RANSAC

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RANdom SAmple Consensus

Bootstrap Meetup: Consensus Algorithms

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Introduction

- Fitting a mathematical model to measured data is at the base of many applications in image analysis, computer vision and robotics
- Measured data is usually inaccurate and erroneous
- Algorithms fitting a model based on measured data must consider measuring errors
- More precisely they should separate between accurate (inliers) and less accurate data (outliers)

What is RANSAC?

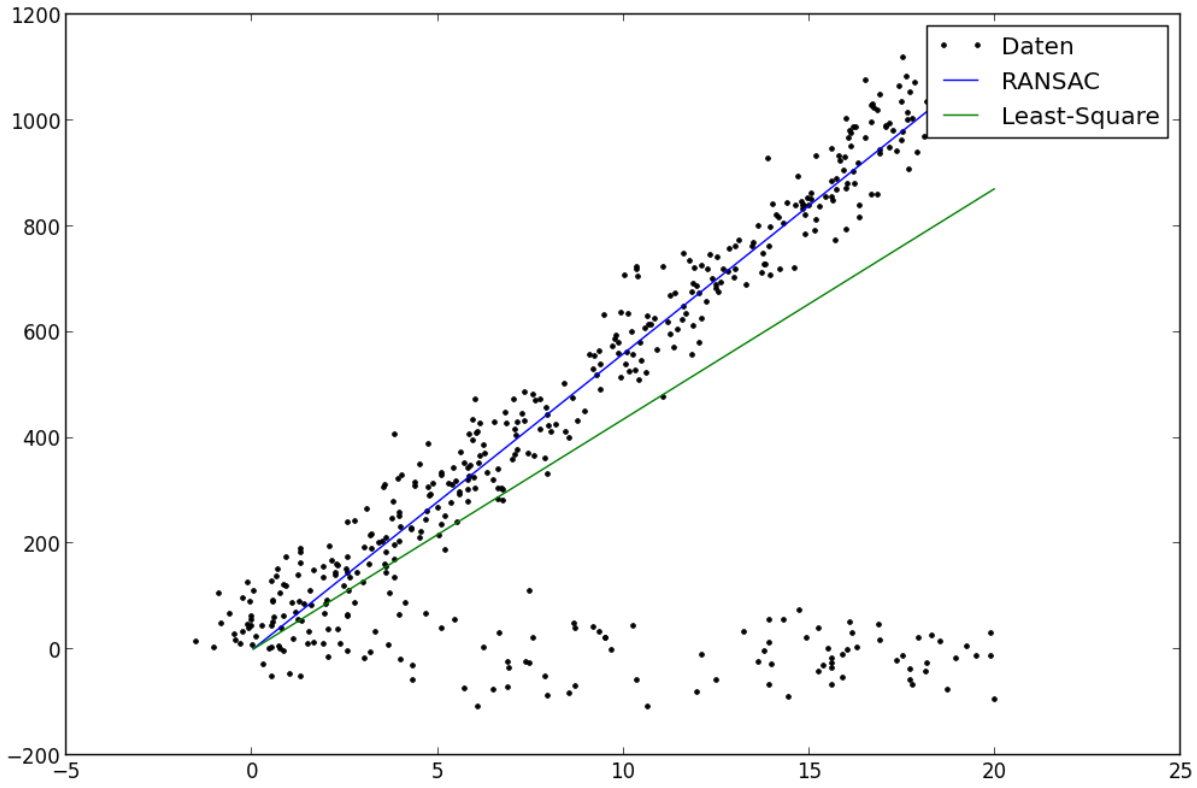
- Algorithm to estimate parameters of a mathematical model from a set of observed data with outliers
- First published in 1981 by Fischler, Bolles

  Fischler, M. A., & Bolles, R. C. (1981). Random Sample Consensus: A Paradigm for Model Fitting with Applications to Image Analysis and Automated Cartography. *Communications of the ACM*, *24*(6), 381–395.
- Non-deterministic
- Iterative

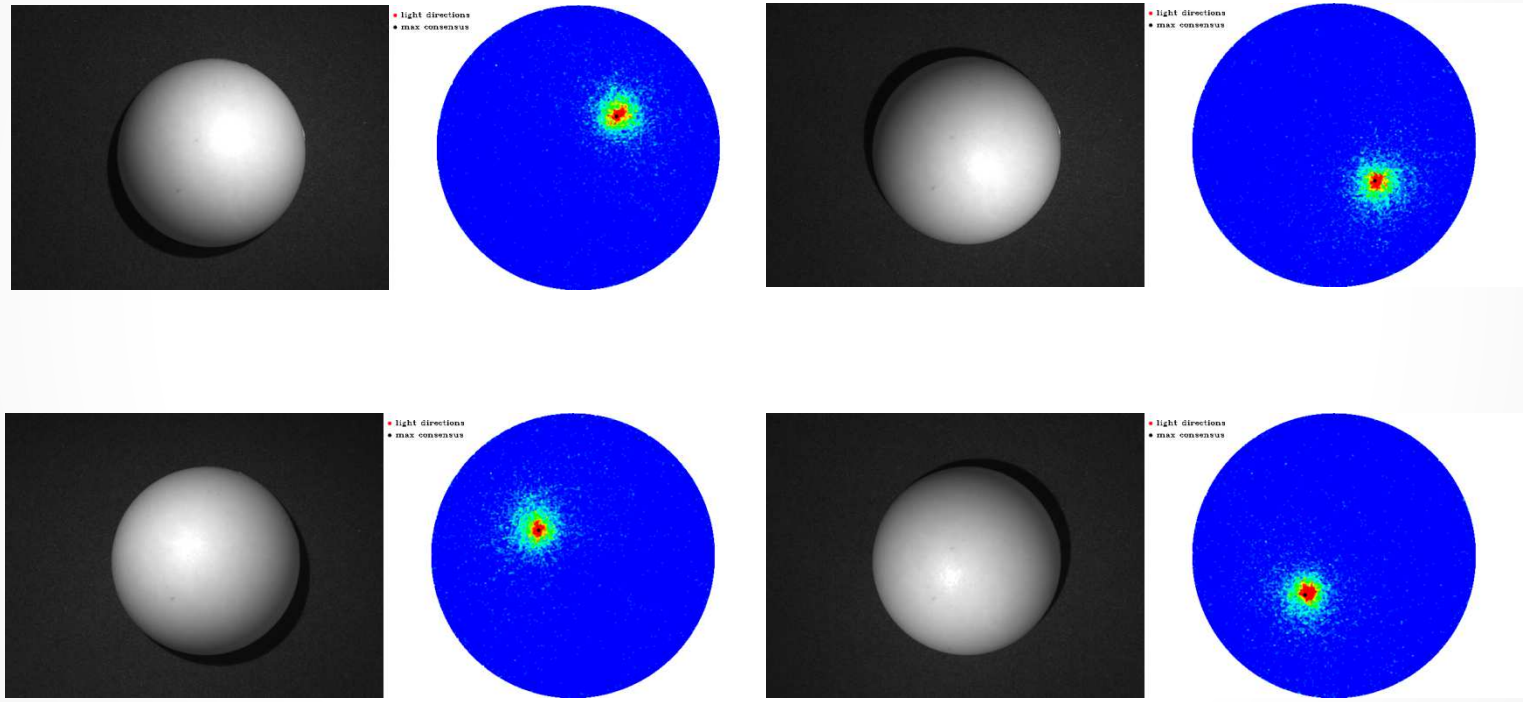
How does it work?

1. For each iteration a minimum set of data points is selected
2. Based on this selection the model parameters are determined
3. All other data points are classified either as inlier or outlier
4. Repeat for a predefined number of iterations
5. Select the model with the highest number of inliers
6. Finally use all inliers for optimized model fitting

Example 1: Line fitting



Example 2: Light direction estimation



Example 3: Light direction estimation