Image Processing with Python and OpenCV

IMAGE PROCESSING WITH PYTHON

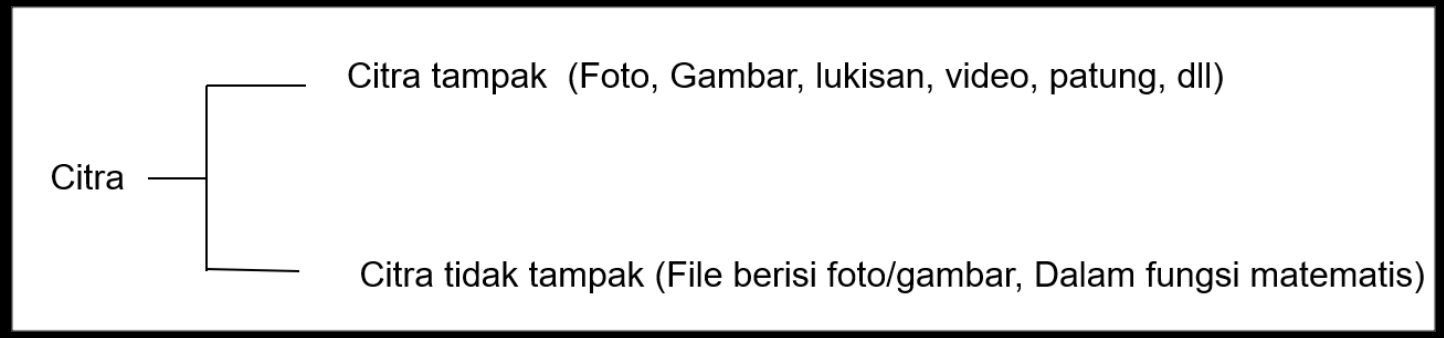
CITRA

- Menurut kamus Indonesia-Inggris karangan John M. Echols dan Hassan Shadily :

  Citra = *Image*

- Menurut Webster, citra adalah :

  "***suatu representasi (gambaran), kemiripan, atau imitasi dari suatu obyek***"

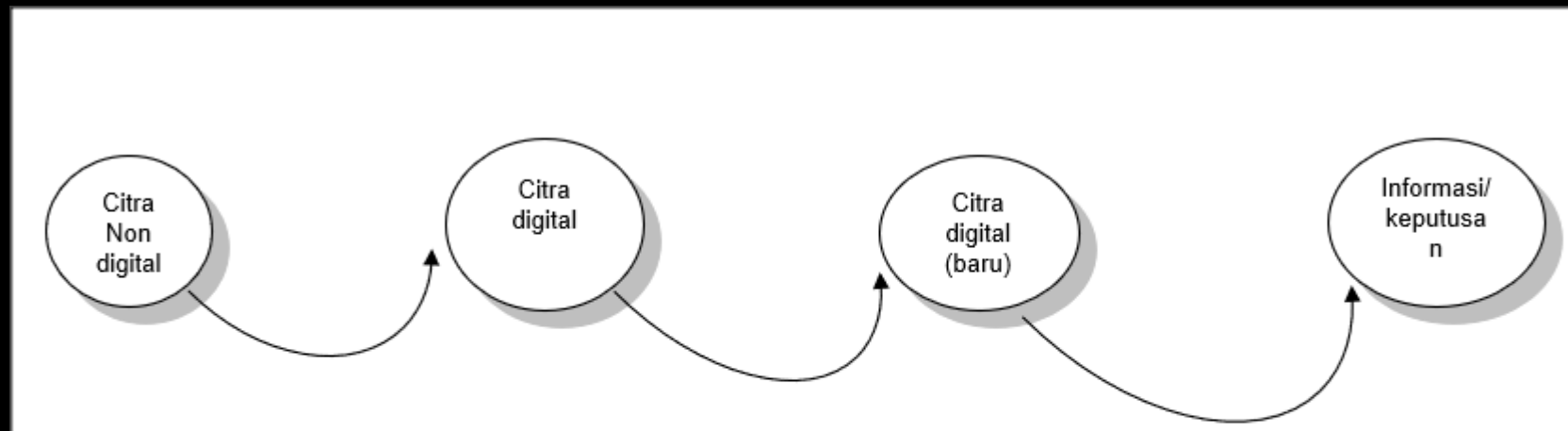


Citra Digital = Citra yang disimpan dalam format digital (misalnya : file)

Istilah

- **Pencitraan** (imaging)
  - Kegiatan transformasi dari citra tampak menjadi citra digital Beberapa alat yang dapat digunakan untuk pencitraan adalah : Scanner, Kamera Digital, Photo sinar-x/sinar infra merah.
- **Analisis Citra** :
  - Adalah kegiatan menganalisis citra sehingga menghasilkan informasi untuk menetapkan keputusan (biasanya di dampingi bidang AI).

Alur



Pencitraan
Scanner
Kamera Digital
Sinar-X, Infra Red

Pengolahan Citra
- Perbaikan Citra (image restoration)
- Peningkatan Kualitas (image enhancement)
- Transformasi (image transformation)

Analisis Citra
- Pengenalan Pola (pattern recognition)

Klasifikasi

- Perbaikan Citra (image restoration) :
  - Modifikasi Kecemerlangan
  - Peningkatan Kontras
  - Pengambangan
- Transformasi (image transformation) :
  - Pencerminan (flipping)
  - Rotasi/pemutaran (Rotating)
  - Pemotongan (Cropping)
  - Penskalaan (Scaling/Zooming)
- Peningkatan Kualitas (image enhancement) :
  - Penggabungan Citra (image blending)
  - Deteksi gerakan (motion detection)
  - Operasi Logika (Logic Operation)
  - Penajaman Citra (Sharping)
  - Efek EMBOSS

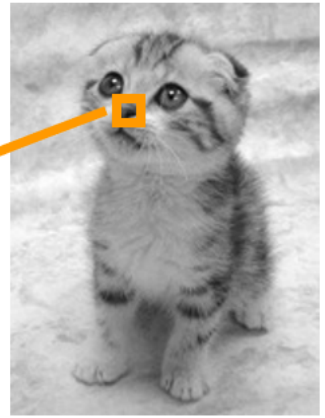
Citra Digital

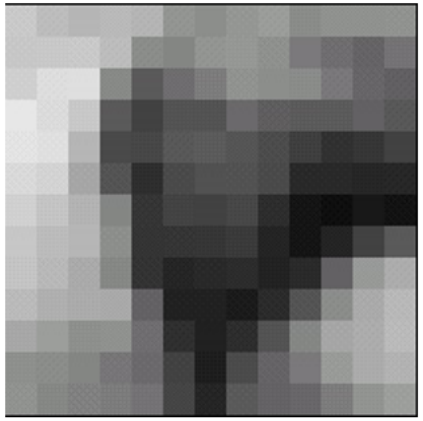
CITRA

f(x,y)

Intensitas warna
pada koordinat x,y

201	188	181	185	180	147	140	149	155	138	144	144	145
199	200	201	188	139	132	147	150	143	123	112	102	117
207	221	222	136	90	111	125	145	140	138	122	104	97
231	219	200	90	65	84	84	107	95	92	92	99	89
227	223	181	74	72	89	92	86	77	63	50	55	65
217	211	166	85	47	75	82	83	75	42	42	39	40
208	195	179	131	54	68	66	72	46	21	15	24	19
198	187	181	141	53	54	55	59	37	21	37	66	90
195	184	170	134	52	38	42	45	35	43	98	152	172
186	175	171	169	100	34	34	27	44	85	139	170	184
167	156	142	144	112	48	32	46	84	133	166	172	186
142	139	131	120	108	67	30	76	102	123	153	171	178
145	134	128	125	117	70	38	91	101	105	125	146	157





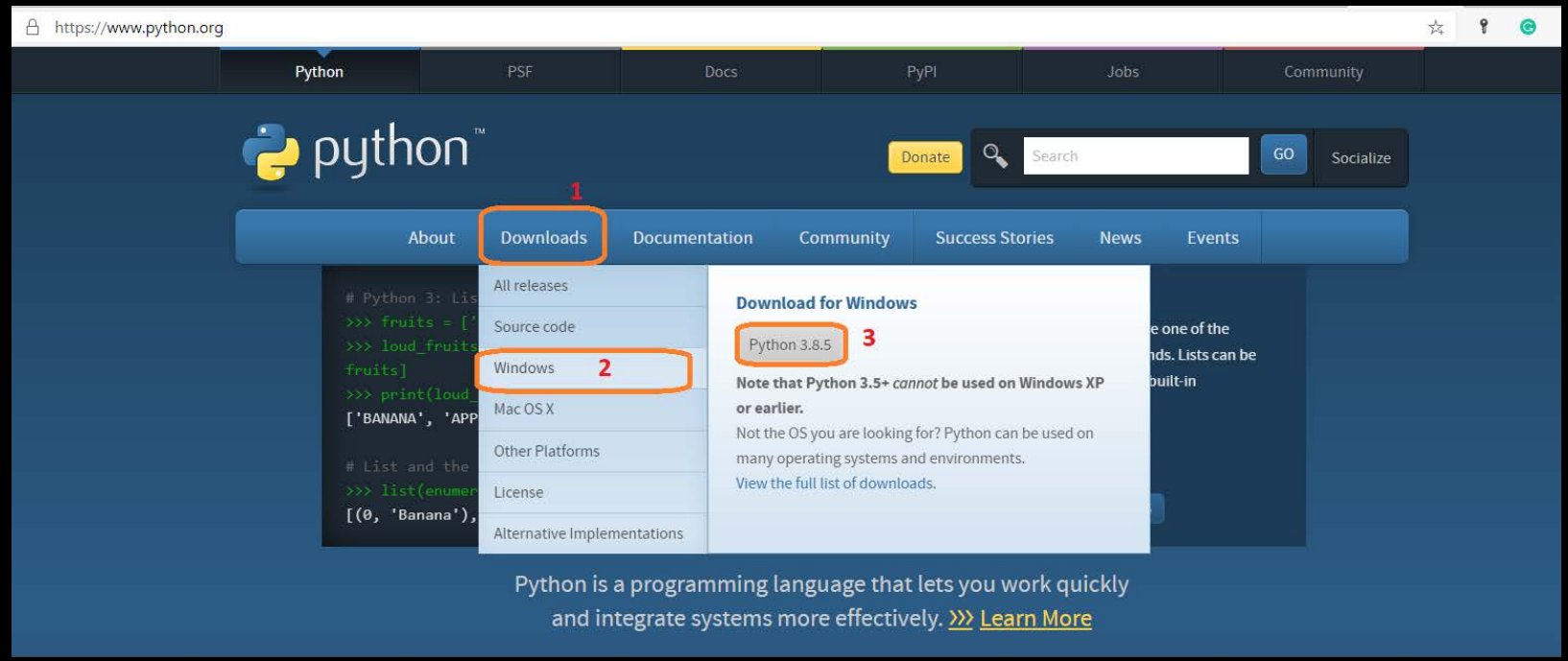
Deskripsi

- Image dibentuk oleh beberapa pixel = picture element
- Pixel mempunyai 2 atribut yaitu :
  - koordinat -> (x,y)
  - intensitas warna -> f(x,y)
- Pengolahan citra berhubungan dengan 2 atribut tersebut dan pengembangannya

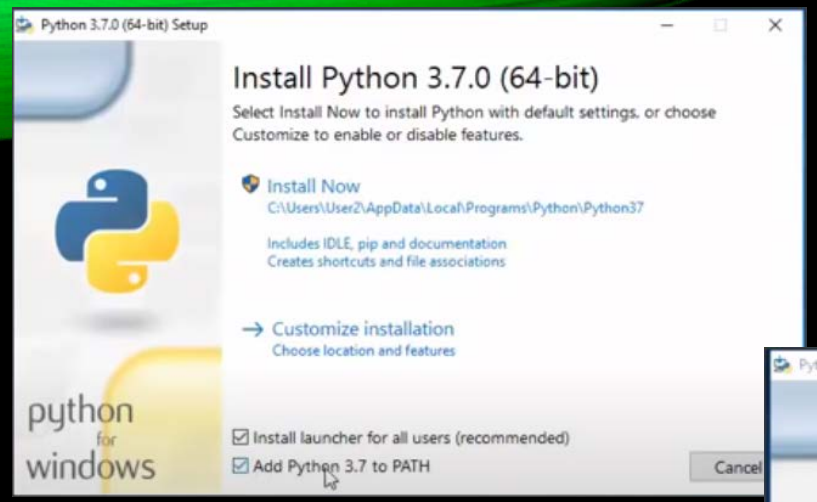
Image Processing with Python and OpenCV

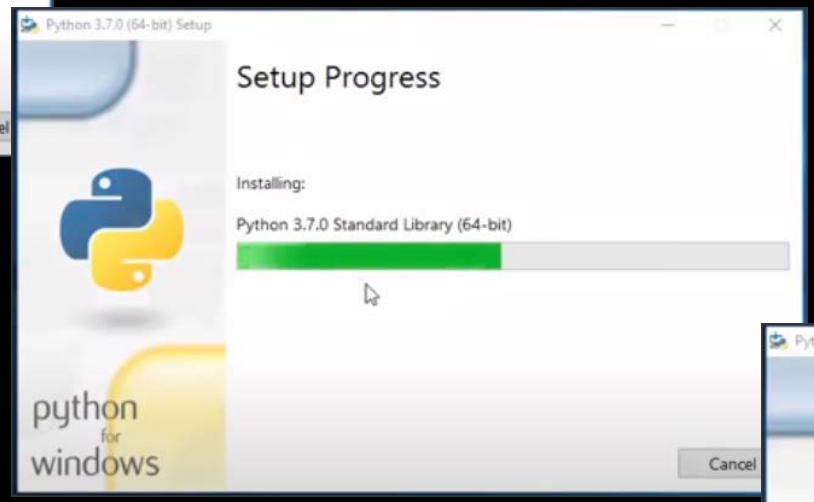
Install Python

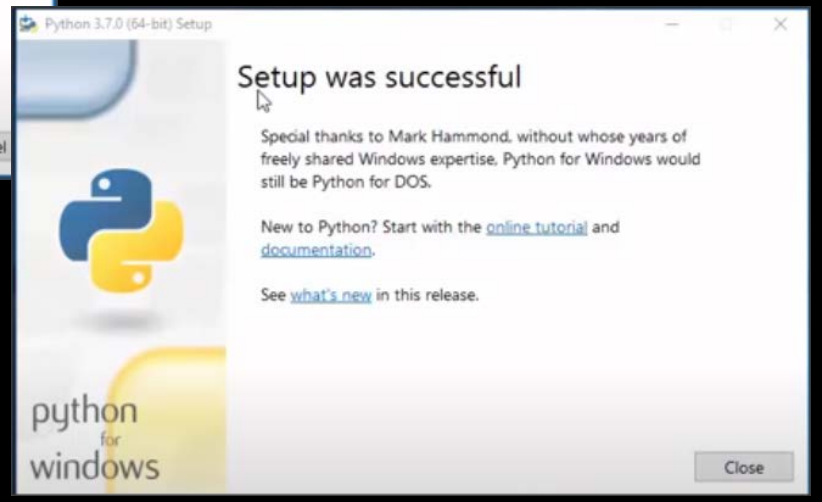
- Go to python.org



Progress Install Python

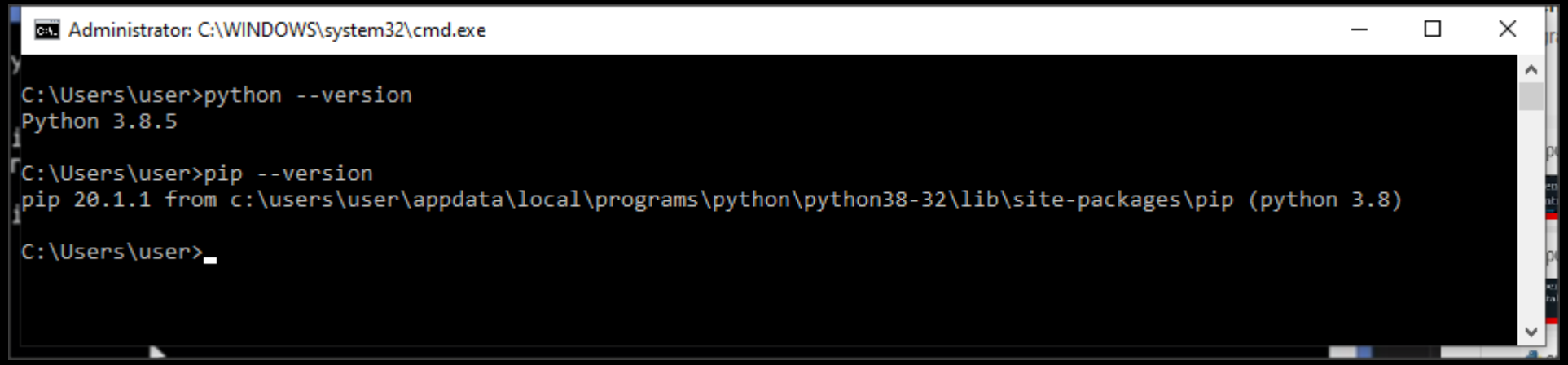






Cek Python Version

- Via command prompt
  - python –version
  - pip –version



Install OpenCV

- Via PIP (Package Manager)

```
C:\Users\ProgrammingKnowledge>pip install opencv-python
Collecting opencv-python
  Downloading https://files.pythonhosted.org/packages/cc/3c/e9b46d4ff65d4dfcca1789e32113f38d5fc18048
40a4aa0bc2437ecef860/opencv_python-4.0.0.21-cp37-cp37m-win_amd64.whl (30.4MB)
    100% |                                | 30.4MB 195kB/s
Requirement already satisfied: numpy>=1.14.5 in c:\python\python37\lib\site-packages (from opencv-py
thon) (1.16.0)
Installing collected packages: opencv-python
Successfully installed opencv-python-4.0.0.21
You are using pip version 10.0.1, however version 19.0.1 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
```

- Check for version
  - Via cmd (globally)
  - Via cmd (by code)

Editor For Python Code

- IDE (Integrated Development Environment)
  - Visual Studio Community (2013, 2015, 2017, 2019)
  - Visual Studio Code
  - Pycharm
  - Anaconda -> Spider
- Editor
  - Notepad++
  - Sublime

Lets Start

Load an Image

```python
# import library open cv
import cv2

#load image (simpan image dalam 1 folder dengan source code)
img = cv2.imread('template.png', 0)
#tampilkan dalam 1 windows utama
cv2.imshow('gambar saya ', img)
#tunggu action dari user
cv2.waitKey(0)
#hapus semua windows (form) yang ada
cv2.destroyAllWindows()
```

Read an image

cv2.imread() Second argument is a flag which specifies the way image should be read.

flag	integer value	description
cv2.IMREAD_COLOR	1	Loads a color image.
cv2.IMREAD_GRAYSCALE	0	Loads image in grayscale mode
cv2.IMREAD_UNCHANGED	-1	Loads image as such including alpha channel