

Computational Photography Assignment 4 - Seam Carving

Aloysius Tan

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1. Theory Question 1

a) Optimal Seam Matrix:

$$\begin{bmatrix} 2 & 3 & 4 & 5 & 1 \\ 3 & 2 & 5 & 3 & 2 \\ 6 & 5 & 7 & 3 & 4 \\ 9 & 9 & 7 & 7 & 9 \\ 13 & 12 & 9 & 7 & 9 \\ 14 & 12 & 10 & 7 & 10 \end{bmatrix}$$

b) Optimal Seams:

$$\begin{bmatrix} 2 & 3 & 4 & 5 & \underline{1} \\ 3 & 2 & 5 & 3 & \underline{\underline{2}} \\ 6 & 5 & 7 & \underline{3} & 4 \\ 9 & 9 & \underline{7} & 7 & 9 \\ 13 & 12 & 9 & \underline{7} & 9 \\ 14 & 12 & 10 & \underline{7} & 10 \end{bmatrix} \quad \text{or} \quad \begin{bmatrix} 2 & 3 & 4 & 5 & \underline{1} \\ 3 & 2 & 5 & 3 & \underline{\underline{2}} \\ 6 & 5 & 7 & \underline{3} & 4 \\ 9 & 9 & 7 & \underline{7} & 9 \\ 13 & 12 & 9 & \underline{7} & 9 \\ 14 & 12 & 10 & \underline{7} & 10 \end{bmatrix}$$

2. Energy Function

The Gaussian filter is defined by the equation:

$$G(x, y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$$

where $\sigma = 1$. The filter was generated using MATLAB's fspecial function.



Figure 1: Original Image 1



Figure 2: Original Image 2



Figure 3: Image 1 Energy Function



Figure 4: Image 2 Energy Function

3. Optimal Seam



Figure 5: Image 1 Optimal Seam



Figure 6: Image 2 Optimal Seam

4. Remove a Seam



Figure 7: Image 1 Seam Removed



Figure 8: Image 2 Seam Removed

5. Remove all Seams

Check the 'results' folder for the 2 MPEG-4 videos for each source image.