Computational Graphics, Homework 1
Seam Carving

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1 Algorithm

The algorithm is base on the dynamic programming method proposed by Avidan *et al.*[1]. Here only the implementation details are presented. For the full algorithm please refer to Avidan *et al.*[1].

1.1 Image Shrink

The energy is calculated as follows,

$$E_{ij} = \alpha\|(I_x)_{ij}\|_1 + (1-\alpha)\|(I_y)_{ij}\|_1,$$

where I_x, I_y are the image gradient calculated by kernel

$$K_x = \begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix}, \quad K_y = K_x^T.$$

Here $\alpha \in [0, 1]$ is a hyper parameter. One possible (and quiet promising) selection for α is $\alpha = 0$ when removing column seam and $\alpha = 1$ when removing row seam.

1.2 Image enlarge

In this implementation, 20% seam is inserted at every iteration.

1.3 Object removal and protection

Object is removed by setting the energy of corresponding pixels to $-\infty$, and protected by setting the energy to ∞.

References

[1] Shai Avidan and Ariel Shamir. Seam carving for content-aware image resizing. *ACM Trans. Graph.*, 26(3), July 2007.