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| OPenCV Tutorial |
| Team error404 |
| The Lab | KDG 2020-2021 |



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| Introduction |
| In this tutorial we will introduce you to the basic of OpenCV. OpenCV is a python Library which is mainly use for real-time computer vision. For our project we will use it to recognize certain objects and colors with our drone. |

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| ARDRONE AUTONOMY (Drone driver)  GAZEBO SIMULATOR    ROS IMAGE SENDER | Decorative |
| Requirments |
| ROS Lorem ipsum dolor sit amet consectetur adipiscing. Nisi lacus sed viverra tellus. Orci eu lobortis elementum nibh tellus molestie nunc non. Laoreet suspendisse interdum consectetur libero id faucibus nisl tincidunt. Pharetra massa massa ultricies mi quis hendrerit dolor. Non tellus orci ac auctor augue mauris augue neque gravida.  **Gazebo simulator**    **Tum Simulator** WEBCAm For this tutorial we want to realtime recognize objects. Because this is a tutorial instead of using a drone we opt for a webca |
| OPENCV (image analysis)  CV - BRIDGE  ARDRONE AUTONOMY (Drone driver) |

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| installing opencv |
| Open up the terminal and run the following command. This wil install the opencv library which we will use in this tutorial to identify objects.  Pip3 install opencv-python  Open up the terminal and run the following command. This wil install the latest opencv version.  Pip3 install matplotlib  We will be using matplot to show us a visualization of the images. Those images are single frames from the camera of the parrot drone which we will be using to analyze.  Aswell as showing the results of the image recognition system we are going to build.   packages import numpy as np  import argparse  import cv2  import   * cv2 is the openCv library * numpy is an library to create powerful n-dimensional arrays |
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| Initialisation modelNeural net model net = cv2.dnn.readNetFromCaffe(args["prototxt"], args["model"])numpy as np parameters  * --image    : The path to the input image.   * --prototxt    : The path to the prototxt file.   * --model    : The path to the pre-trained model.   * --confidence    : The minimum probability threshold to filter weak detections. The default is 20%. | |
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| Load image into blob and pass to model First we shape the image so it can fit in the blob. Then we use the opencv function to create a blob from the image. | |
| image = cv2.imread(args["image"])  (h, w) = image.shape[:2]  blob = cv2.dnn.blobFromImage(cv2.resize(image, (300, 300)), 0.007843, (300, 300), 127.5)  Now we are going to pass the blob through the model to make a prediction.  net.setInput(blob)  detections = net.forward()  blob = cv2.dnn.blobFrom # loop over the detections  for i in np.arange(0, detections.shape[2]):  confidence = detections[0, 0, i, 2]  if confidence > args["confidence"]:  # extract the index of the class label from the `detections`,  # then compute the (x, y)-coordinates of the bounding box for  # the object  idx = int(detections[0, 0, i, 1])  box = detections[0, 0, i, 3:7] \* np.array([w, h, w, h])  (startX, startY, endX, endY) = box.astype("int")  label = "{}: {:.2f}%".format(CLASSES[idx], confidence \* 100)  print("[INFO] {}".format(label))  cv2.rectangle(image, (startX, startY), (endX, endY),  COLORS[idx], 2)  y = startY - 15 if startY - 15 > 15 else startY + 15  cv2.putText(image, label, (startX, y))    cv2.imshow("Output", image)  cv2.waitKey(0)  We first filter out the weak detections by ensuring the `confidence` is greater than the minimum confidence. If that’s true we visualize the result. | |
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| PART 3 | |

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| Testing our code |
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| CONCLUSION |
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