Optical Flow Methods

CISC 489/689

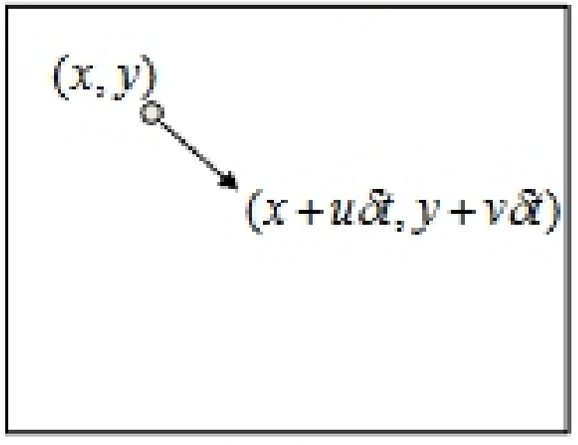
Spring 2009

University of Delaware

Outline

- Review of Optical Flow Constraint, Lucas-Kanade, Horn and Schunck Methods
- Lucas-Kanade Meets Horn and Schunck
- 3D Regularization
- Techniques for solving optical flow
- Confidence Measures in Optical Flow

Optical Flow Constraint

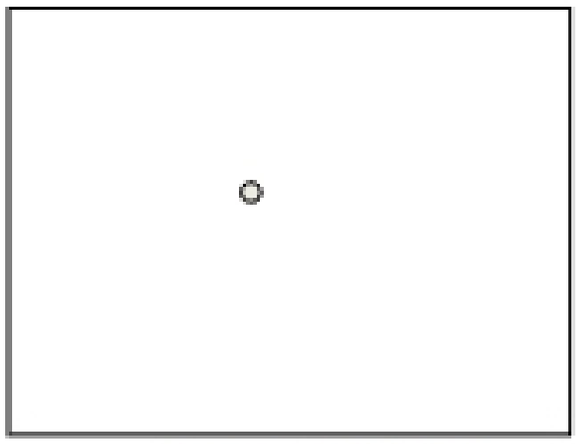


$f(x, y, t)$

$$f(x + u\delta t, y + v\delta t, t + \delta t) = f(x, y, t)$$

$$f(x, y, t) + \delta x \frac{\partial f}{\partial x} + \delta y \frac{\partial f}{\partial y} + \delta t \frac{\partial f}{\partial t} = f(x, y, t)$$

Dividing by δt and taking limit $\delta t \longrightarrow 0$



$f(x, y, t + \delta t)$

$$\frac{\partial f}{\partial x}\frac{dx}{dt} + \frac{\partial f}{\partial y}\frac{dy}{dt} + \frac{\partial f}{\partial t} = 0$$

$$f_x u + f_y v + f_t = 0$$