

Task 1: Identifying the Unknown Annotation Format

The unknown annotation format utilized in the dataset is **COCO annotations**. Unlike YOLO annotations, which are stored in .txt files, COCO annotations use a **JSON format**. This format contains detailed information, including image metadata, bounding box coordinates, category labels, and segmentation masks.

Task 2: Converting COCO Annotations to YOLO Format

To convert COCO annotations into YOLO format, I developed a Python script. This script parses the COCO JSON file, extracts the necessary bounding box data, and saves it in the YOLO .txt format.

Task 3: Generating Enhanced Images

I successfully enhanced the underwater images using the pretrained model from the **Semi-UIR** repository. The process required configuring dependencies, and I encountered challenges, especially with library compatibility (e.g., mmcv). These issues were resolved, and the enhanced images were generated and saved in a separate folder for further evaluation.

Task 4: Evaluating Enhanced Images Using CCF

For this task, I initially faced issues with setting up MATLAB. To resolve this efficiently, I rewrote the CCF evaluation code in Python. The script calculates the **CCF metric** for all images in a specified folder and generates a summary report.

Task 5: Training YOLO-v11 Models

I trained two YOLO-v11 models:

- **Model 1:** Trained on the original images without enhancement.
- **Model 2:** Trained on the enhanced images.

Both models were trained locally in developer mode using the **YOLO-NAS implementation from Deci-AI**. Due to limited resources and time constraints, the models were trained for only a few epochs to provide a preliminary comparison. The training metrics, including the **mAP50-95**, are detailed in the Python training code.

Task 6: Visualizing Inference Results

Inference results were visualized on randomly selected images from the dataset. These results, including bounding boxes and class labels, are provided in the second page of this report.

All of the custom scripts and model metrics can be found using the following link:

<https://drive.google.com/drive/folders/1XcHaRD9hJ3EicX-sSMU2lIVmt8xCYVao?usp=sharing>

