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Paper Analysis Outline 1

- **What problem is the paper addressing?**
    - There is a need to "... represent and reason about spatial uncertainty."
    - There is always inherent uncertainty in the size/shape of objects detected by sensors, the actual measurements provided by sensors, as well as many other sources of uncertainty.
- **What is the proposed solution?**
    - Use multiple, overlapping, lower resolution (cheaper) sensors and perform a sort of sensor fusion to get the best spatial estimate.
- **What are the assumptions the solution depends on (both explicit and implicit)?**
    - Angular errors are "small" meaning within 5 degrees as that had a negligible effect on the means and variances.
    - Estimating only two moments of the PDF of the uncertain spatial relationships is adequate for decision making.
- **What is novel about the paper?**
    - The paper departs from graph transformations to provide a solution that can be used independent of the sensor frame and the destination frame.
    - Introduces an estimation framework based on probabilities (dependent on sensor measurements)
    - Their method allows different paths to be explored before actually taking any actions in the real world.
- **What are the claims the paper makes?**
    - Their methods can be used to calculate in advance of making any actions whether or not the action sequence is possible using a certain tolerance of uncertainty.
    - Their method can determine to (or by it's nature) ignore a sensor reading if it is far off of the expected value or prior readings.
- **Does the evaluation included in the paper validate/verify the claims?**
    - There are sufficient mathematical proofs, but the paper lacks experimental evidence that their method is successful.
    - The drawings are helpful to visualize, but do not serve to substantiate their claims about the effectiveness of their method.