# Image Object Kalman Filtering

## Bounding box corner location

State vector s:

where

l = location coordinate (xmin, xmax, ymin, ymax) of the bounding box corner in the image  
v = velocity (vxmin, vxmax, vymin, vymax) of the bounding box corner 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 l(0) is the first location measurement.

where 10.0 and 10000.0 are believed initial error variances of location and velocity.

where diagonal elements are believed state equation variances of location and velocity.

Where 10.0 is the believed measurement variance.

Kalman filter update: