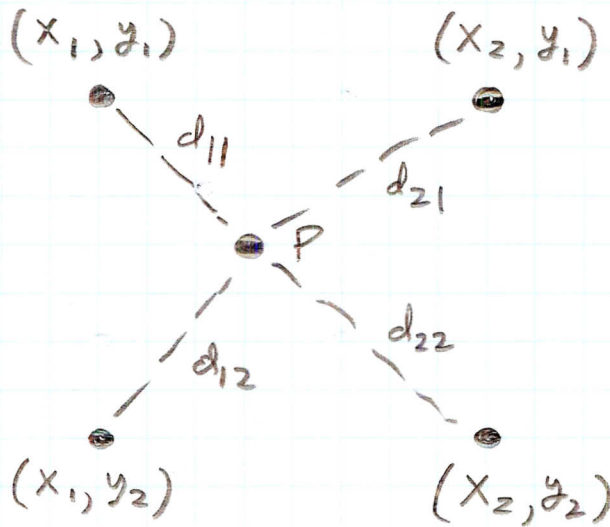


Interpolation Methods

11

1.) Inverse-distance Interpolation



known pixels:

$(x_1, y_1), (x_2, y_1),$
 $(x_1, y_2), (x_2, y_2)$

unknown pixel
 P

d_{ij} = (Euclidean) distance from
 (x_i, y_i) to P

$$f(P) = \frac{\sum \frac{f(x_i, y_i)}{d_{ij}}}{\sum \frac{1}{d_{ij}}}$$

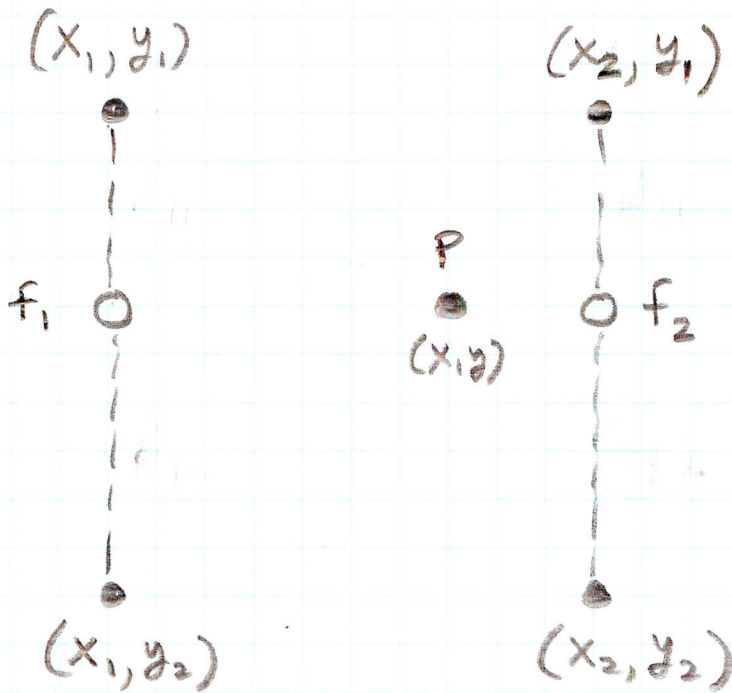
gray-level
value
of
interpolated
pixel

If $P = (x, y)$, then

$$d_{ij} = \sqrt{(x - x_i)^2 + (y - y_i)^2}$$

2.) Bilinear Interpolation

L2



$P = (x, y)$ is

The unknown pixel

Do in two
1-D linear
interpolation steps.



$$\left. \begin{aligned} f_1 &= \frac{y_2 - y}{y_2 - y_1} f(x_1, y_1) + \frac{y - y_1}{y_2 - y_1} f(x_1, y_2) \\ f_2 &= \frac{y_2 - y}{y_2 - y_1} f(x_2, y_1) + \frac{y - y_1}{y_2 - y_1} f(x_2, y_2) \end{aligned} \right\} \begin{array}{l} y \\ \text{direction} \end{array}$$

2)

$$\begin{aligned} f(P) &= f(x, y) \\ &= \frac{x_2 - x}{x_2 - x_1} f_1 + \frac{x - x_1}{x_2 - x_1} f_2 \end{aligned} \left. \vphantom{\frac{x_2 - x}{x_2 - x_1}} \right\} \begin{array}{l} x \\ \text{direction} \end{array}$$