University Defence Research Collaboration (UDRC)
Signal Processing in a Networked Battlespace

Estimating Targets in Scenarios with Spatio-Temporally Correlated Clutter

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E_WP3: Unified DLC in complex environments
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Estimation in the presence of clutter

False alarms complicate tracking. In the maritime domain they can be caused by diverse factors, among them:

- Environmental noise
- Local wildlife
- Static debris

Usual assumptions

Clutter is often assumed to be

- Independent
- Uniformly distributed

These assumptions greatly restrict the types of clutter processes that can be modelled.

Clutter Modelling

Use spatio-temporal correlation to inform of contact type:

- Quasi-static objects
- Confined brownian motion
- Uncorrelated measurements

Filtering

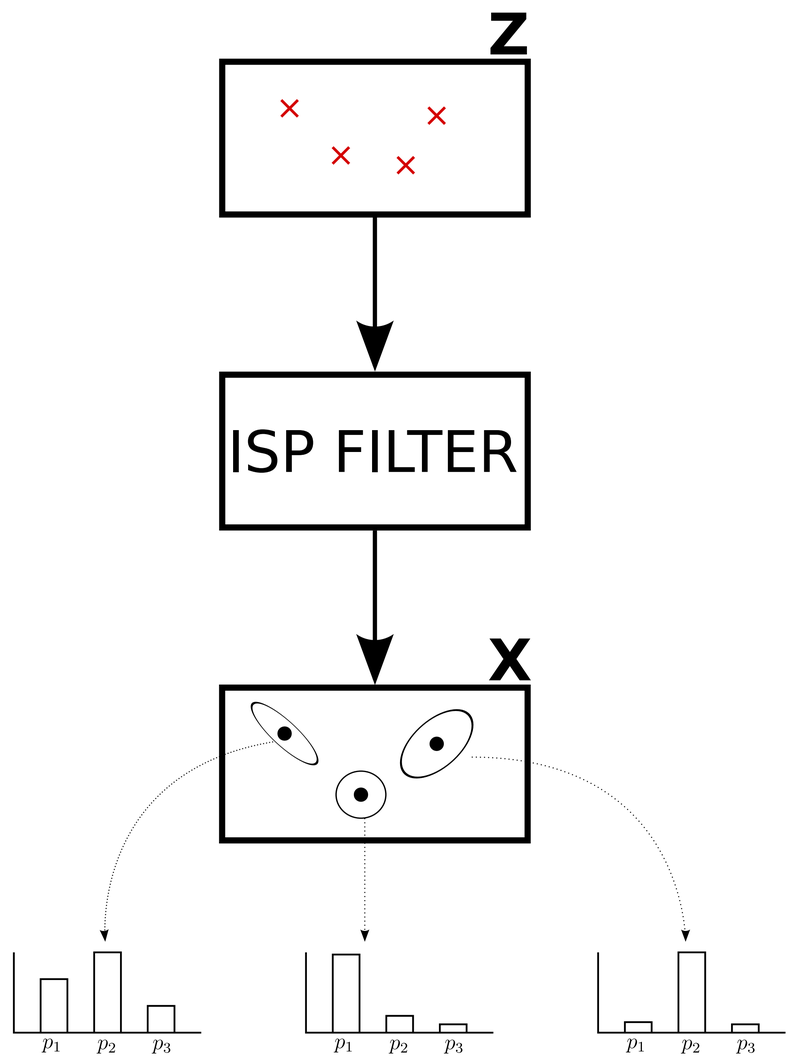
Novel multi-target estimation algorithms can hypothesise different types of targets and discriminate probabilistically as information is acquired.

The ISP Filter achieves these goals in a principled way.

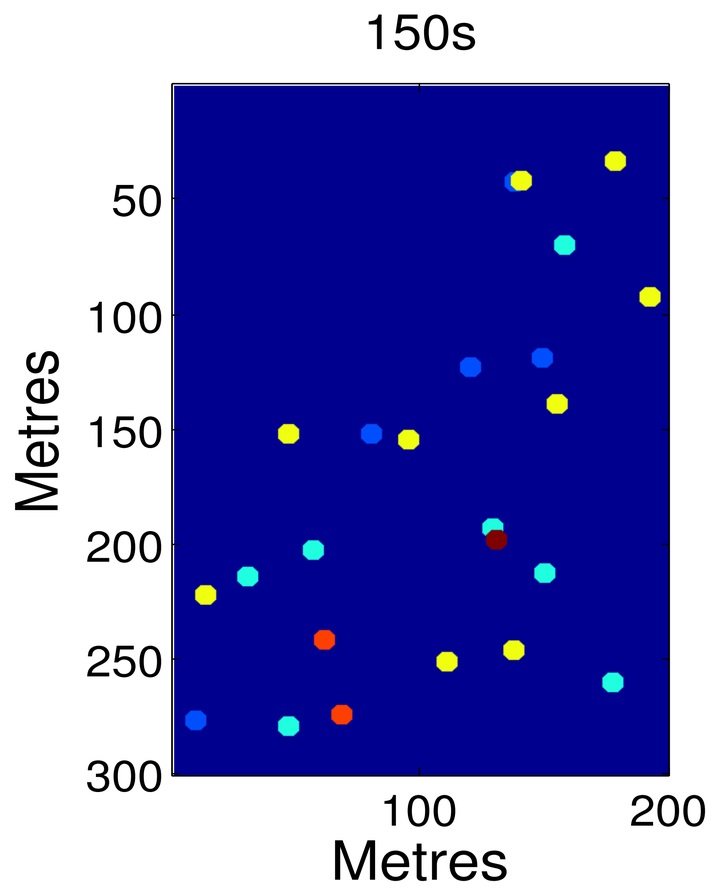
Filter Advantages

The ISP Filter provides several advantages

- No information loss is incurred
- Comprehensive probabilistic representation of the scenario
- No heuristics to tune
- Highly extensible
- High flexibility for modeling



Harbour Scenario



Detection patterns

Target Application

Harbour protection: A restricted area is found next to a heavy traffic lane. MIMO Sonar provides several detections:

- Schools of fish
- Debris in the seafloor
- Passing traffic
- Environmental noise
- Intruder vehicle (AUVs)

The goal is to track only the intruder AUV. The data is obtained from a realistic sonar simulator.

Future Objectives

- Efficient parallel implementation
- Extension to the multiple sensor case
- Test with harbour data from MarCE Task 3.009
- Integrate into comprehensive tracking framework for enhanced situational awareness

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