Image Basics with OpenCV

PIERIAN DATA

Computer Vision with Python

- **Image Basics with OpenCV**
  - In this section we will begin building an understanding of how to use the OpenCV library.
  - Specifically how to open images and draw on them.
  - Later on we will expand on this.

Computer Vision with Python

- OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision.
- Created by Intel in 1999, it is written in C++ (we will be using the Python bindings)

Computer Vision with Python

- It contains many popular algorithms for computer vision, including object detection and tracking algorithms built-in.
- We'll start with the basics and slowly work our way up!

Image Basics with OpenCV

- Section Goals:
  - Be able to open image files with OpenCV in both a notebook and a python script.
  - Draw simple geometries on images.
  - Directly interact with an image through callbacks.

Opening Image Files Notebook

PIERIAN DATA

Opening Image Files OpenCV Python Script

PIERIAN DATA

Image Basics with OpenCV

- In this lecture we will use OpenCV to display images in their own separate window outside of Jupyter.
- For more complex video and image analysis, we'll need to display outside of Jupyter.

Image Basics with OpenCV

- While we often will just use **plt.imshow** to display images inside of a notebook, sometimes we want to use OpenCV on its own to display images in their own window.
- Often Jupyter (being browser based) interferes with closing the window.

Image Basics with OpenCV

- Many times JupyterLab can display a new window with no issues, but the kernel crashes when the OpenCV window is closed.
- To fix this potential issue, simply restart the kernel.

Image Basics with OpenCV

- These issues appear more on MacOS and Linux than Windows.
- If you get the kernel error often, simply run the code as a separate Python script.
- Let’s show how to open and display images directly with OpenCV both in the notebook and as a script!

Image Basics with OpenCV

- Let’s now see how to open files using OpenCV and a normal Python .py script.
- Make sure you understand how to run python scripts at your command line before beginning this part of the lecture!

Drawing on Images Part Two

Direct Drawing with Mouse - Part Three

Image Basics with OpenCV

- We can use CallBacks to connect images to event functions with OpenCV.
- This allows us to directly interact with images (and later on videos).

Image Basics with OpenCV

- In this 3 part lecture we will cover
  - Connecting Callback Functions
  - Adding Functionality through Event Choices
  - Dragging the Mouse for Functionality

Image Basics with OpenCV Assessment

Image Basics Assessment Solutions