ELECTRICAL TEAM TRAINING

TASK 8

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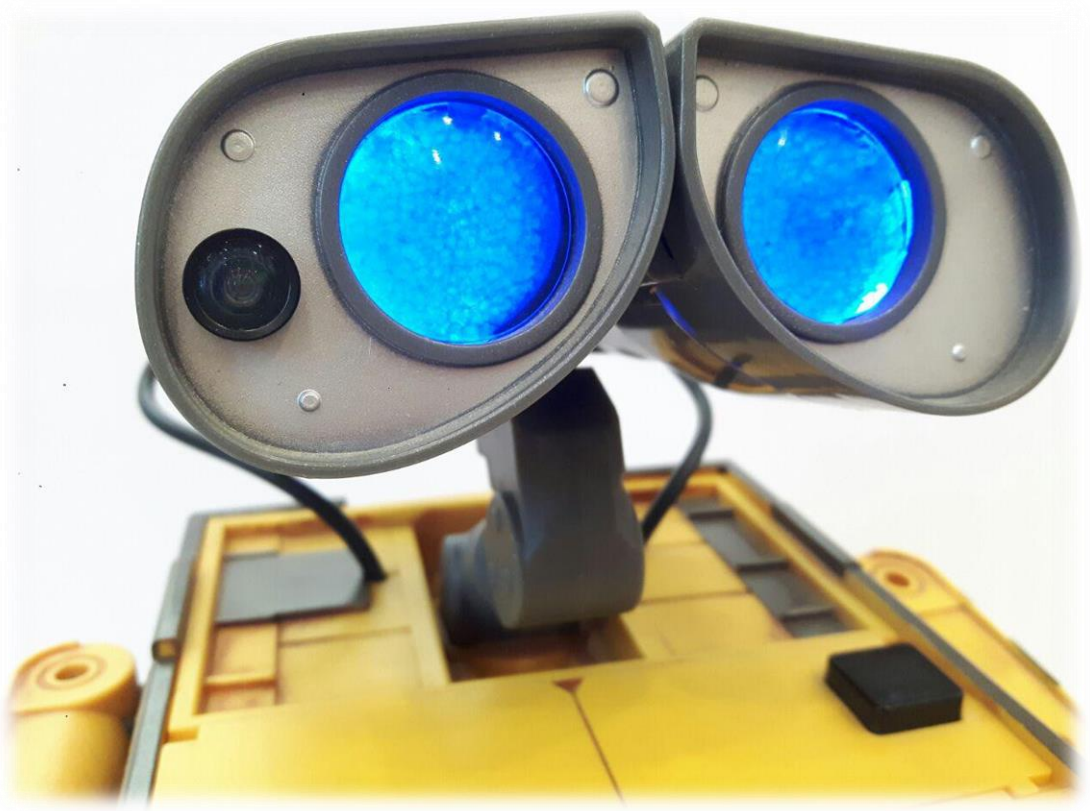
PREFACE



In the ever-evolving mission to rehabilitate their beloved planet, WALL-E and EVE encountered a new challenge. WALL-E, their steadfast and aging robot companion, had diligently served as the primary environmental caretaker for years. However, the passage of time had taken its toll on his computer vision algorithms, which were now struggling to efficiently detect and assess environmental changes.

WALL-E's optical sensors, once at the forefront of technology, were no longer keeping pace with the demands of the mission. The intricate details of the ecosystem's restoration required a higher level of precision, and WALL-E's aging algorithms simply couldn't provide the accuracy needed to identify subtle shifts in the environment this critical issue, EVE, with her advanced technology and unwavering dedication to the mission, decided to step in and offer her expertise. She knew that enhancing WALL-E's computer vision algorithms was essential to the success of their ongoing efforts.

TASK8.1- Classical View

About

The classical computer algorithms that WALL-E relied on in the past encountered limitations as the complexity of the environmental restoration mission increased, struggling to adapt to the evolving challenges such as precise object recognition in cluttered landscapes and dynamic path planning in the ever-changing terrain. planet.

Requirement

- There are 20 images that contain red and blue balls, implementing a classical algorithm using OpenCV, that detects the balls in the images (Classical meansany)
- Detection could be a circle of bounding box around the object

NOTE:

- This task is very challenging, and the team that will get above **95%** accuracy will have a **PRIZE** from MIA team (Accuracy = Right detection/ (Right detection + False detection))
- Aim of this task is to know how **diffult** to create detector using classical methods, and **apprtiate** Deep learning solutions

NOTE:

- This dataset is from ABU ROBOCON 2022 Competition

Output

- (.py) file added to Group repo
- The images with detections

Appendix

- Introduction to Computer Vision (udacity.com)
- OpenCV Course - Full Tutorial with Python - YouTube

TASK8.2-Visual Depth Estimate

About

WALL-E's depth estimate algorithm, enhanced with EVE's technological expertise, provided precise and real-time measurements of the environment's three-dimensional characteristics, enabling him to navigate challenging terrains and assess ecological changes with remarkable accuracy.

Requirement

- Write a Article about different methods to estimate the depth from cameras and get 3D view of the world, using different approaches and cameras such as Mono Camera, stereo camera, and RGBD Camera, (you could use Latex, MD, or any other software)

- (BONUS) Implement Block matching using python (algorithm that could give us depth map from stereo images),

- Q: in the following image if you know the **actual diameter** of each pole (15cm, 10cm), and the Horizontal field of view (HFOV=72) of the camera that take the photo could you know the depth from the camera to each pole?

Output

- (.pdf) file that contains depth estimate article
- (.py) file that contains block-matching implementation
- (.pdf) file show the explanation of the Question and the distances

Appendix

- Stereo Camera Depth Estimation With OpenCV (Python/C++) (learnopencv.com)
- Monocular Depth Estimation | Papers With Code

TASK8.3- You Only Look Once

About

One day, while sifting through a particularly ancient and dilapidated pile of debris, WALL-E made an astonishing discovery. Nestled among the corroded artifacts was a **collection of coins**, bearing the unmistakable markings of Egyptian currency from a time when humans still called Earth home.

These coins were no ordinary currency; they were crafted from a **rare alloy**, known for its durability and historical significance. They had survived the ages remarkably well, offering a glimmer of the planet's once-vibrant past.

WALL-E, always the **diligent collector** of objects with **historical value**, gently scooped up the coins and brought them to **EVE**. With her advanced sensors and analytical capabilities, **EVE** quickly recognized the significance of the find. These coins were not just relics; they were a tangible link to a time when humans had thrived on Earth.

Requirement

- Create Object detection model (using **YOLOv8 ultralytics framework**), that detect Egyptian coins, (There are three classes One pound, Half pound, Quart pound).
    - Preferably collect some of all data by team member **not from internet**
- Document each step-in data collection and **training process**, and show how the team **collaborated** in this project



NOTE:

- Each Group's model will be tested on test dataset consist of 100 image from different distribution collected by supervisors.
- There will be a **Board View** of Groups **ranked** by **accuracy** of their models, and also the number of dataset

Output

- Link of the dataset (**Google Drive**)
- (.pt) model weights
- (.ipynb) training notebook
- (.py) deployment script
- (.pdf or md) that include documentation about process

Appendix

- YOLO tutorials:
    - YOLOv8 for Object Detection Explained [Practical Example] | by Encord | Encord | Medium
- YOLO Docs:
    - Intro about YOLO
    - Image Augmentation
    - IOU
    - mAP