

$$\begin{aligned} &I(x+1, y), I(x-1, y) \\ &I(x, y+1), I(x, y-1) \end{aligned}$$

$$d_x, d_y$$

$$\begin{aligned} &\text{quadrant II} \\ &= \text{sign}(d_x) * \text{sign}(d_y) \end{aligned}$$

$$|d_x|, |d_y|$$

$$\phi_1, \phi_2 = \begin{cases} 070, 090 & \text{if } 004 \times d_y \geq 011 \times d_x \\ 050, 070 & \text{if } 073 \times d_y \geq 087 \times d_x \\ 030, 050 & \text{if } 168 \times d_y \geq 097 \times d_x \\ 010, 030 & \text{if } 017 \times d_y \geq 003 \times d_x \\ 170, 010 & \text{if others} \end{cases}$$

$$\begin{cases} d_x = B_{\phi_i} \times \cos(\phi_i) + B_{\phi_{i+1}} \times \cos(\phi_{i+1}) \\ d_y = B_{\phi_i} \times \sin(\phi_i) + B_{\phi_{i+1}} \times \sin(\phi_{i+1}) \end{cases}$$

$$\phi = \begin{cases} 180 - \phi & \text{if quadrant II} \\ \phi & \text{if others} \end{cases}$$

$$\phi_i, \phi_{i+1}, B_{\phi_i}, B_{\phi_{i+1}}$$