

Final Project Instructions

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Handout: Thu, 2024-04-03

Due: Tue, 2025-04-29

Monocular SLAM Dataset

The monocular SLAM dataset consists of 4 files:

1. **camera_calibration.json**: Contains all necessary camera intrinsic and extrinsic parameters.
2. **camera_trajectory_tum.txt**: Contains the ground truth camera trajectory for comparison with your estimates. Each line follows the TUM format:

```
timestamp tx ty tz qx qy qz qw
```

where `timestamp` is the time of capture, `tx ty tz` represents the position, and `qx qy qz qw` represents the orientation as a quaternion.
3. **timings.csv**: Maps camera images to their capture timestamps.
4. **images.zip**: Contains the image sequence for running your monocular SLAM system.

Output Format Requirements

Your SLAM system output should follow the TUM format for both LiDAR and monocular implementations:

```
timestamp tx ty tz qx qy qz qw
```

Evaluation Tools

evo_traj Tool

To visualize and compare trajectories:

```
# Convert your output to TUM format (if needed)
```

```
evo_traj tum your_trajectory.txt --ref=camera_trajectory_tum.txt -vap
```

evo_ape Tool

To evaluate absolute pose error:

```
# Calculate absolute pose error against ground truth
```

```
evo_ape tum camera_trajectory_tum.txt your_trajectory.txt -vap
```

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LiDAR SLAM Dataset

The LiDAR SLAM dataset contains a single file:

- **sequence_00.bag**: A ROS bag file publishing KITTI LiDAR scans on the topic `/kitti/velo/pointcloud`

To access the data:

```
# Play the bag file
```

```
rosbag play sequence_00.bag
```

```
# In another terminal, subscribe to the topic
```

```
rostopic echo /kitti/velo/pointcloud
```