MOBILE ROBOTS Case Studies 8

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Back to the forest

Consider a robotic application in a forest, where a robot needs to move in difficult all-terrain conditions. When moving in wet conditions, the wheels tend to slip when in pure mud, until they find a solid support below. To estimate the pose of the robot we defined the state variables as robot pose + humidity and we want to make a state estimation. Which filter should we use?

A. **Kalman filter, compact**
B. **Particle filter, generic**
C. **Grid-based filter, very generic**

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Back to the forest

Gaussian model of movement? NO, not A
Small environment or weak resolution? NO, not C
-> best solution B

A. Kalman filter, compact
B. Particle filter, generic
C. Grid-based filter, very generic

Automatic train

For a specific mobile app, we would like to make the estimation of the position of an automatic shuttle for a passenger of a shuttle making the link between two airport terminals defining a state (position, absolute speed, direction), using a map that includes the position of several visual landmarks and the many different slopes, the slope sensor of the smartphone and the camera detecting the markers. What filter should I use:

CC0 Max Pixel

A. Kalman filter, compact
B. Particle filter, generic
C. Grid-based filter, very generic

Automatic train

"Direction" is gaussian? NO, not A
Small environment or weak resolution? NO (can be discussed), not C
-> best solution B

CC0 Max Pixel

A. Kalman filter, compact
B. Particle filter, generic
C. Grid-based filter, very generic

Automatic train again

For the control of the shuttle we evaluate its position and we have to choose the strategy that ensures the best precision. Which is the best approach?

CC0 Max Pixel

A. Direct measurement of the position by an absolute sensor on the ground
B. Kalman filter using the measured absolute position
C. Kalman filter using the measured absolute position and the measured speed of the shuttle

Automatic train again

For the control of the shuttle we evaluate its position and we have to choose the strategy that ensures the best precision. Which is the best approach?

CC0 Max Pixel

A. **Direct measurement of the position by an absolute sensor on the ground**
B. **Kalman filter using the measured absolute position**
C. **Kalman filter using the measured absolute position and the measured speed of the shuttle** **(2 sensors, most information, well fused)**