For P

update observations
update currentbelief

Next cell

Just searched

$$P(\text{in cell}_i \mid \text{obs\_t} \wedge \text{fail}_j) = \frac{P(\text{in cell}_i \mid \text{obs\_t}) \times P(\text{fail}_j \mid \text{in cell } i \wedge \text{Obs\_t})}{P(\text{fail}_j \mid \text{obs\_t})}$$

- $P(\text{in cell}_i \mid \text{Obs\_t} \wedge \text{fail}_j)$ this is the belief state for cell i at time t.
- $P(\text{in cell}_i \mid \text{obs\_t})$ this is the belief state for cell i at time t.
- $P(\text{fail}_j \mid \text{in cell}_i \wedge \text{obs\_t})$ since you are conditioning on the target being in cell i, as you note this is 1 for i != j, and the false negative rate for i = j.
- $P(\text{fail}_j \mid \text{Obs\_t})$ this is the necessary normalization term, to make sure that all your belief states at time t+1 sum to 1 (as all probabilities must). There are a couple of ways to compute this, but the most direct way is to consider marginalizing on where the target is, i.e., consider the sum of $P(\text{fail}_j \wedge \text{in cell}_k \mid \text{obs\_t})$ for all possible cells k

Formula is the integral of $f(x,y)$

$x = P(\text{fail in cell}_j)$

$y = P(\text{target in } k \mid \text{Obs\_t})$

$$p(z) = \int_Y p(x,y)\,dy$$

False negative · Current belief

K = # of cells

$$p(z) = \int_1^k \frac{p(\text{fail in cell}_j) \cdot p(\text{target in cell}_k)}{p(\text{Obs\_t})_{\text{observations}}}$$

$P(\text{fail}_j \mid \text{Obs\_t})$

Our Rule: Check cell that has the lowest false negative and