**Image Processing**

**Assignment 3**

**Repository Link(Repo) :**

<https://github.com/Mohamed-Abbes03/Assignment_3/>

<https://huggingface.co/mohhamedd/seqtrack-team10>

**Team:10**

## **1. Selected Classes and Dataset Sizes**

For this assignment, two classes from the LaSOT dataset were selected for training and evaluation:  
- Class 1: Coin 🡪 Size: 1.77 GB   
- Class 2: Electricfan 🡪 Size: 1.64 GB  
  
Each class was filtered and used to form the two-class subset for SeqTrack training. The dataset subset contained the full set of sequences available under these two categories. The sizes were verified after loading the dataset using the Hugging Face Datasets library.

## **2. Environment Setup**

The environment setup was based on the official SeqTrack GitHub repository. All dependencies were installed following the repository instructions, and additional fixes were applied to ensure compatibility.  
  
During environment setup, two external packages required special handling due to installation issues:  
- The 'pytorch-OpCounter' package failed to install directly from GitHub because of PyTorch compatibility issues, so it was cloned locally and installed from the local path.  
- The 'vot-toolkit-python' package installation failed due to version incompatibilities, so a specific stable release (v1.2.1) was installed instead.  
  
These adjustments ensured that all dependencies were correctly configured, and the environment was fully functional for SeqTrack training and evaluation.  
  
The 'requirements.txt' file was generated after successful setup, and the 'huggingface\_hub' dependency was added to enable automatic checkpoint uploading.

## **3. Training Procedure and Modifications**

The SeqTrack model was trained for 5 epochs using the selected two classes ('Coin' and 'Electricfan'). All random number generation processes were initialized with a fixed seed equal to the team number (10). This ensured reproducible results across all training runs.  
  
Key modifications were made to support controlled training, checkpoint management, and detailed logging:

1. Seeding:  
- Added a '--seed' argument to 'train.py' with a default value of 10.  
- The seed is passed to 'run\_training.py' and applied to initialize all random number generators (NumPy, random, Torch).

2. Checkpoint Saving and Uploading:  
- Modified checkpoint saving to occur at the end of every epoch (instead of the original schedule).  
- Checkpoints now save only model weights (no optimizer state or statistics), resulting in smaller file sizes.  
- Each checkpoint includes: epoch number, network type, network state dict, and network info.  
- Automatic uploading to the Hugging Face repository 'mohhamedd/seqtrack-team10' was implemented.  
- The 'huggingface\_hub' library was added to requirements.txt.

3. Logging:  
- Logging interval changed to every 50 samples.  
- Implemented the exact logging format specified in the assignment, including time statistics and performance metrics.  
- The format follows:  
 Epoch X : Y / Z samples , time for last 50 samples : H:M:S hours , time since beginning : H:M:S hours , time left to finish the epoch : H:M:S hours , loss: value , IoU: value  
- Metrics (loss, IoU, performance) are printed on-screen and written to a log file.  
- Time statistics are computed dynamically based on sample progress.

Training Log Example:  
Epoch 1 : 48 / 48 samples , time for last 50 samples : 0:6:58 hours , time since beginning : 0:6:58 hours , time left to finish the epoch : 0:0:0 hours , Loss/total: 8.28724 , IoU: 0.04923  
Epoch 2 : 48 / 48 samples , time for last 50 samples : 0:5:24 hours , time since beginning : 0:5:24 hours , time left to finish the epoch : 0:0:0 hours , Loss/total: 8.18016 , IoU: 0.02736  
Epoch 3 : 48 / 48 samples , time for last 50 samples : 0:5:53 hours , time since beginning : 0:5:53 hours , time left to finish the epoch : 0:0:0 hours , Loss/total: 8.04452 , IoU: 0.03467  
Epoch 4 : 48 / 48 samples , time for last 50 samples : 0:5:16 hours , time since beginning : 0:5:16 hours , time left to finish the epoch : 0:0:0 hours , Loss/total: 7.89170 , IoU: 0.09420  
Epoch 5 : 48 / 48 samples , time for last 50 samples : 0:6:1 hours , time since beginning : 0:6:1 hours , time left to finish the epoch : 0:0:0 hours , Loss/total: 7.70782 , IoU: 0.10961

## **4. Checkpoint Saving and Upload Confirmation**

All five checkpoints were saved locally inside the 'checkpoints/' folder after each training epoch. In addition, every checkpoint was automatically uploaded to the Hugging Face repository 'mohhamedd/seqtrack-team10' using the 'huggingface\_hub' API. This ensures that both local and remote backups of the trained model are available for evaluation and future reuse.  
The Hugging Face token was configured using the command:  
 huggingface-cli login  
or alternatively by setting the HF\_TOKEN environment variable.  
Each checkpoint upload was verified via the Hugging Face Hub dashboard.

HuggingFace Link: <https://huggingface.co/mohhamedd/seqtrack-team10>