

Tracking

Indoor Localization (582747), autumn 2015

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1 Tracking

2 Fingerprinting

3 Ekahau

What? Recap from first lecture

- Taking information from previous location hypotheses into account
- Kalman filter: Weighting information based on their likelihood (Gaussian distribution and noise)
- Particle filter: Monte Carlo -sampling of a Hidden Markov Model

What was that regarding a particle filter?

- Discrete position hypotheses
- Movement model
- Posterior probability given “emission” observation (RSS)
- Resampling
- Example of laser range metering -based self-location by robot in Sebastian Thrun’s video
<http://robots.stanford.edu/movies/sca80a0.avi>

Movement model?

- Model of how your target device may move in between location hypotheses
- May include speed, direction
- May have constraints

Resampling?

- “Genetic” part
- Particles with higher posterior probability get more offspring
- Random particles
- Violation of constraints may kill particle

More info?

- Textbooks on probabilistic models
- Andrew Ng's machine learning course (online at stanford or coursera.com)
- Sebastian Thrun's Intro to AI course (online at udacity.com)
- Khan Academy
- Previous location awareness course <http://www.cs.helsinki.fi/courses/582684/2014/K/K/1>

Further with fingerprinting

- APs have several radios
- Transmit power fluctuates
- Number of samples?
- Estimating fingerprints [1]

References I



Teemu Pulkkinen, Johannes Verwijnen, and Petteri Nurmi. “WiFi positioning with propagation-based calibration”. In: *Proceedings of the 14th International Conference on Information Processing in Sensor Networks*. ACM. 2015, pp. 366–367.