Bayes' Theorem & Bayesian Tracking

Estimation problems: distinguish

(I) $x$ parameter (const)

(II) $x(k)$ time-varying

$\rightarrow$ process model: $x(k) = g_k(x(k-1), v(k))$

Both: measurement model

$z = h(x, w)$ for (I)

$z(k) = h_k(x(k), w(k))$ for (II)

(II) $x(k)$ time-varying

- Bayesian Tracking (x(k) D.R.V.)

Prior Update:

$f(x(k) | z(1:k-1)) = \sum_{x(k-1)} f(x(k) | x(k-1)) f(x(k-1) | z(1:k-1))$

Measurement Update:

$f(x(k) | z(k:1)) = \frac{f(z(k) | x(k)) f(x(k) | z(1:k-1))}{\sum_{x(k)} f(z(k) | x(k)) f(x(k) | z(1:k-1))}$

(I) $x$ parameter

- Bayes Theorem:

$f(x|z) = \frac{f(z|x) f(x)}{f(z)}$