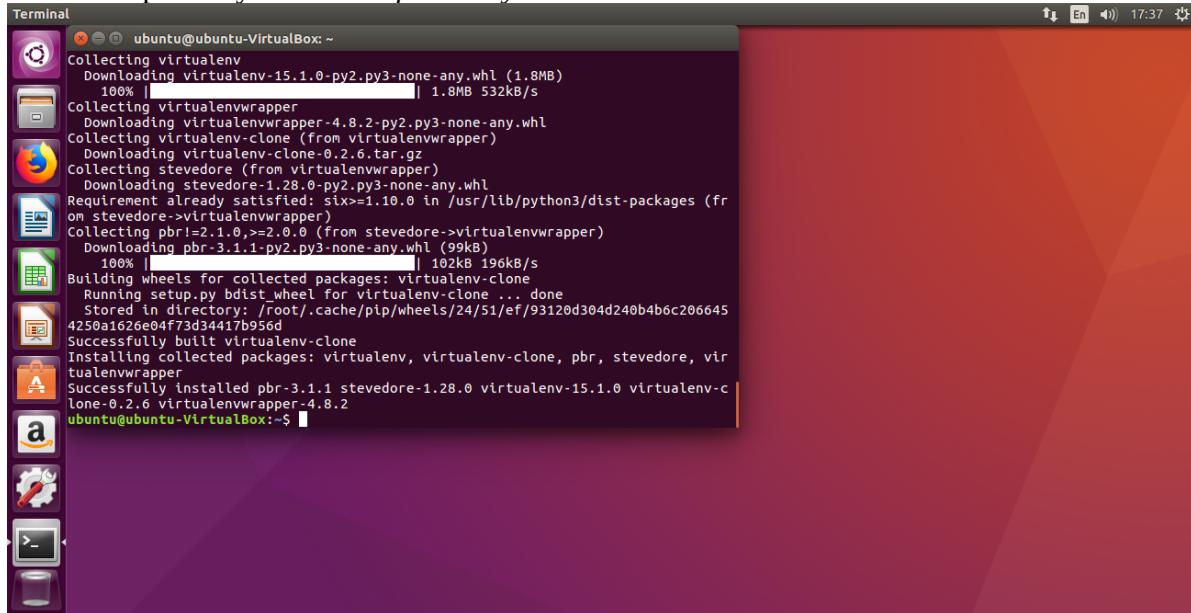
- 1) sudo apt-get install python-pip
  - 2) sudo -H pip install --upgrade pip
- pip sangat berguna untuk mengatur *package* Python.



#### 4. Pasang Python Virtual Environment dengan memberikan perintah berikut.

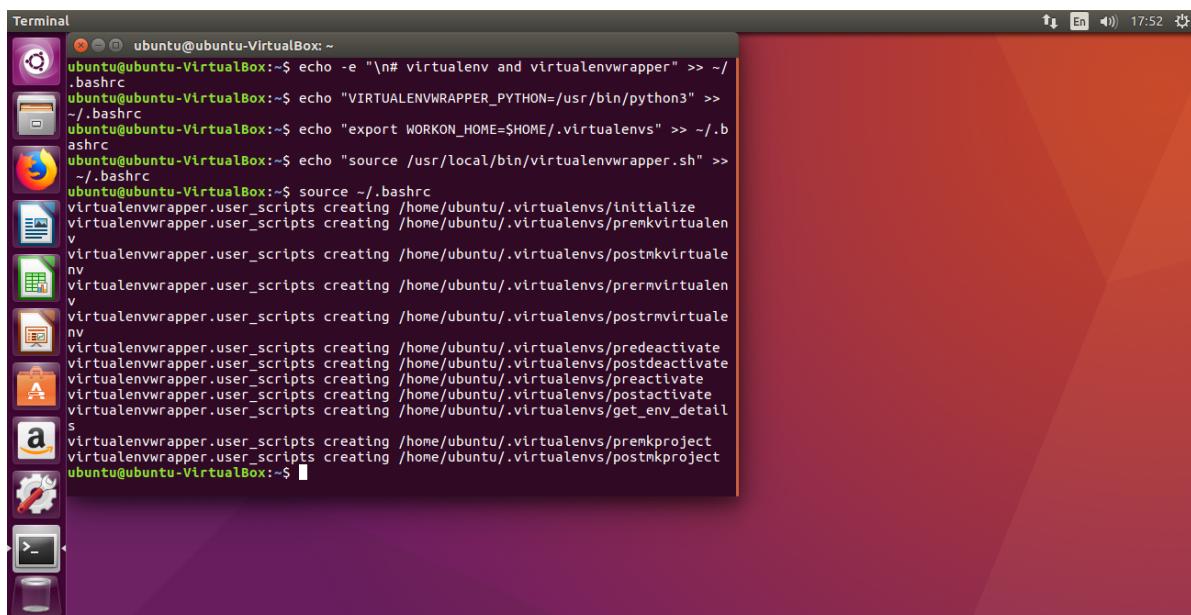
```
1) sudo -H pip install virtualenv virtualenvwrapper
2) sudo rm -rf ~/.cache/pip
3) echo -e "\n# virtualenv and virtualenvwrapper" >> ~/.bashrc
4) echo "VIRTUALENVWRAPPER_PYTHON=/usr/bin/python3" >> ~/.bashrc
5) echo "export WORKON_HOME=$HOME/.virtualenvs" >> ~/.bashrc
6) echo "source /usr/local/bin/virtualenvwrapper.sh" >> ~/.bashrc
7) source ~/.bashrc
```

virtualenv adalah alat untuk membuat *environment* Python yang terisolasi dan sangat berguna karena menjadikan dapat memasang *package/executable* Python di dalamnya, tanpa menyebabkan *dependency* di luar *virtual environment*.



The terminal window shows the following output:

```
ubuntu@ubuntu-VirtualBox:~$ Collecting virtualenv
  Downloading virtualenv-15.1.0-py2.py3-none-any.whl (1.8MB)
    100% |████████████████████████████████| 1.8MB 532kB/s
Collecting virtualenvwrapper
  Downloading virtualenvwrapper-4.8.2-py2.py3-none-any.whl
Collecting virtualenv-clone (from virtualenvwrapper)
  Downloading virtualenv-clone-0.2.6.tar.gz
Collecting stevedore (from virtualenvwrapper)
  Downloading stevedore-1.28.0-py2.py3-none-any.whl
Requirement already satisfied: six==1.10.0 in /usr/lib/python3/dist-packages (from stevedore->virtualenvwrapper)
Collecting pbr!=2.1.0,>=2.0.0 (from stevedore->virtualenvwrapper)
  Downloading pbr-3.1.1-py2.py3-none-any.whl (99kB)
    100% |████████████████████████████████| 102kB 196kB/s
Building wheels for collected packages: virtualenv-clone
  Running setup.py bdist_wheel for virtualenv-clone ... done
  Stored in directory: /root/.cache/pip/wheels/24/51/ef/93120d304d240b4b6c2066454250a1626e04f73d34417b956d
Successfully built virtualenv-clone
Installing collected packages: virtualenv, virtualenv-clone, pbr, stevedore, virtualenvwrapper
Successfully installed pbr-3.1.1 stevedore-1.28.0 virtualenv-15.1.0 virtualenv-clone-0.2.6 virtualenvwrapper-4.8.2
```

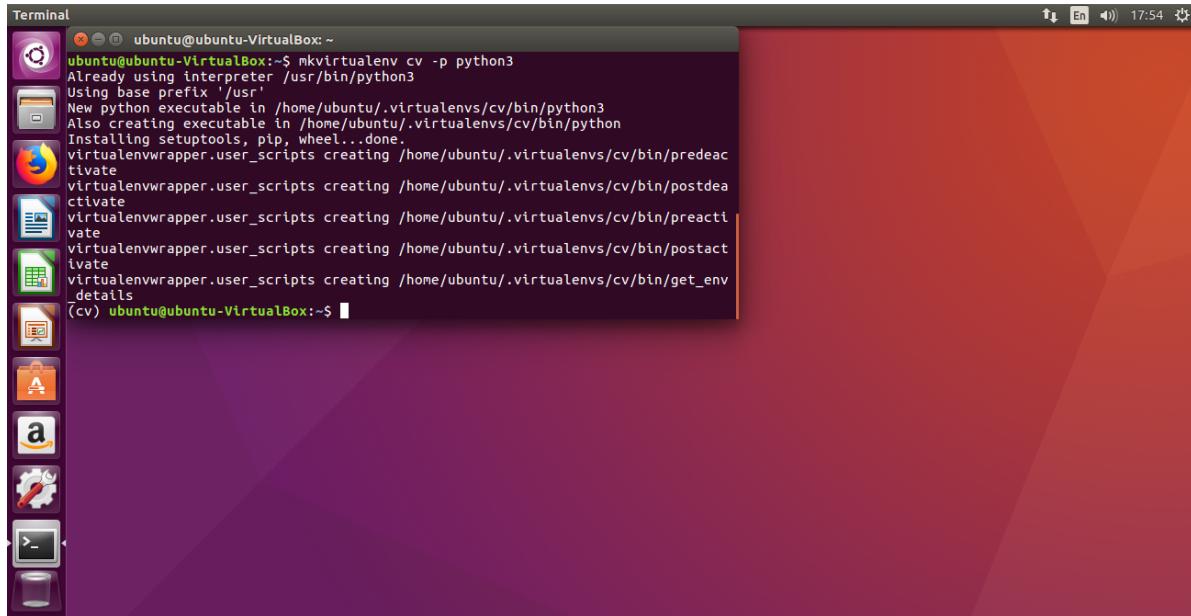


The terminal window shows the following output:

```
ubuntu@ubuntu-VirtualBox:~$ echo -e "\n# virtualenv and virtualenvwrapper" >> ~/.bashrc
ubuntu@ubuntu-VirtualBox:~$ echo "VIRTUALENVWRAPPER_PYTHON=/usr/bin/python3" >> ~/.bashrc
ubuntu@ubuntu-VirtualBox:~$ echo "export WORKON_HOME=$HOME/.virtualenvs" >> ~/.bashrc
ubuntu@ubuntu-VirtualBox:~$ echo "source /usr/local/bin/virtualenvwrapper.sh" >> ~/.bashrc
ubuntu@ubuntu-VirtualBox:~$ source ~/.bashrc
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/initialize
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/premkvirtualenv
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/postrmvirtualenv
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/prermvirtualenv
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/postrmvirtualenv
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/predeactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/postdeactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/preactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/postactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/get_env_details
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/premkproject
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/postmkproject
ubuntu@ubuntu-VirtualBox:~$
```

#### B. Instalasi OpenCV

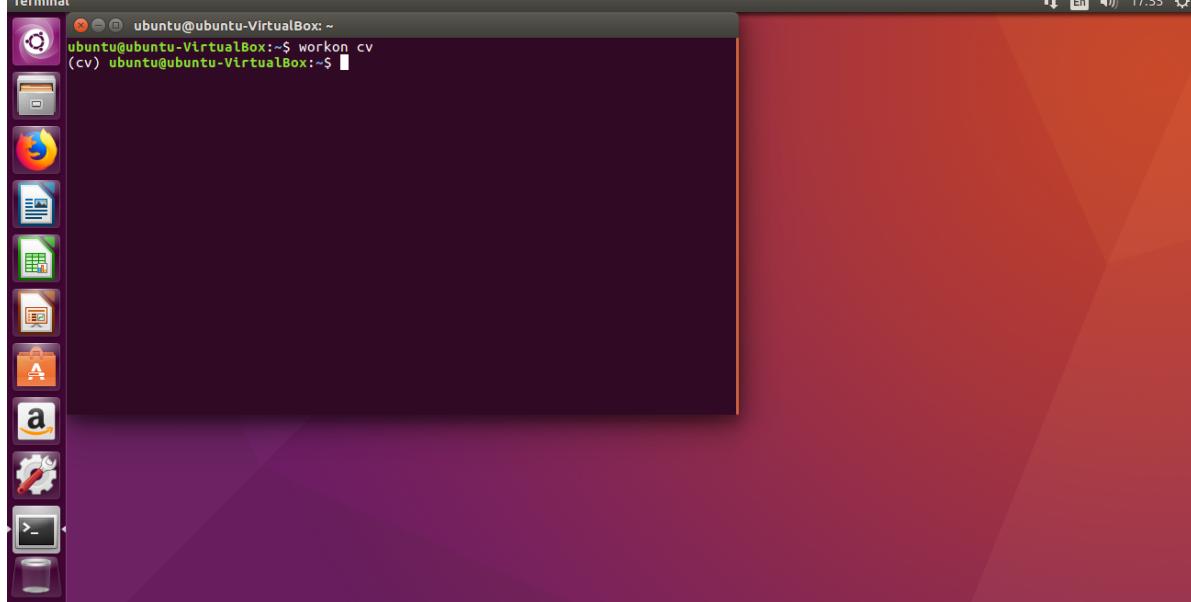
1. Pastikan terhubung dengan internet. Buka Terminal, kemudian update Ubuntu dengan memberikan perintah berikut.
  - 1) sudo apt-get update
  - 2) sudo apt-get full-upgrade
  - 3) sudo apt-get autoremove
2. Buat *virtual environment* untuk OpenCV dengan Python 3 memberikan perintah berikut.
  - 1) mkvirtualenv cv -p python3



```
Terminal
ubuntu@ubuntu-VirtualBox: ~
ubuntu@ubuntu-VirtualBox:~$ mkvirtualenv cv -p python3
Already using interpreter /usr/bin/python3
Using base prefix '/usr'
New python executable in /home/ubuntu/.virtualenvs/cv/bin/python3
Also creating executable in /home/ubuntu/.virtualenvs/cv/bin/python
Installing setuptools, pip, wheel...done.
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/cv/bin/predeactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/cv/bin/postdeactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/cv/bin/preactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/cv/bin/postactivate
virtualenvwrapper.user_scripts creating /home/ubuntu/.virtualenvs/cv/bin/get_env_details
(cv) ubuntu@ubuntu-VirtualBox:~$
```

3. Masuk ke *virtual environment* OpenCV yang baru saja dibuat dengan memberikan perintah berikut.

- 1) workon cv



```
Terminal
ubuntu@ubuntu-VirtualBox: ~
ubuntu@ubuntu-VirtualBox:~$ workon cv
(cv) ubuntu@ubuntu-VirtualBox:~$
```

Pastikan telah berhasil masuk ke *virtual environment* dengan melihat apakah ada tulisan **(cv)** di sebelah paling kiri teks sebelum nama user.

4. Pasang *package* NumPy dan Matplotlib dengan memberikan perintah berikut.

- 1) pip install numpy
- 2) pip install matplotlib

```
ubuntu@ubuntu-VirtualBox:~$ workon cv
(cv) ubuntu@ubuntu-VirtualBox:~$ pip install numpy
Collecting numpy
  Downloading numpy-1.14.0-cp35-cp35m-manylinux1_x86_64.whl (17.1MB)
    100% |██████████| 17.1MB 45kB/s
Installing collected packages: numpy
Successfully installed numpy-1.14.0
(cv) ubuntu@ubuntu-VirtualBox:~$ pip install matplotlib
Collecting matplotlib
  Downloading matplotlib-2.1.2-cp35-cp35m-manylinux1_x86_64.whl (15.0MB)
    100% |██████████| 15.0MB 71kB/s
Requirement already satisfied: numpy>=1.7.1 in ./virtualenvs/cv/lib/python3.5/site-packages (from matplotlib)
Collecting pyparsing!=2.0.4,!>=2.1.2,!>=2.1.6,>=2.0.1 (from matplotlib)
  Downloading pyparsing-2.2.0-py2.py3-none-any.whl (56kB)
    100% |██████████| 56kB 120kB/s
Collecting six<1.10 (from matplotlib)
  Downloading six-1.11.0-py2.py3-none-any.whl (9kB)
Collecting python-dateutil>=2.1 (from matplotlib)
  Downloading python_dateutil-2.6.1-py2.py3-none-any.whl (194kB)
    100% |██████████| 194kB 160kB/s
Collecting cycler>=0.10 (from matplotlib)
  Downloading cycler-0.10.0-py2.py3-none-any.whl (511kB)
Collecting pytz (from matplotlib)
  Downloading pytz-2017.3-py2.py3-none-any.whl (511kB)
    100% |██████████| 512kB 243kB/s
Installing collected packages: pyparsing, six, python-dateutil, cycler, pytz, matplotlib
Successfully installed cycler-0.10.0 matplotlib-2.1.2 pyparsing-2.2.0 python-dateutil-2.6.1 pytz-2017.3 six-1.11.0
(cv) ubuntu@ubuntu-VirtualBox:~$
```

5. Pasang OpenCV 3.4.0 / versi terbaru dengan memberikan perintah berikut.

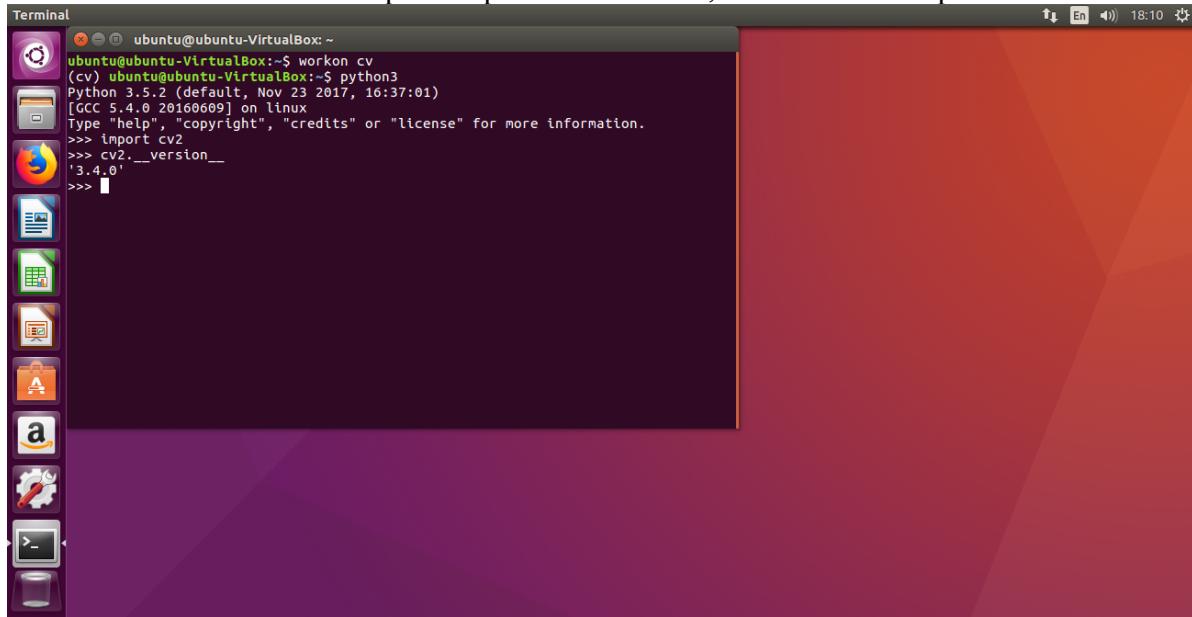
- 1) pip install opencv-contrib-python

```
ubuntu@ubuntu-VirtualBox:~$ pip install opencv-contrib-python
Collecting matplotlib
  Downloading matplotlib-2.1.2-cp35-cp35m-manylinux1_x86_64.whl (15.0MB)
    100% |██████████| 15.0MB 71kB/s
Requirement already satisfied: numpy>=1.7.1 in ./virtualenvs/cv/lib/python3.5/site-packages (from matplotlib)
Collecting pyparsing!=2.0.4,!>=2.1.2,!>=2.1.6,>=2.0.1 (from matplotlib)
  Downloading pyparsing-2.2.0-py2.py3-none-any.whl (56kB)
    100% |██████████| 56kB 120kB/s
Collecting six<1.10 (from matplotlib)
  Downloading six-1.11.0-py2.py3-none-any.whl (9kB)
Collecting python-dateutil>=2.1 (from matplotlib)
  Downloading python_dateutil-2.6.1-py2.py3-none-any.whl (194kB)
    100% |██████████| 194kB 160kB/s
Collecting cycler>=0.10 (from matplotlib)
  Downloading cycler-0.10.0-py2.py3-none-any.whl (511kB)
Collecting pytz (from matplotlib)
  Downloading pytz-2017.3-py2.py3-none-any.whl (511kB)
    100% |██████████| 512kB 243kB/s
Installing collected packages: pyparsing, six, python-dateutil, cycler, pytz, matplotlib
Successfully installed cycler-0.10.0 matplotlib-2.1.2 pyparsing-2.2.0 python-dateutil-2.6.1 pytz-2017.3 six-1.11.0
(cv) ubuntu@ubuntu-VirtualBox:~$ pip install opencv-contrib-python
Collecting opencv-contrib-python
  Downloading opencv_contrib_python-3.4.0.12-cp35-cp35m-manylinux1_x86_64.whl (30.5MB)
    100% |██████████| 30.5MB 31kB/s
Requirement already satisfied: numpy>=1.11.1 in ./virtualenvs/cv/lib/python3.5/site-packages (from opencv-contrib-python)
Installing collected packages: opencv-contrib-python
Successfully installed opencv-contrib-python-3.4.0.12
(cv) ubuntu@ubuntu-VirtualBox:~$
```

6. Buka Python 3 dengan memberikan perintah berikut.

- 1) python3
7. Berikan perintah berikut kepada Python 3 untuk mengetahui apakah OpenCV berhasil terpasang.
- 1) import cv2
  - 2) cv2.\_\_version\_\_

Jika telah muncul tampilan seperti di bawah ini, maka instalasi OpenCV telah berhasil.



8. Pastikan setiap saat membuka Terminal baru untuk masuk ke dalam *virtual environment* OpenCV dengan perintah `workon cv`.

### Contoh Program Penampil Citra

```
import numpy as np
import cv2

img = cv2.imread('messi.jpg',0)
cv2.imshow('image',img)
k = cv2.waitKey(0)
if k == 27 & 0xFF:      # wait for ESC key to exit
    cv2.destroyAllWindows()
elif k == ord('s'): # wait for 's' key to save and exit
    cv2.imwrite('messigray.png',img)
    cv2.destroyAllWindows()
```

