Bias Estimation and Calibration of a Pair of Laser Range Sensors

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Presentation outline

Motivation

- Benchmarking people tracking algorithms
- Large area ground-truth data collection
- Easy calibration

System overview

General formulation

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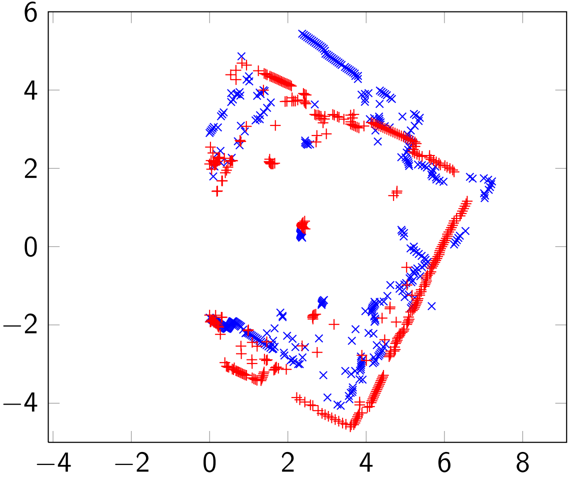
- $f^{-1} \circ \eta$ also affine
- Estimated parametes uncertainty ${}_{\hat{\mathbf{p}}}\Sigma = (J^{\mathrm{T}}\Sigma^{-1}J)^{-1}$

2d Euclidean transformation visualization



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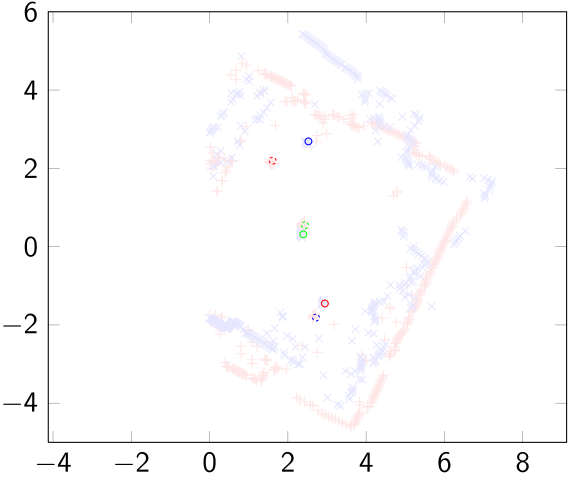

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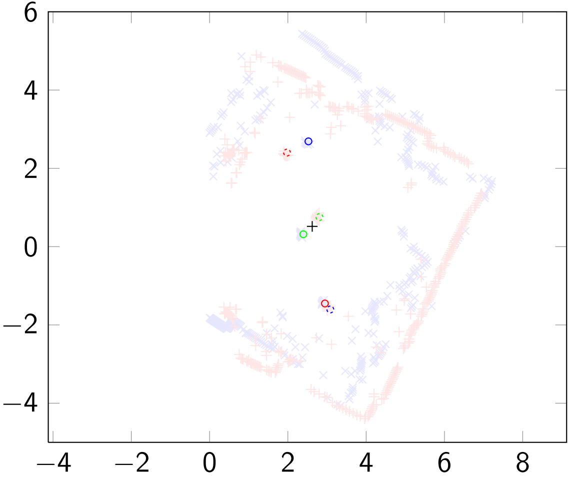

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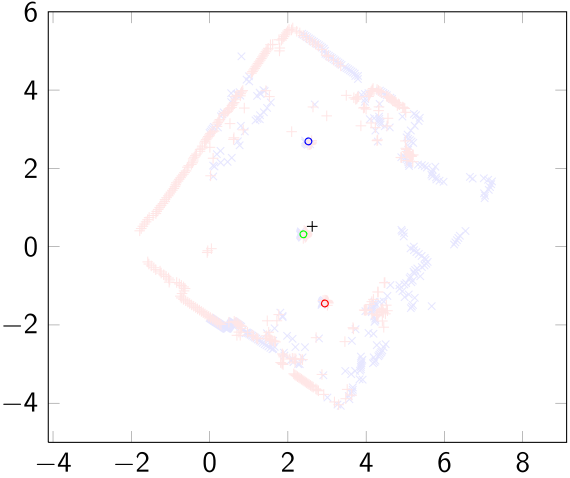

Kabsch algorithm

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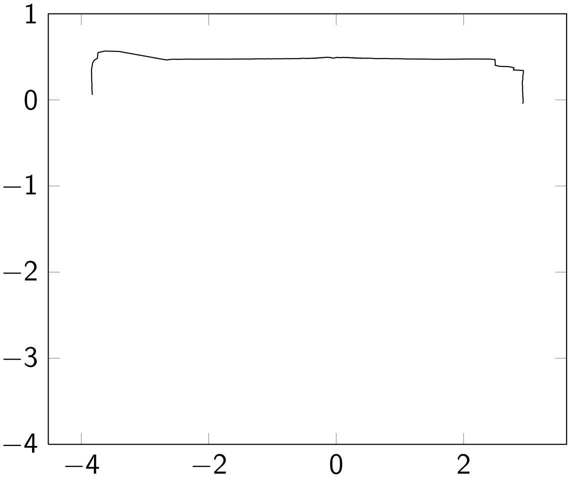
- $\mathbf{R} = \mathbf{U} \begin{bmatrix} 1 & 0 \\ 0 & det(\mathbf{U})det(\mathbf{V}) \end{bmatrix} \mathbf{V}^{\mathrm{T}}$

LRS systematic error – bias



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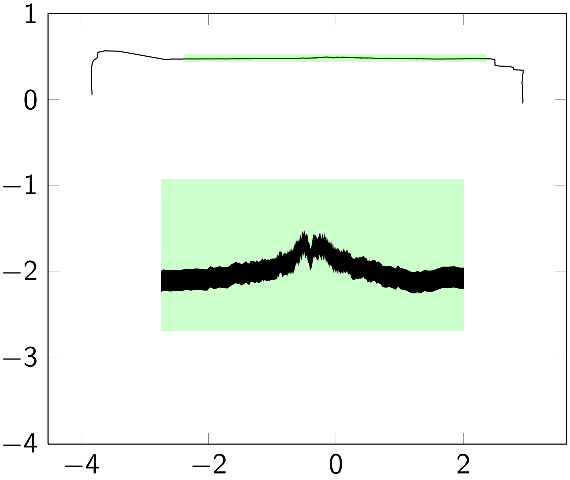

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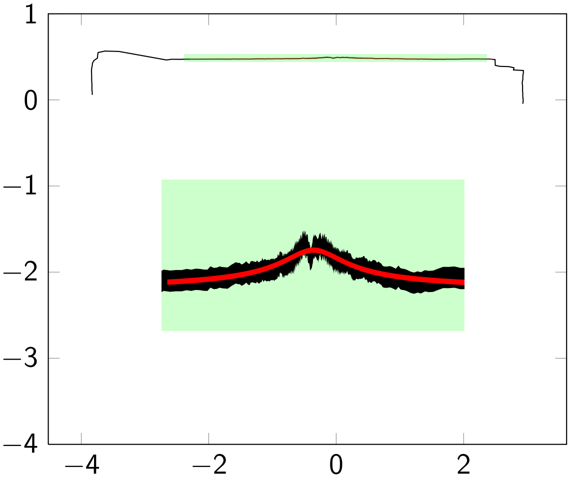

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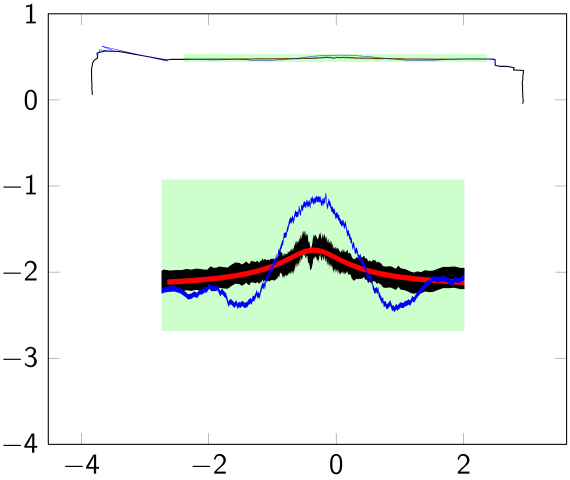
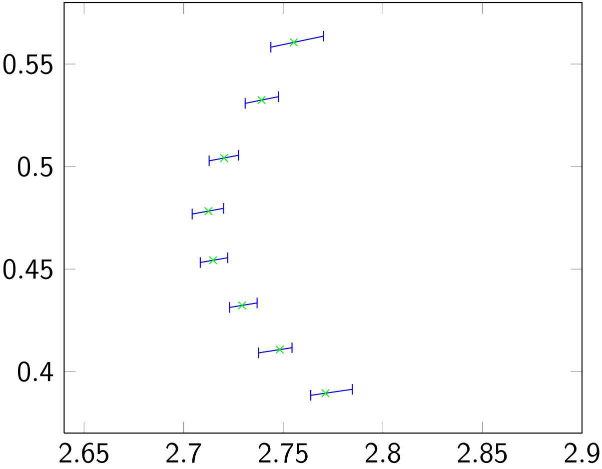


LRS bias – estimating cylinder center



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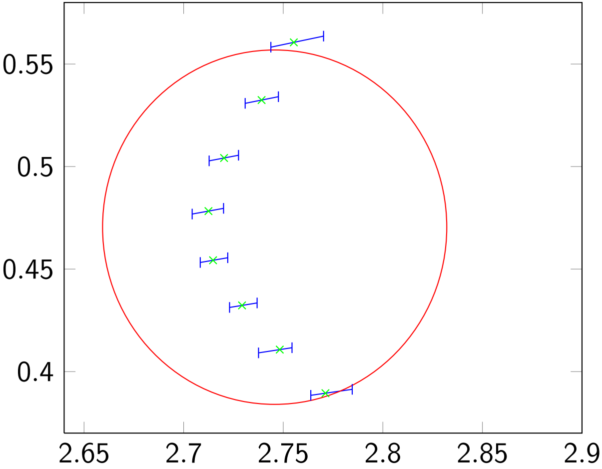

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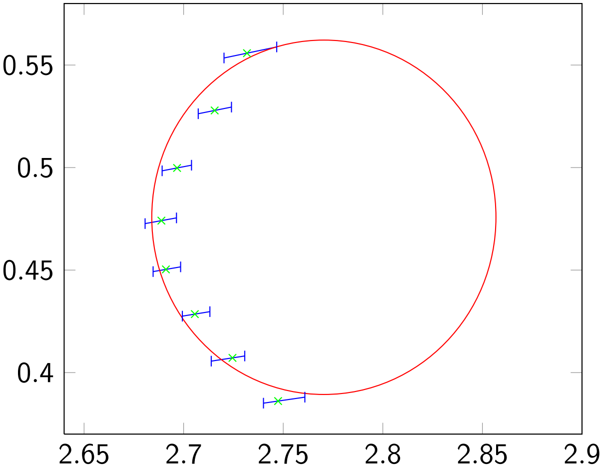

Thank you for your attention

Questions?