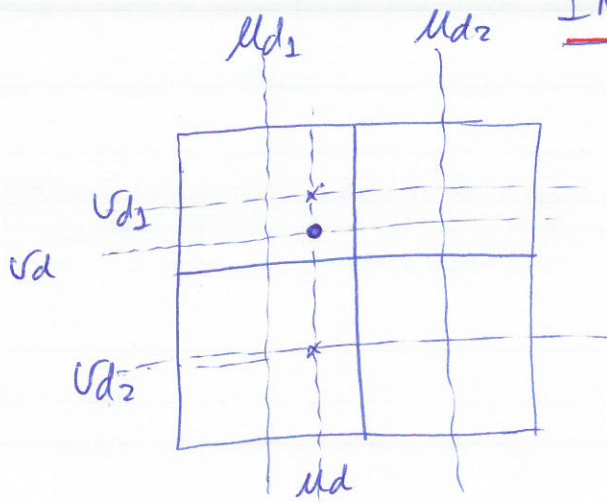
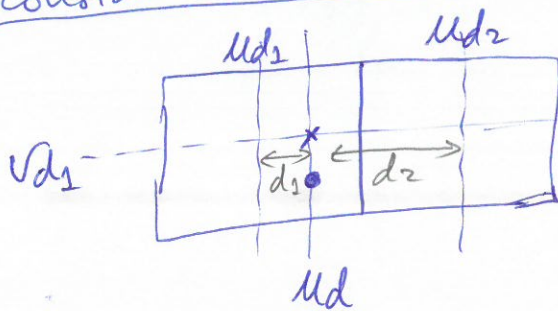


INTERPOLACIÓN BILINEAL

①



1) Consideramos ~~en~~ en primer lugar la primera fila:



Si ponderáramos por distancia:

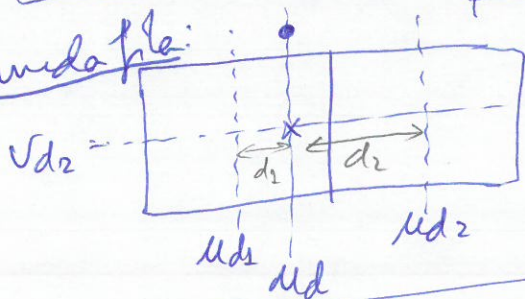
$$I(u, v_1) = \frac{d_1}{d_1 + d_2} \cdot I(u_1, v_1) + \frac{d_2}{d_1 + d_2} \cdot I(u_2, v_1)$$

Si ponderáramos por proximidad:

$$I(u, v_1) = \frac{d_2}{d_1 + d_2} \cdot I(u_1, v_1) + \frac{d_1}{d_1 + d_2} \cdot I(u_2, v_1)$$

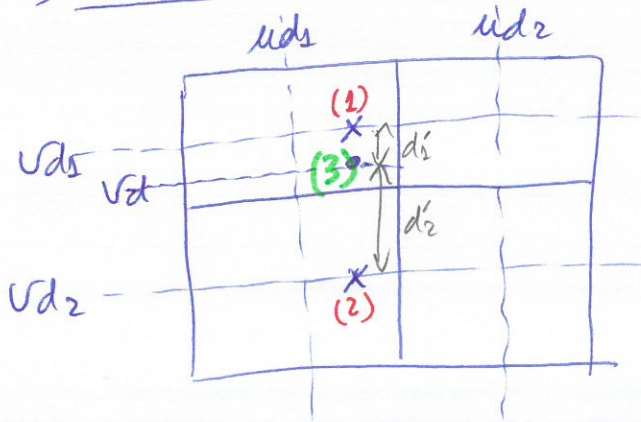
$$I(u, v_1) = \frac{u_2 - u}{u_2 - u_1} \cdot I(u_1, v_1) + \frac{u - u_1}{u_2 - u_1} \cdot I(u_2, v_1) \quad (1)$$

2) Segunda fila:



$$I(u, v_2) = \frac{u_2 - u}{u_2 - u_1} \cdot I(u_1, v_2) + \frac{u - u_1}{u_2 - u_1} \cdot I(u_2, v_2) \quad (2)$$

3) Combinamos ambas fls:



Ahora ponderamos (1) y (2) por proximidad vertical.

$$I(v_d, u_d) = \frac{(v_{d2} - v_d)}{(v_{d2} - v_{d1})} \cdot I(v_{d1}, u_d) + \frac{(v_d - v_{d1})}{(v_{d2} - v_{d1})} I(v_{d2}, u_d); \quad (3)$$

Sustituyendo:

~~$$I(v_d, u_d) = \frac{(v_{d2} - v_d)}{(v_{d2} - v_{d1})} \cdot I(v_{d1}, u_{d1}) + \frac{(v_d - v_{d1})}{(v_{d2} - v_{d1})} I(v_{d1}, u_{d2})$$~~

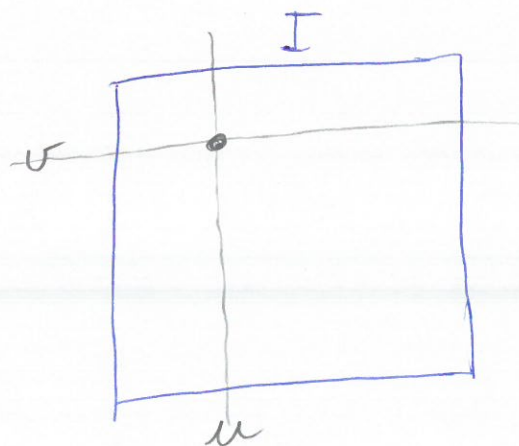
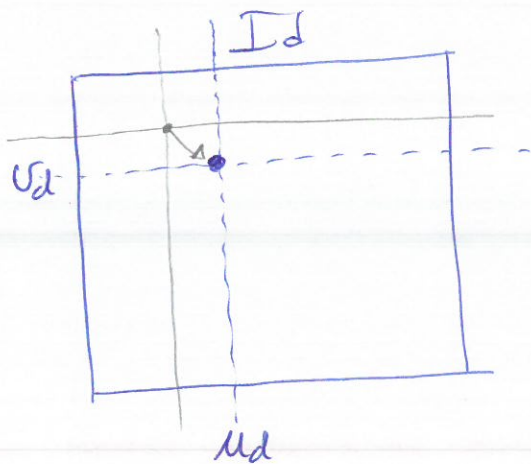
$$I(v_d, u_d) = \frac{(v_{d2} - v_d)(u_{d2} - u_{d1})}{(v_{d2} - v_{d1})(u_{d2} - u_{d1})} \cdot \left[\begin{aligned} &(v_{d2} - v_d)(u_{d2} - u_d) \cdot I(v_{d1}, u_{d1}) + \\ &(v_{d2} - v_d)(u_d - u_{d1}) \cdot I(v_{d1}, u_{d2}) + \\ &(v_d - v_{d1})(u_{d2} - u_d) \cdot I(v_{d2}, u_{d1}) + \\ &(v_d - v_{d1})(u_d - u_{d1}) \cdot I(v_{d2}, u_{d2}) \end{aligned} \right] \quad (3)$$

(en nuestro caso)

CORRECCIÓN DISTORSIÓN

I_d : Imagen de partida distorsionada.

I : Imagen a obtener rectificada.



$$\begin{cases} u = x_n \cdot f_x + u_0 \\ v = g_n \cdot f_y + v_0 \end{cases} \rightarrow \begin{cases} x_n = \frac{u - u_0}{f_x} \\ y_n = \frac{v - v_0}{f_y} \end{cases}$$

$$\begin{cases} x_n^d = x_n \cdot (1 + k_r \cdot r^2) \\ y_n^d = y_n \cdot (1 + k_r \cdot r^2) \end{cases} \quad (r^2 = x_n^2 + y_n^2)$$

$$\begin{cases} u_d = x_n^d \cdot f_x + u_0 \\ v_d = y_n^d \cdot f_y + v_0 \end{cases}$$

$$I(u, v) = I_d(v_d, u_d)$$

- a) Nearest neighbour
- b) Bilinear