Median Filtering / Smoothing

- Here's the algorithm:

1. Choose a window size for smoothing, let's say 5×5.
2. Process image in a way that you always find a 5×5 window of pixels, that is, find an appropriate edge. In our case it's 2.
3. When you encounter a pixel store its entire window in an array. In our case that array will be 25 elements long.
4. Sort the array.
5. Pick the element in the middle of the array, in our case the one at index 12 and assign it to the current pixel.
6. Do this for all pixels in the image.

Equalising Images

- Histogram equalisation is based on the argument that the image's appearance will be improved if the distribution of pixels over the available grey levels is even.
- Equalisation transformation warps the horizontal axis of the histogram, stretching it in some regions and compressing it in others, such that the frequencies of the grey values become more uniform.
- Here's how you do it:

$$\text{histo}(i) \xrightarrow{①} \text{cumul}(i) = \sum_{k=0}^{i} \text{histo}(k) \xrightarrow{②} \text{lookup}(i) = \frac{L}{N} \cdot \text{cumul}(i)$$

histo(i): histogram of the original image

cumul(i): cumulative histogram

lookup: lookup table

L: number of grey values = 256

N: number of pixels in original image

pixel index (or i * width + j)

$$\xrightarrow{③} \text{equalisedImage}[p] = \text{lookup}[\text{image}[p]]$$

output image

original image