# 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 α, β and γ are believed variances of location and velocity.

where , and are believed state equation variances of location and velocity.

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

Kalman filter update: