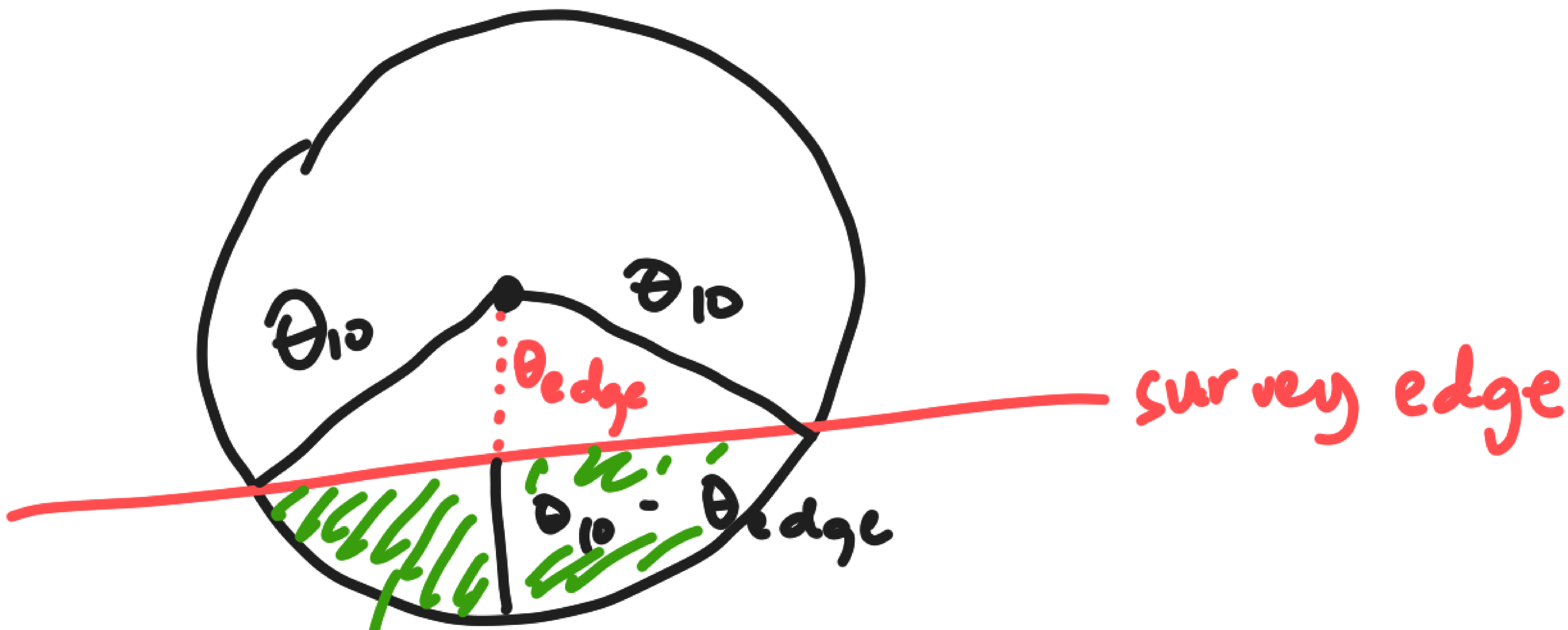
EDGE CORRECTION



we are interested in this area

Area of segment = area of sector − area of triangle.

For area of sector.

$$A_s = \frac{1}{2}\theta_{10}^2 \alpha$$

angle b/w the two radii, unknown

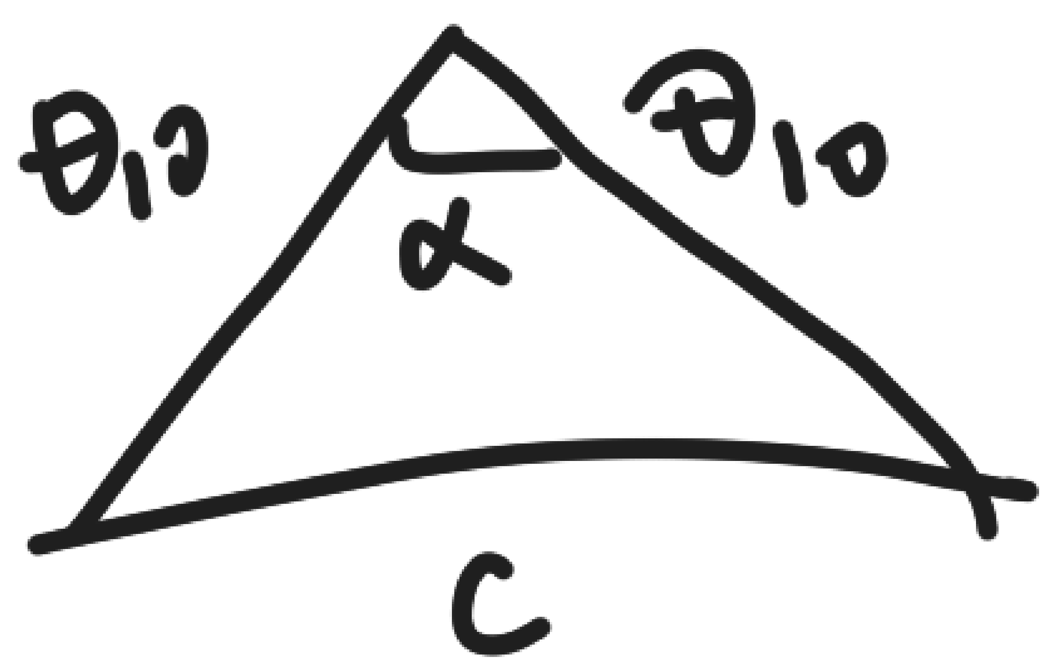
For area of triangle,

$$A_\Delta = \frac{1}{2}\theta_{10}^2 \sin \alpha$$

In the code (line 147),

$$C = \text{length of chord}$$
$$= 2\sqrt{\theta_{10}^2 - \theta_{edge}}$$

Also,



Law of cosines:

$$C^2 = \theta_{10}^2 + \theta_{10}^2 - 2\theta_{10}^2 \cos\alpha$$

$$\therefore \; C^2 = 2\theta_{10}^2 (1 - \cos\alpha)$$

$$\frac{C^2}{2\theta_{10}^2} = 1 - \cos\alpha$$

$$\cos\alpha = 1 - \frac{C^2}{2\theta_{10}^2}$$

$$\alpha = \cos^{-1}\left(\underbrace{1 - \frac{C^2}{2\theta_{10}^2}}_{\text{line 148 in code}}\right)$$

α is "theta" in line 149
of code

The area of the segment is therefore:

$$A_s = \frac{1}{2}\theta_{10}^2 \alpha - \frac{1}{2}\theta_{10}^2 \sin\alpha$$

$$= \frac{\theta_{10}^2}{2}\left[\alpha - \sin\alpha\right]$$

(line 150 in code).

Then, get the percentage of segment area to the total area of sector

$$\text{percent\_area} = \frac{A_s}{\pi\theta_{10}^2}$$

Following Santos et al. (2018),

If $\theta_{edge} < \theta_{10}$, $\frac{n}{1-x} = \frac{10}{1}$

$n = 10(1-x)$

where x = percent area of segment

n = true index of 10th nearest neighbor