An efficient Particle filter implementation for TBD applications

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Abstract:

Radar systems are used widely for detecting and tracking stationary or moving objects (also called targets). The classical approach to detect and track a target proceeds in two phases: a first detection step consist in pre-processing the raw radar signal to keep only detection “plots”. A second tracking step aims to estimate the actual state of the target from these detection “plots”. In the first step a threshold decision is already made and obviously results in a loss of information. To overcome this problem, the Track before Detect (TBD) approach proposes to base the tracking on the raw measurements instead of plots. First, a model-based integrated detection & tracking extended to include ambiguities and eclipsing effects in range and Doppler will be detailed. Then, it will be applied by means of a particle filter. The proposed particle filter succeeds in resolving range and Doppler ambiguities and detecting and tracking multiple targets in a TBD context.