Mcahine Vision HW3 Report

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Dependencies

```
python = ">=3.9,<4"
opencv-python = "^4.9.0.80"
alive-progress = "^3.1.5"
```

Run

```
python 110590004_hw4.py
```

Question 1

Part 1

Image Labeling

- Use different colors to label different objects in the image.

Part 2

Flooding Process

1. Start with putting all labeled pixel into the priority queue.
2. Reapetedly pop the pixel with the highest priority from the queue.
3. The priority of given pixel p is determined by the following formula:

$$\text{priority} = \text{Distance}(p, \text{mean}(p\text{'s 25-neighbors})) + 2 \cdot \text{Variance}(p\text{'s 25-neighbors}) + \text{Sobel}(p)$$

4. The Sobel operator is implemented following the definition in wikipedia.
5. If the pixel is not labeled, check its neighbors. If the neighbor is labeled, assign the label to the pixel. If there are multiple labels, assign the pixel as a boundary pixel.
6. If the pixel is labeled, skip it.
7. Put the pixel's neighbors into the queue.
8. If the queue is not empty, back to step 2.
9. Done.

Result