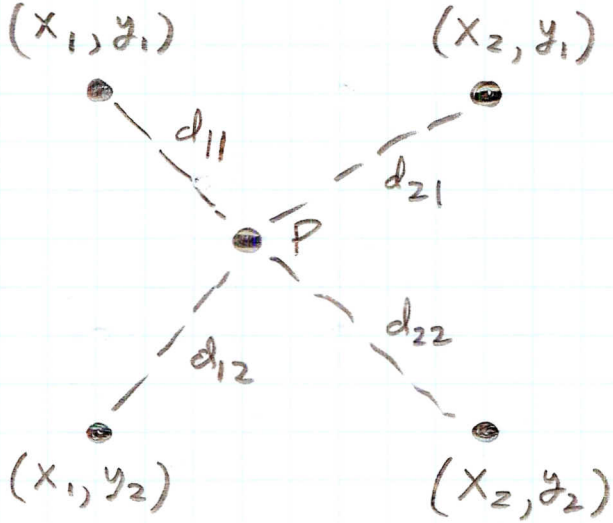
Interpolation Methods

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_j) to P

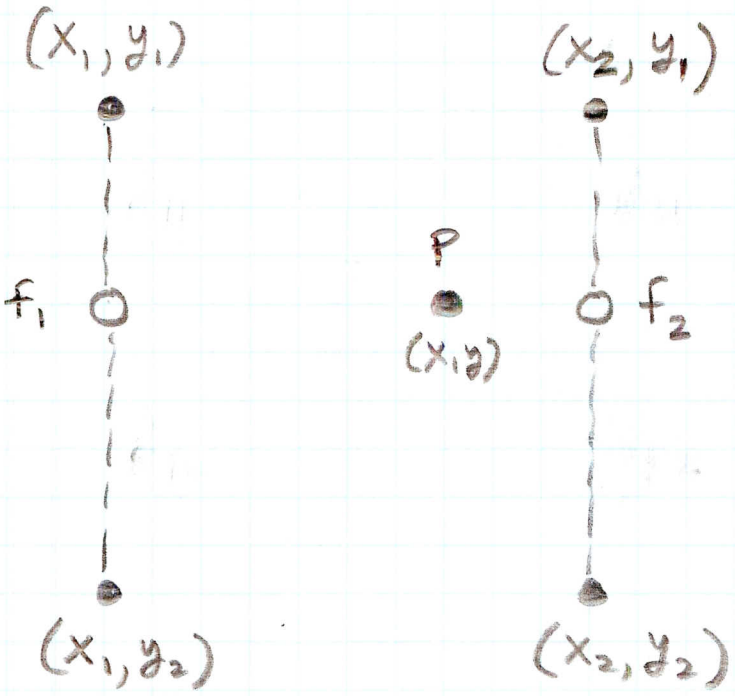
$$f(P) = \frac{\sum \frac{f(x_i, y_j)}{d_{ij}}}{\sum \frac{1}{d_{ij}}}$$

gray-level value of interpolated pixel

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

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

2.) Bilinear Interpolation



1)

$$f_1 = \frac{y_2 - y}{y_2 - y_1} f(x_1, y_1) + \frac{y - y_1}{y_2 - y_1} f(x_1, y_2)$$

$$f_2 = \frac{y_2 - y}{y_2 - y_1} f(x_2, y_1) + \frac{y - y_1}{y_2 - y_1} f(x_2, y_2)$$

} y direction

2)

$$f(P) = f(x, y)$$

$$= \frac{x_2 - x}{x_2 - x_1} f_1 + \frac{x - x_1}{x_2 - x_1} f_2$$

} x direction