Computer Vision Course — A.A. 2020/2021

Lab 1: OpenCV Intro

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Recommendations

- Feel free to interrupt and ask questions
- If you have any doubt, you can ask me after lecture or drop me an e-mail: niccolo.bisagno@unitn.it

Feedback

- First time the Lab is run remotely
- Any feedback is welcome, **especially** negative ones
- Anonymous feedback form at the end of this week

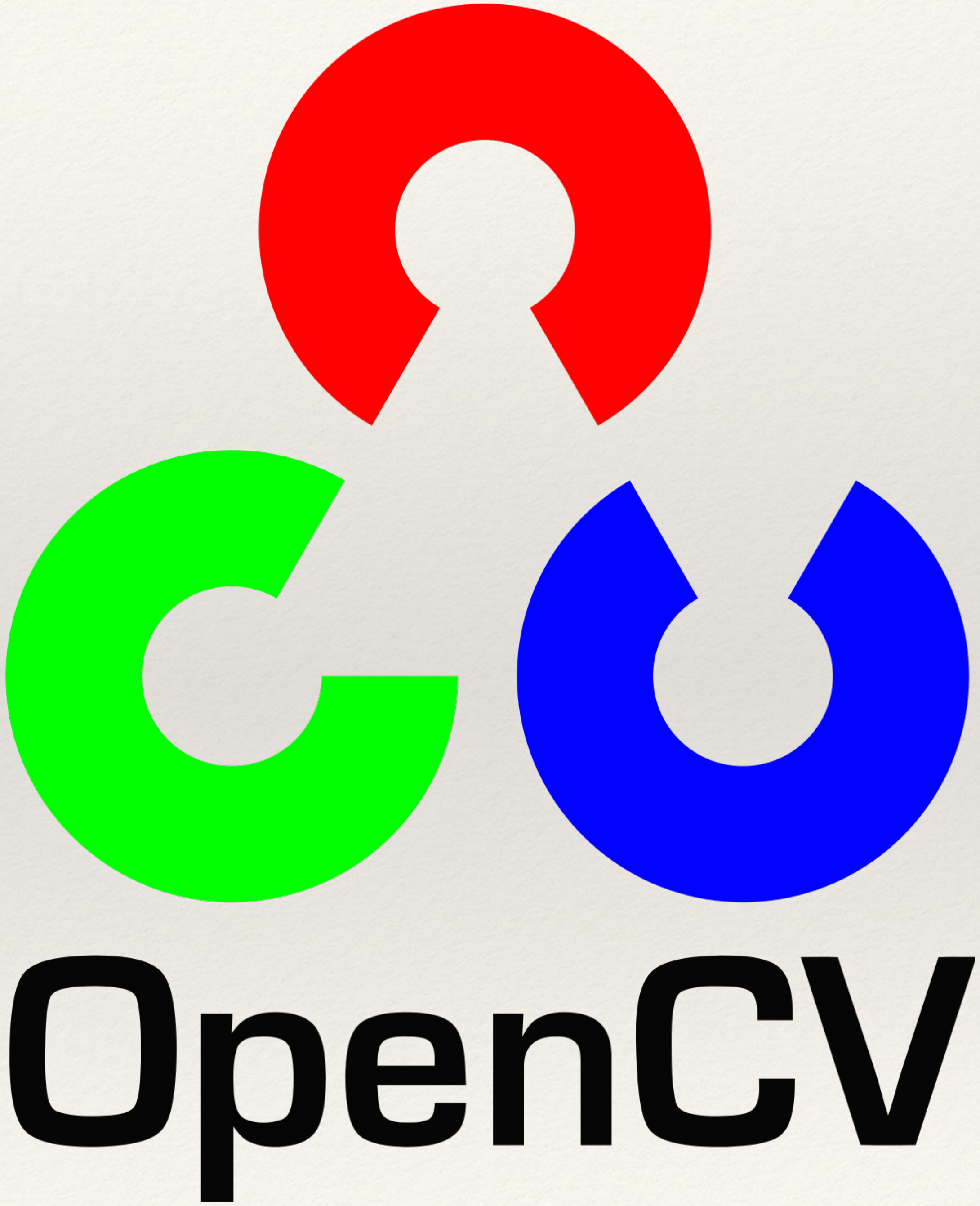
Any questions so far?

What's up today

- What is OpenCV?
- The Virtual Machine
- How to initialise project in OpenCV
- How to open and display images
- How to open and display videos

What is OpenCV?

- Computer Vision library
- Open source
- Website: opencv.org



What is OpenCV?

OpenCV is an Open Source Computer Vision Library: it's a collection of C/C++, Python and Java implementations of some of the popular algorithms of image processing and computer vision, which cover:

- 2D/3D feature toolkit
- Works for images and videos
- Face/gesture recognition
- Segmentation and recognition
- Tracking
- Image/video load, save, display
- Many more…

Why OpenCV?

- Fully supported and widely used
- Open Source
- Huge number of algorithms ready to use
- Recognised as the reference library by the research community
- Has good interface also for newbies

The working environment

Prerequisites:

- Virtual Box: www.virtualbox.org
- Virtual Box Guest Additions
- Recommended: Virtual Box Extension Pack

- **Characteristics:**
- OS: Ubuntu 18.04 LTS
- User: mmlab
- Password: mmlab
- OpenCV version: 4.1.2-pre

How to initialise a project: Python

- Start Visual Studio Code
- Create a new folder under Python path
- Create a new file e.g. main.py
- Open file
- Press play

How to open and display images (Python)

```
import cv2 as cv

image = cv.imread("/home/mmlab/workspace/Python/Google.jpg",1)
cv.imshow('image',image)
cv.waitKey(0)
```

How to open and display videos (Python)

```
import numpy as np
import cv2 as cv

cap = cv.VideoCapture(0)

while(True):
    # Capture frame-by-frame
    ret, frame = cap.read()

   # Display the resulting frame
    cv.imshow('frame',frame)
    cv.waitKey(1)


# # When everything done, release the capture
cap.release()
```

How to initialise a project: C++

- **Start Visual Studio Code**
- Create a new folder under C++ path
- Create a new file e.g. main.cpp
- Create a new file CMakeLists.txt

```
cmake_minimum_required(VERSION 2.8)
project( ProjectName )
find_package( OpenCV REQUIRED )
include_directories( ${OpenCV_INCLUDE_DIRS} )
include_directories( ${PROJECT_SOURCE_DIR} )
add_executable( ProjectName main.cpp )
target_link_libraries( ProjectName ${OpenCV_LIBS} )
```

- Now you have linked the OpenCV libraries with your project
- Open the project folder in Terminal
- In Terminal: ‘**cmake .**’ to compile the project in the current folder
- In Terminal: ‘**make**’ to build an executable of your project
- In Terminal: ‘**./ProjectName**’ to run your executable

How to open and display images (C++)

```
#include <opencv2/opencv.hpp>
#include <opencv2/highgui.hpp>

using namespace cv;

int main( int argc, char** argv )
{
  Mat image;
  image = imread("Google.jpg", 1);

  namedWindow("Window",1);
  imshow("Window", image);
  waitKey(0);

  return 0;
}
```

How to open and display videos (C++)

```
#include <opencv2/opencv.hpp>
#include <opencv2/highgui.hpp>
using namespace cv;

int main( int argc, char** argv )
{
  Mat image;
  VideoCapture cap;
  cap.open("Video.mp4");
  if(!cap.isOpened())
          return 0;

  namedWindow("Window",1);

  for(;;){
          cap >>image;
          imshow("Window", image);

          if(waitKey(10) >= 0) break;
  }
  return 0;
}
```