

ESE 650 Homework 4 - Particle Filter SLAM

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Code Summary

```
function [pos, map, slam_state] = ...  
    step_slam( data, slam_state, map, params )
```

(1) a priori estimate for particles using odometry

```
slam_state.particles = ...  
    a_priori( slam_state, data, params );
```

(2) a posteriori estimate for particles and map using scan matching

```
[a_posteriori_weights, a_posteriori_map] = ...  
    a_posteriori( slam_state, map, data, params );
```

(3) re-sample particles

```
slam_state = resample_particles( slam_state, params );
```

Odometry

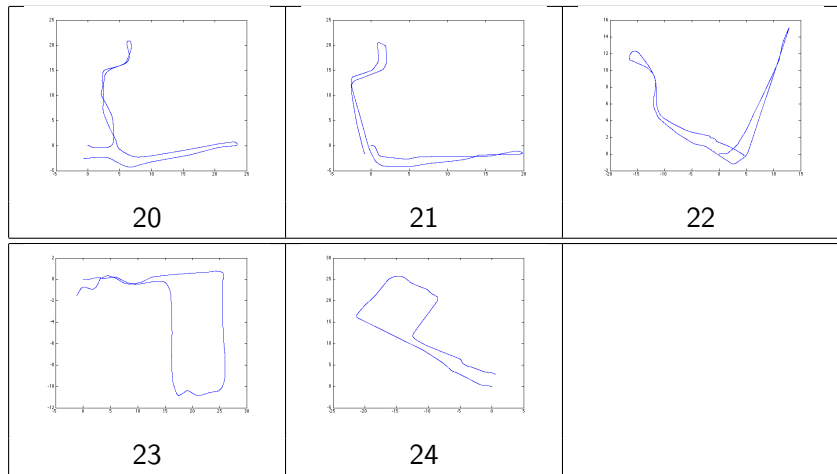
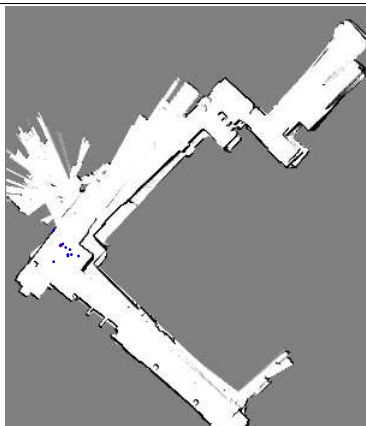
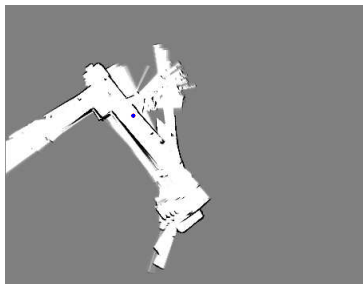


Figure : Pure Odometry Integration

Results



Training set 20



Test set 1

Analysis

- ▶ Odometry worked well on training set, but not test set
 - ▶ Suspicious
 - ▶ But noise characteristics were the same
- ▶ Getting the parameters right is important
 - ▶ Noise characteristics
 - ▶ Number of particles
 - ▶ Resample rate
 - ▶ Laser priors
- ▶ Possible Improvements:
 - ▶ Better parameter tuning
 - ▶ Pruning scans on hills
 - ▶ Better measure of correlation