# Image Object Kalman Filtering

## Bounding box line location

State vector s:

where

(xmin , xmax , ymin , ymax) = location of the bounding box corner lines in the image  
(vxmin , vxmax , vymin , vymax) = velocity of the bounding box corner line in the image  
(axmin , axmax , aymin , aymax) = acceleration of the bounding box corner line in the image

State equation in differential form:

State equation in difference form:

where is the time increment and Gaussian noise with covariance R.

Measurement equation

Where is Gaussian noise with covariance matrix Q.

Kalman filter initialization:

where x(0) is the first location measurement.

where α, β and γ are believed variances of location, velocity and acceleration, for example 1.0.

where , and are believed variances of location, velocity and acceleration, for example 1.0.

Where q is the believed measurement variance, for example 1.0.

Kalman filter update: