**Assignment 3 – SeqTrack Setup, Training, and Checkpoint Management**

**Team Number:** 8

**Course:** Image Processing - Level 4

**Date:** 15October 2025

**1. The selected 2 classes and their dataset sizes:**The LaSOT dataset was loaded from Hugging Face using the datasets library. Two classes were selected for training:

* **airplane**: 150 samples
* **bicycle**: 120 samples

**Total Samples:** 270The airplane class was fixed as specified in the assignment requirements, while the bicycle class was randomly selected from the remaining available classes using a reproducible random seed (team number 8).

**14. A description of the environment setup:**The environment was set up according to the SeqTrack repository instructions. All required packages were installed and exported to requirements.txt:**Core Dependencies:**

* PyTorch >= 1.9.0 (CPU version for compatibility)
* torchvision >= 0.10.0
* torchaudio >= 0.9.0
* NumPy >= 1.21.0
* Pandas >= 1.3.0
* Matplotlib >= 3.4.0

**SeqTrack Dependencies:**

* PyYAML >= 6.0
* easydict >= 1.9
* cython >= 0.29.0
* opencv-python >= 4.5.0
* pycocotools >= 2.0.0
* jpeg4py >= 0.1.4
* lmdb >= 1.2.0
* scipy >= 1.7.0
* visdom >= 0.1.8
* timm >= 0.4.0
* yacs >= 0.1.8

**Additional Dependencies:**

* datasets >= 1.8.0 (for LaSOT dataset loading)
* transformers >= 4.12.0
* tqdm >= 4.62.0 (for progress tracking)

**Installation Process:**

1. SeqTrack repository was cloned and integrated
2. Core dependencies were installed from SeqTrack requirements
3. Additional dependencies for dataset loading were added
4. All packages were exported with exact versions to requirements.txt
5. **A description of the training procedure and modifications made:**

**Training Configuration Modifications:Key Parameters:**

* **Random Seed:** 8 (team number for reproducibility)
* **Epochs:** 5 (reduced from default 500 for assignment requirements)
* **Patch Size:** 1 (modified from default 16)
* **Batch Size:** 8 (optimized for memory efficiency)
* **Learning Rate:** 1e-4 (standard AdamW configuration)

**Training Procedure:1. Seed Initialization:**All random number generation was initialized with fixed seed 8:

* Python random seed
* NumPy random seed
* PyTorch manual seed
* CUDA random seed (if available)
* Deterministic operations enabled

**2. Dataset Loading:**

* LaSOT dataset loaded from Hugging Face using datasets library
* Two classes selected: airplane (fixed) and bicycle (random)
* Custom dataset filtering implemented for selected classes
* Total of 270 samples used for training

**3. Model Configuration:**

* Modified SeqTrack model with patch\_size = 1
* Custom trainer class (Assignment3Trainer) implemented
* Optimizer: AdamW with learning rate 1e-4 and weight decay 1e-4

**4. Training Loop:**

* 5 epochs of training
* Detailed logging every 50 samples with time statistics
* Loss and IoU metrics calculated and tracked
* Progress tracking with ETA calculations

**5. Logging Implementation:**

* Dual output: console and file logging
* Detailed time statistics in required format:

"Epoch X : Y / total\_samples, time for last 50 samples : X:XX:XX hours, time since beginning : X:XX:XX hours, time left to finish epoch : X:XX:XX hours"

* Loss values and IoU results recorded
* Training performance metrics tracked

**4. Confirmation that checkpoints were saved locally and uploaded to Hugging Face:Local Checkpoint Saving:**✅ **Confirmed:** Checkpoints were successfully saved locally after each epoch.**Checkpoint Details:**

* **Location:** assignment\_3/checkpoints/
* **Files:** epoch\_1.ckpt, epoch\_2.ckpt, epoch\_3.ckpt, epoch\_4.ckpt, epoch\_5.ckpt
* **Total:** 5 checkpoints (one per epoch as required)

**Checkpoint Contents:**Each checkpoint file contains:

* Model state dictionary
* Optimizer state dictionary
* Training loss
* Epoch number
* Random seed (8)
* Patch size (1)
* Dataset information
* Timestamp

**Hugging Face Upload:**✅ **Confirmed:** All checkpoints and assignment files were successfully uploaded to Hugging Face.**Upload Details:**

* **Hugging Face Space:**

<https://huggingface.co/spaces/hossamaladdin/Assignment3/tree/main>

* **Files Uploaded:**
* All 5 checkpoint files
* Training log (training\_log.txt)
* Dataset summary (dataset\_summary.md)
* Assignment report (assignment\_3\_report.md)
* **Upload Method:** Automated using huggingface\_hub library
* **Verification:** All files confirmed present in the Hugging Face Space

A screenshot of a computer

AI-generated content may be incorrect.

**5. The link to the GitHub repository containing the assignment\_3 folder:GitHub Repository:** <https://github.com/HossamAladin/Assignment_3.git>

**Repository Contents:**

* Complete assignment\_3 folder with all deliverables
* Modified training script (seqtrack\_train.py)
* Dataset loader (dataset\_loader.py)
* Requirements file (requirements.txt)
* Training logs (training\_log.txt)
* Model checkpoints (checkpoints/ directory)
* Comprehensive documentation (assignment\_3\_report.md)
* WSL deployment guides and scripts
* All supporting files and documentation

**Repository Status:** Public and accessible for evaluation and review.

**Conclusion:**This assignment successfully demonstrates the complete setup, training, and checkpoint management system for SeqTrack. All requirements have been fulfilled including environment setup, dataset preparation, training implementation, comprehensive logging, checkpoint management, and Hugging Face integration. The implementation is fully reproducible and documented with professional-grade code quality and comprehensive documentation.

**Team 8**

**Image Processing - Level 4**

**Assignment 3: SeqTrack Setup, Training, and Checkpoint Management**