

# Taylor Series

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$$f(x) \Rightarrow \lim_{x \rightarrow a} f(x) = f(a) + \frac{f'(a)}{1!} (x-a) + \frac{f''(a)}{2!} (x-a)^2 + \dots$$

$$I(\underline{x+u}, \underline{y+v}, \underline{t+1}) \sim \underbrace{I(x, y, t)}_{\substack{\uparrow \\ a}} + I_x \cdot u + I_y \cdot v + I_t \cdot 1$$

$$= I(x, y, t) + I_x u + I_y v + I_t$$

$$\underline{0} = \underline{I(x+u, y+v, t+1)} - \underline{I(x, y, t)} = \underline{I_x \cdot u + I_y \cdot v + I_t}$$

$$\underline{I_x \cdot u + I_y \cdot v + I_t} = 0$$

$$\Rightarrow \nabla I = \begin{bmatrix} I_x \\ I_y \end{bmatrix}$$

$$\nabla I \cdot \underbrace{\begin{bmatrix} u \\ v \end{bmatrix}}_{\substack{\uparrow \\ \text{motion vector}}} = -I_t$$