CS480

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Grid Localization

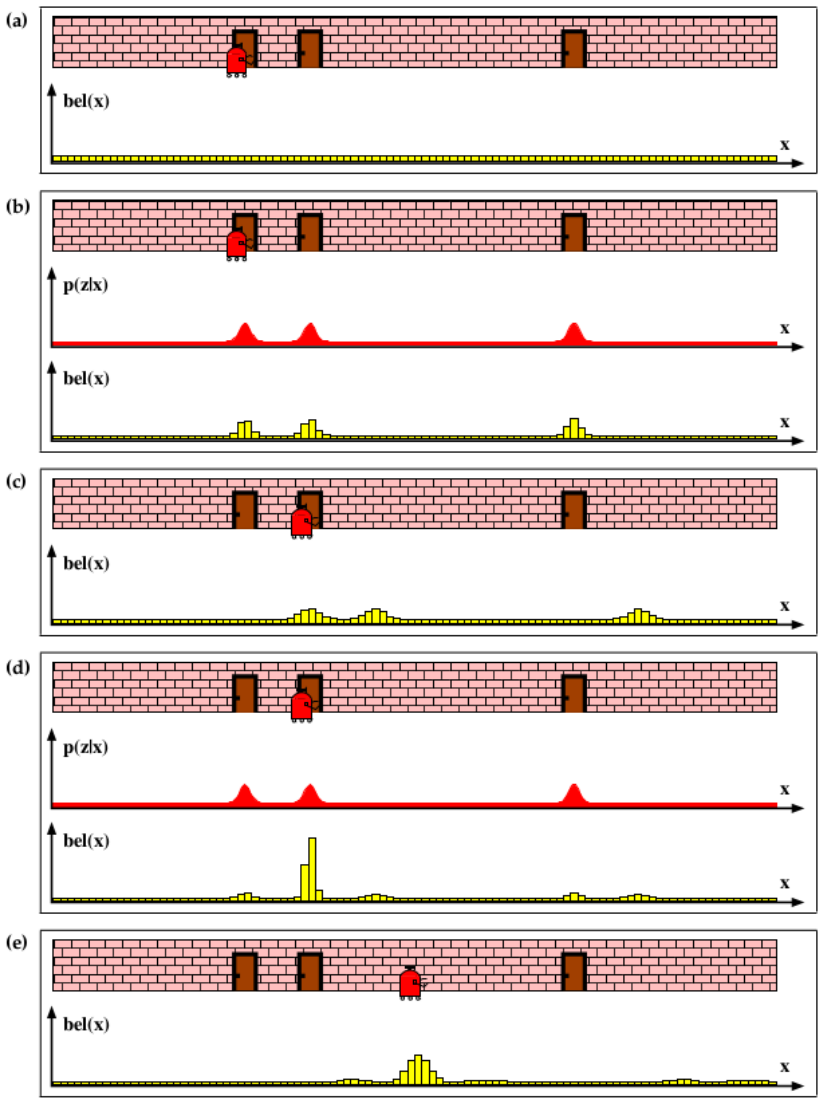

Figure 8.1 Grid localization using a fine-grained metric decomposition. Each picture depicts the position of the robot in the hallway along with its belief $bel(x_t)$, represented by a histogram over a grid.

Probabilistic Robotics. Thrun, Burgard, Fox, 2005

Monte-Carlo Localization

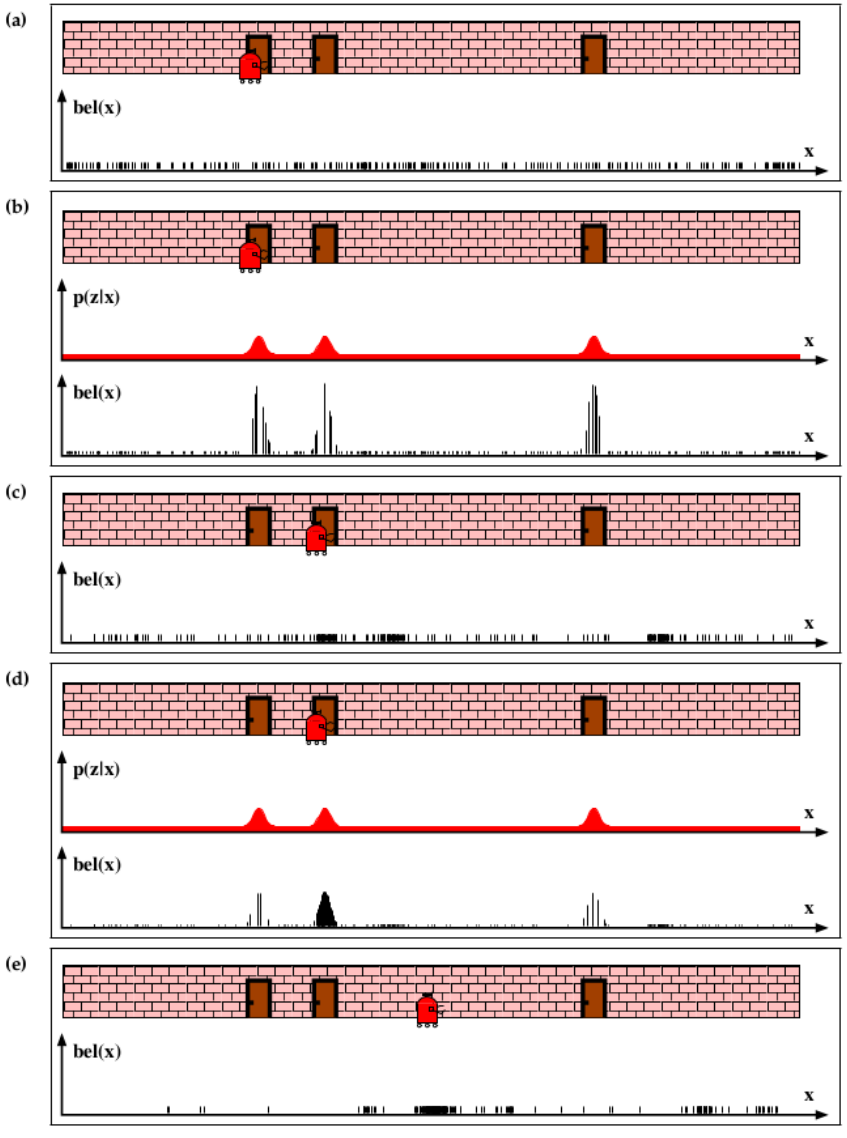

Figure 8.11 Monte Carlo Localization, a particle filter applied to mobile robot localization.

Probabilistic Robotics. Thrun, Burgard, Fox, 2005

SLAM

- The localization problem was:

$$p(s_t|z_{0:t}, u_{0:t})$$

where s_t is the robot pose, $z_{0:t}, u_{0:t}$ represent the history or sensor inputs and actions.

- The SLAM problem is:

$$p(s_t, \Theta|z_{0:t}, u_{0:t})$$

where Θ represents the map.

The Solution

This should look familiar:

$$p(s_t, \Theta | z_{0:t}, u_{0:t}) =$$

$$\mu p(z_t | \Phi, s_t) \int p(s_t | s_{t-1}, u_t) p(s_{k-1}, \Phi | z_{0:t-1}, u_t) ds_{k-1}$$