

[CGDI] Assignment 2: Seam Carving

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Description

Seam Carving (https://en.wikipedia.org/wiki/Seam_carving)^[1] is a popular technique in image processing and computer graphics to perform content aware rescaling of an image. Many applications have been derived from this elegant yet simple tool (e.g. texture synthesis^[2], video (<http://alice.loria.fr/publications/papers/2010/TEXRESIZE//video/texresize.wmv>)).

The problem can be sketched as follows: given an input image, if we want to reduce its width from M to N , we have to remove $(M - N)$ columns. One can simply rescale (cf table, col 2), or crop the image (table, col 3).

Input	rescaling	cropping	seam carving
			

Seam carving aims to remove columns one by one, by considering a sequence of pixels (one per row), from the top to the bottom of the image, minimizing some energy function. Removing such seam will produce an image with width $M - 1$. The magic trick is to define the energy function in a way that the seams do not alter interesting parts of the image.



Objectives

Implementing a seam carving is rather simple. We would like you to extend this idea in various possible ways:

- faster implementation
- seam carving on video sequences
- seam carving for texture synthesis
- ...

There is a huge literature with followup papers to the original Seam carving one. Do not hesitate to discuss with us about your ideas before digging into the details.

References

1. Avidan, Shai; Shamir, Ariel (July 2007). "Seam carving for content-aware image resizing | ACM SIGGRAPH 2007 papers". Siggraph 2007: 10. doi:10.1145/1275808.1276390. ↵
2. Sylvain Lefebvre, Samuel Hornus, Anass Lasram. "By-example Synthesis of Architectural Textures", ACM Transactions on Graphics (SIGGRAPH Conference Proceedings) 2010 ↵