

Obstacle Avoidance for a Quadrotor

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Introduction

- ▶ Obstacle avoidance for an ARDrone 2.0 quadrotor
- ▶ Use the approach in *Obstacle avoidance for small UAVs using monocular vision* (Lee et al. 2011)
- ▶ Test with real data as opposed to simulations

Proposed Solution

- ▶ Extract SIFT and MOPS features from two images
- ▶ Match SIFT and MOPS features in images to locate points in 3D
- ▶ Use MOPS to get object outlines
- ▶ Use SIFT to get internal object structure
- ▶ Determine type of object

MOPS

- ▶ Multi-Scale Oriented Patches (*Image Matching using Multi-Scale Oriented Patches* (Brown et al. 2004))
- ▶ TODO: Include sample image

Some Results

- ▶ MOPS is not robust on real data:
 - ▶ Poor keypoints (multi-scale Harris)
 - ▶ Poor matches
 - ▶ Computationally intensive
- ▶ SIFT is also relatively slow
- ▶ Do not have sufficient “good” matches to generate object outlines
- ▶ Lee et al. approach is not robust on real-world data

A Better Idea

- ▶ Use faster and more robust features than SIFT and MOPS while still having sparsity
- ▶ PTAM
 - ▶ An existing monocular SLAM framework using FAST (and other) features
 - ▶ Robust enough to work with real-world indoor and outdoor data
 - ▶ Significantly faster than our approach
- ▶ Integrate with the quadrotor using `ardrone_autonomy` and `tum_ardrone`

Further Results

TODO: Images/video from flight

Conclusions

- ▶ MOPS is slow and not robust
- ▶ Sparsity is important
- ▶ PTAM works well