Computer Vision

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Exercise
Bayesian Detection and Tracking

We can use background difference subtraction to build a simple Bayesian tracker for moving objects. Assume an image has I columns and J rows and that we are looking for new objects within an entry region (or window) of size W x H on the edge of the window.

a) Explain how to use background difference subtraction to detect objects that enter a region via an entry region on the boundary of an image.

b) Explain how to compute the center of gravity and spatial extent (second moment or covariance) for an object detected in an entry region.

c) Explain how to predict a detection region (region of interest) for the next image from objects detected in the previous image using the position and spatial extent of the object.

d) Explain how to update the center of gravity and spatial extent for an object from a new detection in the next image.

f) Explain how to determine the width, length and orientation of the object from its covariance matrix.