Target Tracking Using the Probabilistic Multiple Hypothesis Tracking Algorithm*

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Abstract: *Multiple target tracking is the problem of localizing an unknown number of objects using a collection of sensor measurements. The problem can be decomposed into two sub-problems: data association, and state estimation. Traditional data association approaches suffer from a rapid growth in complexity. This is because the number of hypotheses assigning measurements to objects grows combinatorially with the number of measurements and the number of objects at one point in time, and exponentially with the time. This growth in complexity makes it necessary to accept (often severe) approximations to obtain a computationally feasible solution.*

In the recent years, the Probabilistic Multiple-Hypothesis Tracker (PMHT) was derived by applying the statistical technique of Expectation-Maximization (EM) to association and estimation. An advantage of the PMHT is that the complexity of the algorithm grows only linearly with the number of targets.

This paper presents the base PMHT algorithm, its weaknesses and the ways to overcome them using some PMHT modifications.

Key words: *Multi-Target Tracking (MTT), data associations, Probabilistic Multi-Hypothesis Tracking (PMHT), Expectation Maximization (EM).*

1. Introduction

Solution of the multi-target tracking problem requires the simultaneous completion of two tasks: estimation and data association. Estimation is the task of finding the best model parameters to describe the observed data. The task of assigning data to the components of the data model is data association. There are many different approaches