DAA Project

Seam Carving for Content-Aware Image Resizing

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Problem Definition

Seam carving is a novel way to crop images without losing important content in the image. This is often called “content-aware” cropping or image retargeting. Its an algorithm that lets you go

from this:

to this :

Overview

- Assign an energy value to every pixel
- Find a connected path of the pixels with the least energy
- Delete all the pixels in the path
- Repeat 1-3 till the desired number of rows/columns are deleted

Algorithm

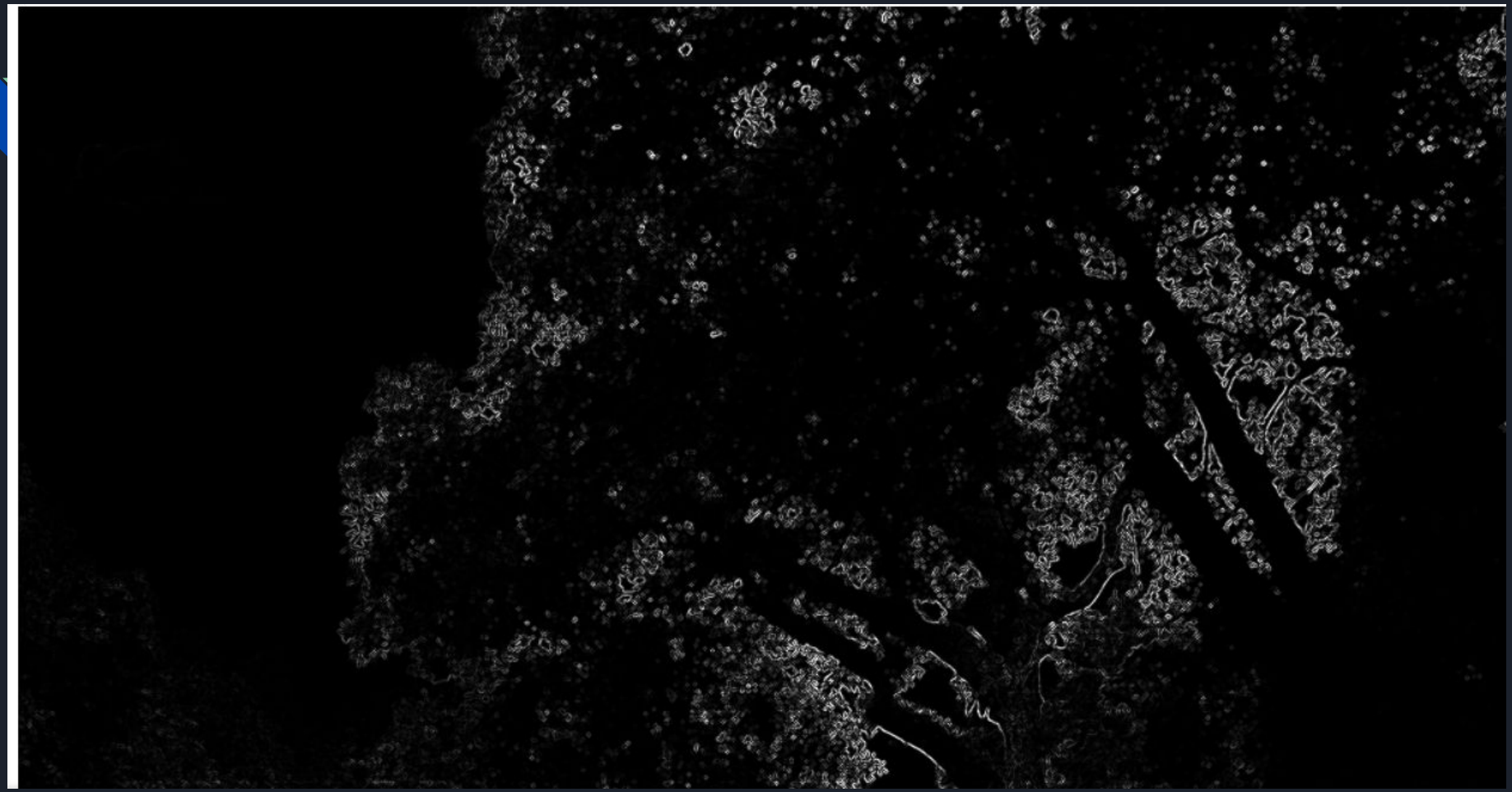
- Dynamic programming

Assigning an Energy Level to every Pixel

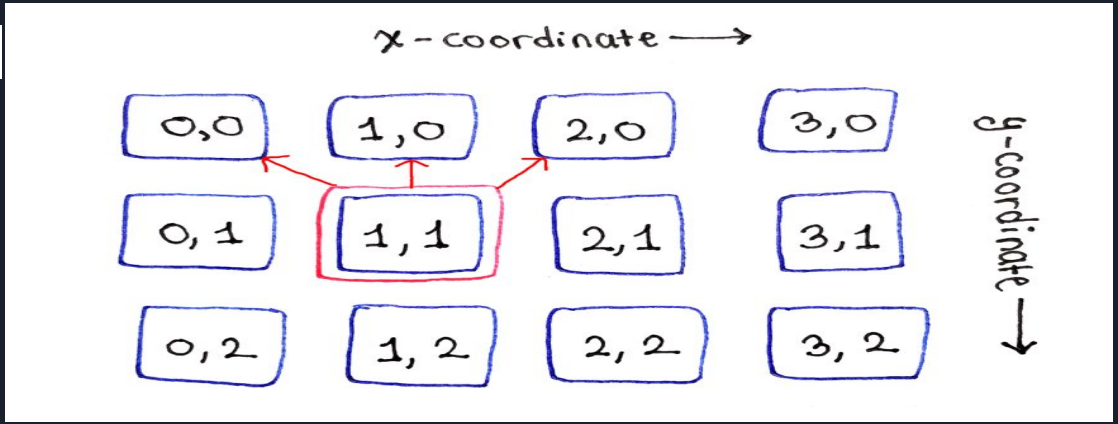
- Δr_x = (left pixel - right pixel) [Respect to X-axis]
- Δr_y = (top pixel - bottom pixel) [Respect to Y-axis]

$$|\Delta x|^2 = (\Delta r_x)^2 + (\Delta g_x)^2 + (\Delta b_x)^2$$
$$|\Delta y|^2 = (\Delta r_y)^2 + (\Delta g_y)^2 + (\Delta b_y)^2$$

$$e(x, y) = |\Delta x|^2 + |\Delta y|^2$$



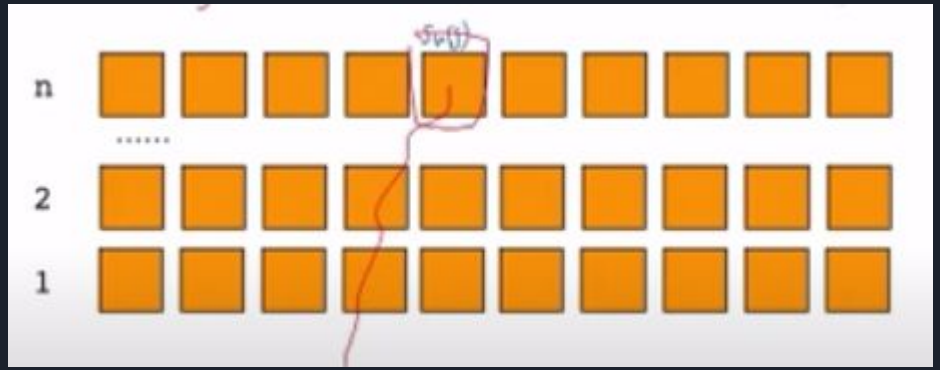
Find a connected path with the



$$M(x,y) = e(x,y) + \min \begin{cases} M(x-1,y-1) \\ M(x,y-1) \\ M(x+1,y-1) \end{cases}$$

Deleting all Pixels in Path

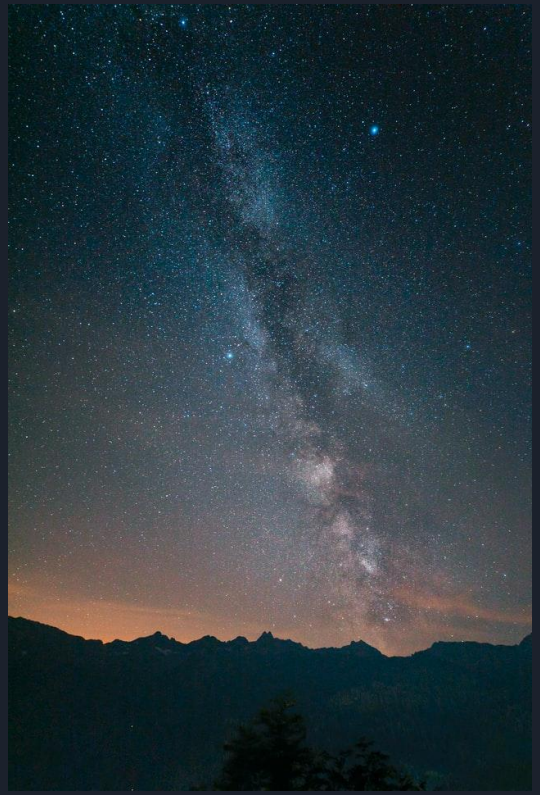
- Choose minimum from them top row / right column
- Backtrack the path and Delete that path

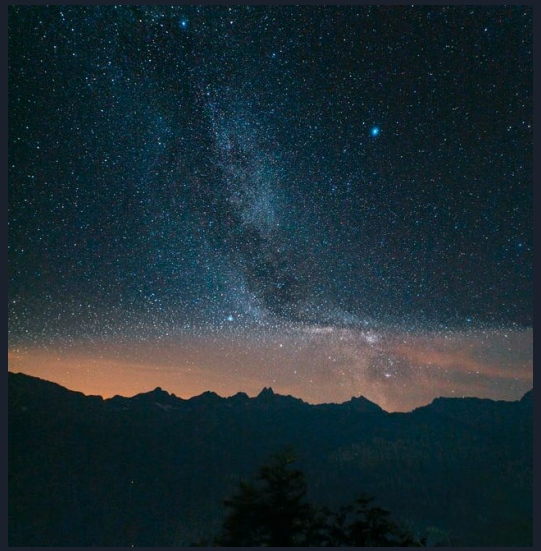


$$\min_{0 \leq x < W} M(x, H-1)$$

Image Resize X-axis

Image Resize Y-axis





Future Scope

- We would like to extend our approach to other domains, first of which would be resizing of video.

- we would like to investigate the possibility to combine the two approaches, specifically to define more robust multi-size images.

- we would also like to find a better way to combine horizontal and vertical seams in multi-size images

Drive Link

https://colab.research.google.com/drive/1d0MzaS0BfnDeQ7qJtCYeLrEINnoxW-Nm

THANK YOU