



Semester: 11th

Title: A Comparison of 2D-3D Pose Estimation Methods

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Abstract:

This thesis describes pose estimation as an increasingly used area in augmentation and tracking with many different solutions and methods that constantly undergo optimization and each has drawbacks and benefits. But the aim is always speed, accuracy or both when it comes to real applications.

Pose estimation is used in many areas but primarily tracking and augmentation issues, where another large area of finding 2D-2D correspondences is crucial research area today.

Software like ARToolKit tracks a flat marker and is able to draw 3D objects on top of it for augmentation purposes. It is very fast, because the accuracy is not the largest issue when the eye has to judge if it looks real or augmented. But the speed must be high for the eye to see it as real as the background.

There is not really a common standard of how to compare methods for pose estimation and there is no standard method to compare with. In this thesis effort is made to get a fair comparison and there is included a simple very known method as comparator.

In total there is 4 methods tested, they calculate the perspective from known 2D-3D correspondences from image to point cloud. All have different limitations such as minimum amount of 2D-3D correspondence pairs or sensitivity to noise that makes it unpredictable in noisy conditions. The benefits and drawbacks are listed for each method for easy comparison.

The 3 methods are nonlinear CPC, PosIt and PosIt for coplanar points, while DLT is a linear method that is used because it is easy to implement and good for comparison.

All tests are done on fictive data to allow some extreme cases and to have ground truth for accurate comparisons.

In short the tests made are:

Noise test, increased number of points, planarity issues, distance to object and initial guesses.

The findings were many and shows that the methods are working very differently. So when choosing a method, one has to consider the application of it, and what data is available to the method.

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