Tracking Methods

Introduction

Tracking methods estimate the hidden state of a moving object/system over time. Two main methods: - Kalman Filters: Linear-Gaussian assumptions, efficient. - Particle Filters: Non-linear, non-Gaussian, approximate via sampling.

Uses & Use Cases

1. Self-driving cars: Track pedestrians, cars.
2. Radar tracking: Track aircraft.
3. Computer vision: Track objects across frames.

Steps

1. Define state-space model: State (position, velocity), Observation (sensor reading).
2. Prediction: Estimate next state from dynamics.
3. Update: Correct estimate using sensor observation.
4. Repeat for multiple time steps.

Example

1D Object Tracking: - Object moves in 1D with noisy measurements. - Kalman filter tracks true position.