3.8 discrete Kalman

* Model
* initial: k=0

3.8.a) compute a priori / prediction ( and posteriori /correction covariance for

For k= 1; covariance:

+prediction Since at , there is no previous estimation, assume

+correction

For

+prediction

+correction

3.8.b) compute optimal gain

For k= 1;

+

For

+

3.8.c) compute optimate estimator with

For k= 0;

+ at t=0, the correction is assumed :

1. prediction :

For

correction :

For

+prediction:

+correction:

4.10 Continuous function basis

Define is an inner product, then

which implies that is an orthonormal basis in this space.

Hence the minimum mean square approximation (estimator) of is the orthogonal projection in the space of span

Hence

can be determined. For example

(a)Remember the Fourier series on ,

(b) how about

(c) consider , which is independent with .

-Find the orthogonal basis,

- Find the least square estimator of

4.12 LSE in static systems(batch type)

4.12.a)

1. The least square estimator is
2. Since the estimation error

By the assumption

And the estimation error variance is

Hence the estimation error variance converges to 0 as converges to infinite

1. If we do not know , then

implies the estimator is biased. And You may show the estimation error variance converges to zero as converges to infinite.

This means even if the variance converges to zero, the mean of the estimator does not converge to the true value, implies the estimator is unbiased.

How to estimate along with and ? If we know , then

.QED