CVPDL: Computer Vision Practice with Deep Learning

Homework #1
Object Detection

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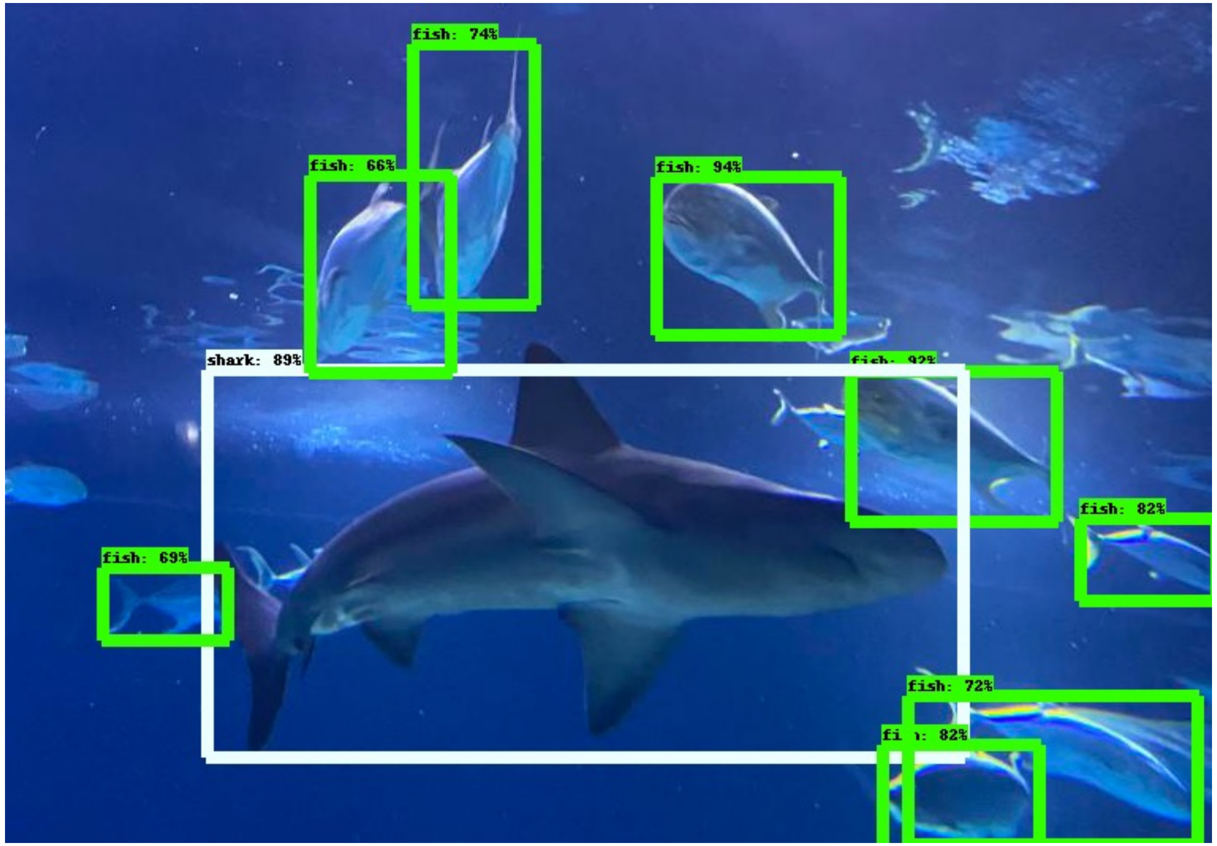
Object Detection

- ➢ Object Detection
  - ➢ Input: 2D RGB image
  - ➢ Task: localization and classification
  - ➢ Output: N x [points, confidence]

- ➢ Structure
  - ➢ CNN based method
    - ➢ Faster R-CNN, YOLO-series
  - ➢ Transformer based method
    - ➢ DETR, deformable DETR

Transformer based only !!



Dataset

- Training : 448 images
- Validation : 127 images
  - DO NOT use validation data to train your model
- Testing : 63 images
  - DO NOT try to find the ground truth

- Violating any of the rules outlined for this assignment will result in a grade of zero
- If you are uncertain about the legitimacy of the usage, email the TAs for clarification

Grading

- Baseline (validation set) (40%)
  - Simple baseline (20%) : 0.35 mAP
  - Strong baseline (20%) : 0.40 mAP
- Performance ranking (testing set) (30%)
  - Linear grading
- Report (30%)

- My implement :
  - DETR : 0.393 AP (300 ep
  - d-DETR : 0.462 AP (300 ep

Start from COCO pretrained weight !!

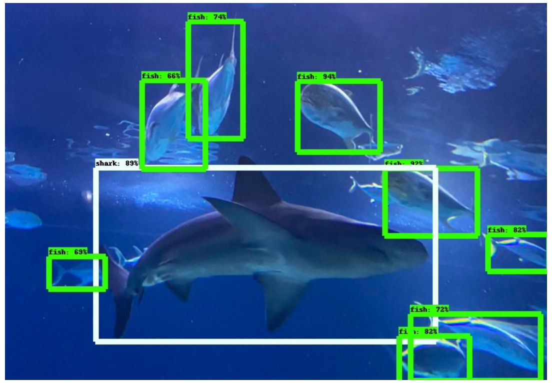
Evaluation

- Evaluation Metric
  - We’ll use the metric taught in class – Average Precision
  - Please refer to course slides or this intro
  - The performance will be evaluated by this function

- AP at IoU = [50:5:95] is used for all evaluation

Report

1) Draw the architecture of your object detector
    - ➢ In brief and clear
    - ➢ It would be fine to copy the figure from the paper
2) Implement details
    - ➢ Ex: augmentation, loss function, parameter settings
3) Table of your performance for validation set (AP, AP_{50}, AP_{75}
4) Visualization
    - ➢ Demonstrate the detection results of any image in testing set
    - ➢ Something like this

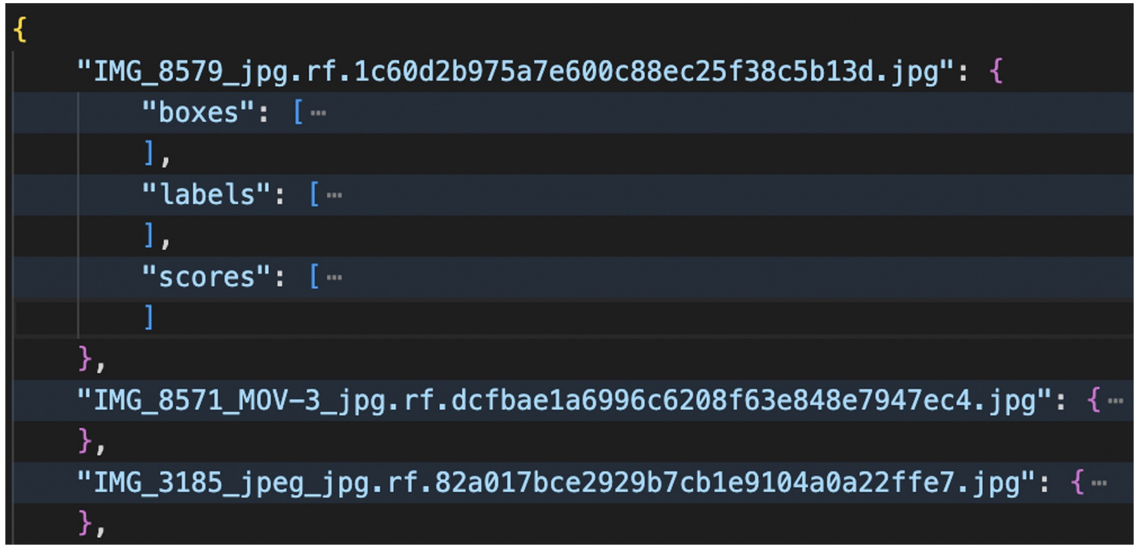


Submission

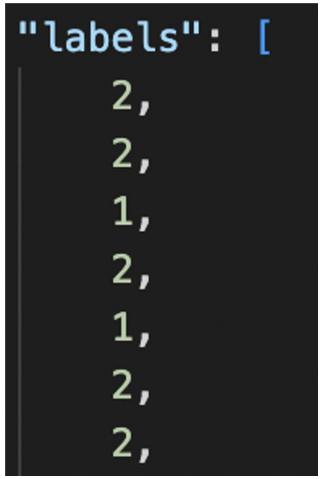
- Deadline : 2023/10/18 (Wed.) 23:59
- Zip all files as hw1_<student_id>.zip
- Submit to NTU cool
- Your submission should include the following files
  - hw1_<student_id>.pdf
  - All codes for training and testing
  - Readme file
    - your environments
    - How to run your code
  - Output_json_for_test.json

Output JSON format

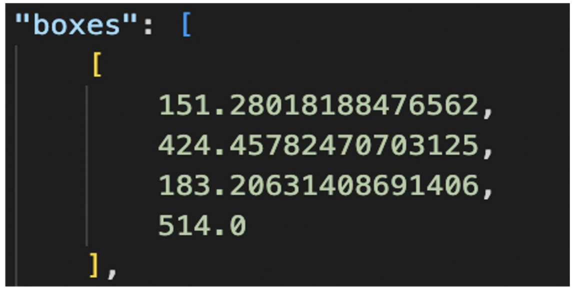
- sample_submission.json is provided



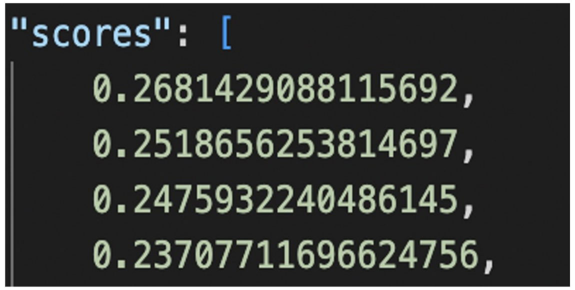
```
{
    "IMG_8579_jpg.rf.1c60d2b975a7e600c88ec25f38c5b13d.jpg": {
        "boxes": [⋯
        ],
        "labels": [⋯
        ],
        "scores": [⋯
        ]
    },
    "IMG_8571_MOV-3_jpg.rf.dcfbae1a6996c6208f63e848e7947ec4.jpg": {⋯
    },
    "IMG_3185_jpeg_jpg.rf.82a017bce2929b7cb1e9104a0a22ffe7.jpg": {⋯
    },
```



```
"labels": [
        2,
        2,
        1,
        2,
        1,
        2,
        2,
```



```
"boxes": [
    [
        151.28018188476562,
        424.45782470703125,
        183.20631408691406,
        514.0
    ],
```



```
"scores": [
    0.2681429088115692,
    0.2518656253814697,
    0.2475932240486145,
    0.23707711696624756,
```

- Check your performance on validation set

```
$ python evaluate.py <predic_json> <target_json>
```

Any Question

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