UNIVERSITÀ DEGLI STUDI DI PADOVA

The OpenCV library

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Agenda

- OpenCV: history and motivation
- Structure of the OpenCV library
- Installing OpenCV

Disclaimer

- This Computer Vision course is meant for computer engineering students and has **programming and C++** as a **pre-requisite**

- The slides of this lecture are meant:
  - To provide an overview
  - To deliver some concepts
  - To provide a list of keywords

- Details shall be already known/learned on your side
- Time dedicated to these activities **is not part** of the CV **course workload**

The OpenCV library

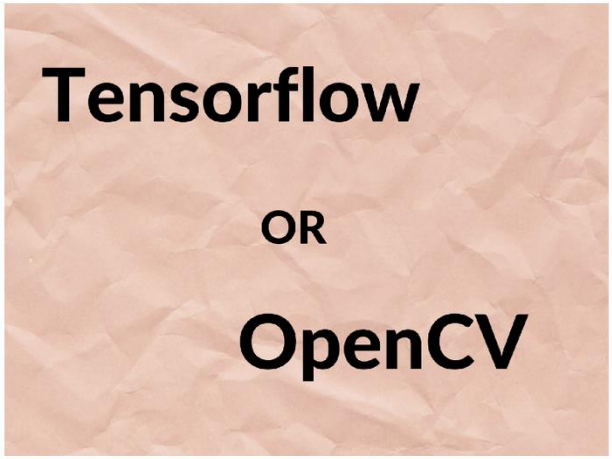
- 1999: Born as an Intel project (IPL, Intel Performance Library)
- 2006: version 1.0 released
- 2009: version 2.0 released (C -> C++ transition)
- 2012: non-profit organization OpenCV.org takes over support
- 2015: version 3.0 released (new functionalities & algos, support to other programming languages) https://opencv.org/opencv-3-0.html
- 2018: version 4.0 released (C++11, C removed, better support for deep learning) https://opencv.org/opencv-4-0-0.html
- 2023: latest release, 4.9.0

Choosing our tools

- The C++/Python, OpenCV/Tensorflow dilemma https://towardsdatascience.com/which-is-better-for-your-machine-learning-task-opencv-or-tensorflow-ed16403c5799

Which is Better For Your Machine Learning Task, OpenCV or TensorFlow?

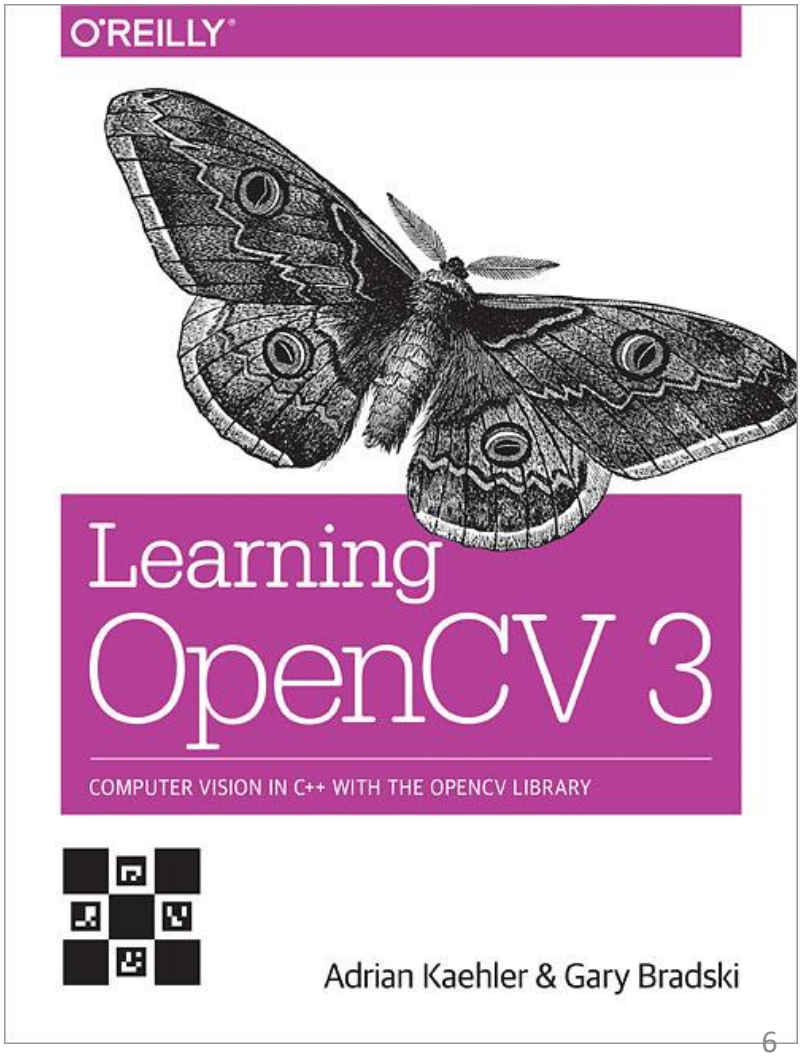
Is one of them really better than the other? An explanation from a ML engineer who uses both frameworks.



made by the author

Book reference

- A. Kaehler, G. Bradsky, "Learning OpenCV 3", O'Reilly



OpenCV modules

core

imgproc | highgui | calib3d | features2d

imgcodecs | videoio | ml | dnn

Extra feature, 3D viz, CUDA, obj detector

See a list of tutorials at https://docs.opencv.org/4.x/d9/df8/tutorial_root.html

OpenCV installation

- Installation process may be
  - From pre-compiled software (someone has already compiled the code)
  - From source files (you compile the code)
- Dependencies: OpenCV (as many other softwares and libraries) depends on other libraries
  - Dependencies shall be installed prior to OpenCV installation

Linux installation

- Linux has a package manager
  - The Operating System (OS) handles software installations
  - Packages and dependencies are easily installed
  - GUI or apt install <package_name>
  - The manager determines what version of the package you can install
- Installation from source is also possible
  - Compile the sources
  - We can choose the version of the package to be installed
  - The package manager may be used to install the dependencies

Windows installation

- Windows does not have a package manager
- Installers are used instead
  - The installer handles software installation
- Installation from source is also possible
- OpenCV can be found online using a **GIT repo**

Building a library

- The library is built using a building tool: Cmake
- After building, the library shall be installed
  - Windows: install in a custom directory
  - Linux: standard directories are used
- Installation places in a given path the files
  - Headers
  - Library files (compiled), static/dynamic

Installation directories

- Windows: custom directories are provided
  - They shall be placed in some environment variables
- Linux: standard directories are used
  - Package manager installation: /usr/include and /usr/lib
  - Installation from source: /usr/local/include and /usr/local/lib

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