CV: Lab 05 Writeup

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Assignment

This weeks assignment was split into two parts:

- Implementing mean-shift for image segmentation
- Implementing a simplified version of SegNet

This writeup only covers the first part.

Mean-Shift

We can split `mean-shift` into five steps:

- Calculate distances between pixels
- Calculate weights for each pixel based on distance
- Calculate the mean of the pixels weighted by the weights
- Update the pixels to the mean
- Repeat until convergence (or number of steps reached)

Calculating Distances

We simply used numpy's `linalg.norm` function to calculate the distances for all pixels from a given pixel.

Calculating Weights

We used the Gaussian kernel to calculate the weights for each pixel. The kernel is defined as:

$$K(x) = e^{\frac{x}{\sqrt{2}b}^2}$$

where b is the bandwidth and x is the distance between the pixels.

Calculating the Mean and Updating Pixels

The mean can be easily be calculated using the following code:

```
np.sum(weight.reshape(-1, 1) * X, axis=0) / np.sum(weight)
```

this result is then used to update the pixels.

Results

Now for the interesting part, the results. We ran the algorithm on the provided image:

Figure 1: Original Image

I've also made fun little GIF showing the evolution of the algorithm.