Jorge Betancourt PS2

1. Instead of inefficiently multiplying each filter (kernel matrix) to the image, it would be more efficient to group the matrices in such a way that makes the application of the kernel more efficient, less computationally expensive.
2. [01111111]
3. [0 1/2 0 -1/2 0] * [0 1/2 0 -1/2 0] = [0 0 ¼ 0 -1/2 0 ¼ 0 0]
4. Increase the lower bound of the threshold filter and increase the gaussian blur.
5. With a gaussian filter, the noise is applied consistently throughout the image assuming a normal distribution. However, we wouldn't want this to represent image noise, because the gaussian adds noise without taking the image itself into account. It would be better to take averages of a local area of the image and use those values to add noise instead of just applying noise when there might not be any variance in the original image.
6. Assuming that the assembled pieces are large enough to notice differences when assembled correctly and that the conveyor belt is a solid color. Assume that the final product is meant to have flush edges. When having the conveyor belt go by, take images of the assembled parts and apply Canny edge detector on the assembly. Have the program intelligently count the edges on the image. If there are too man edges, it is because the parts were not assembled correctly as there should only be a few flush edges.

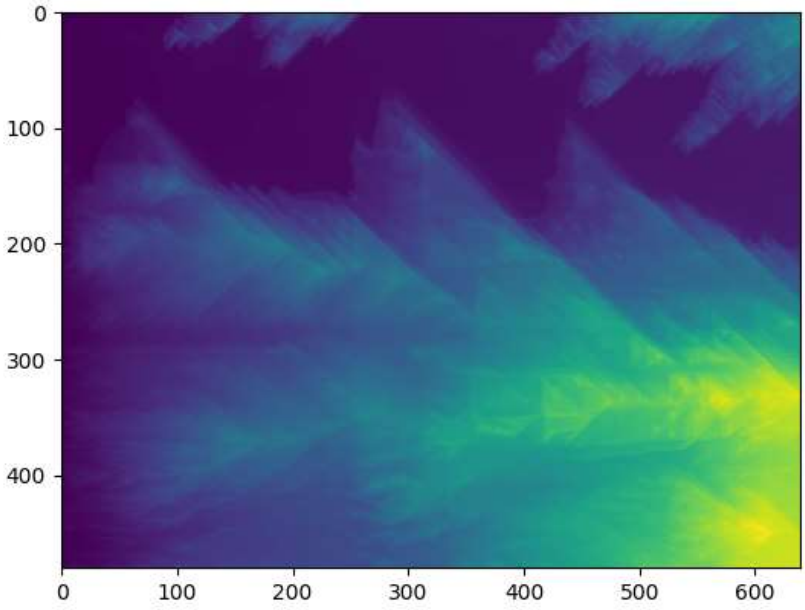
Mall Height

Mall Width

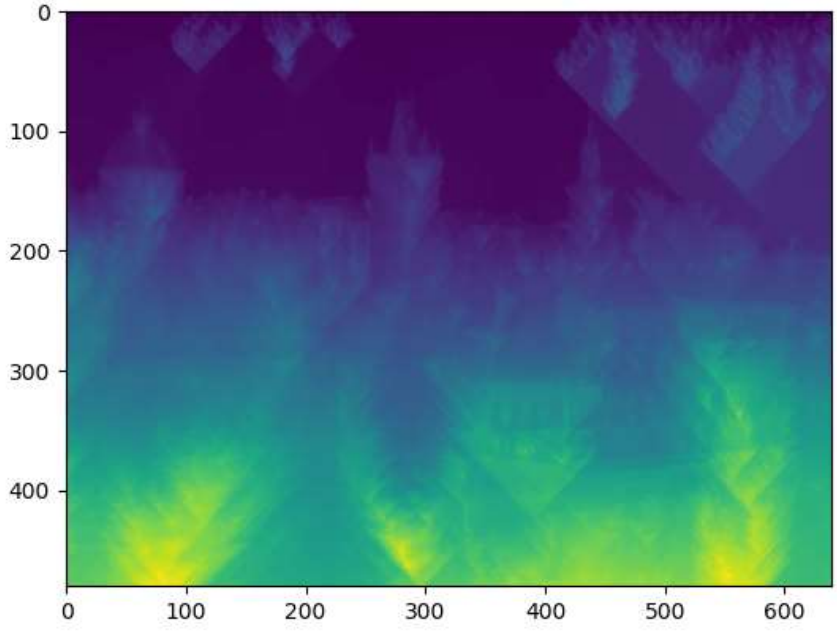
Prague Height

Prague Width

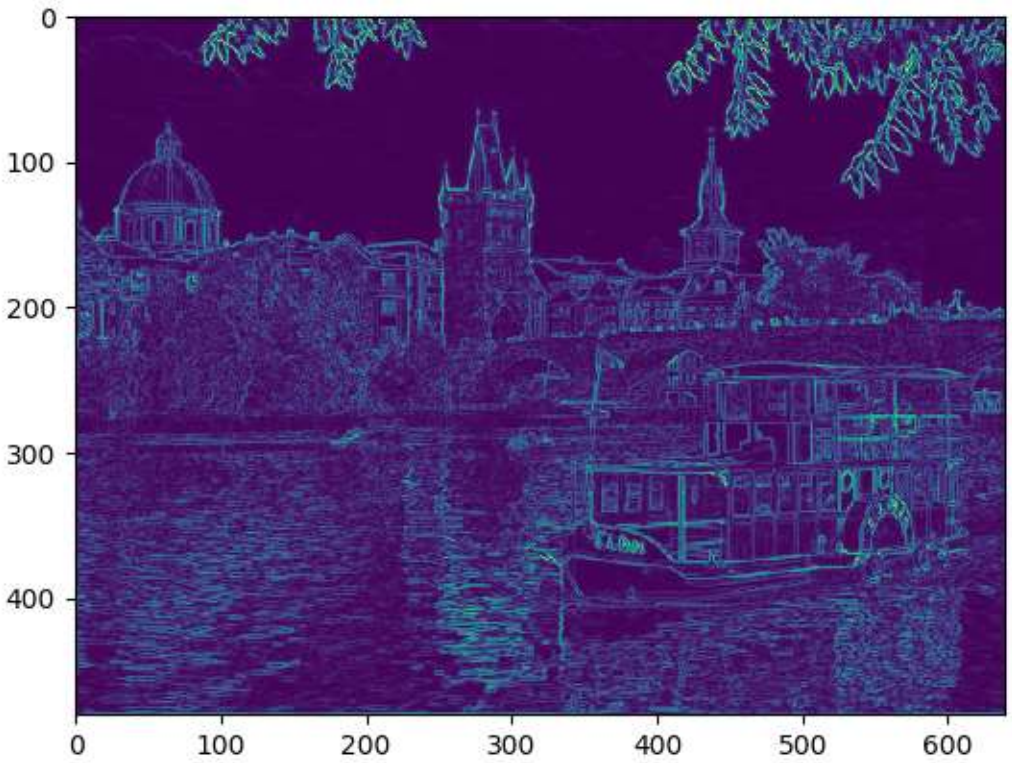
Cumulative Horizontal



Cumulative Vertical



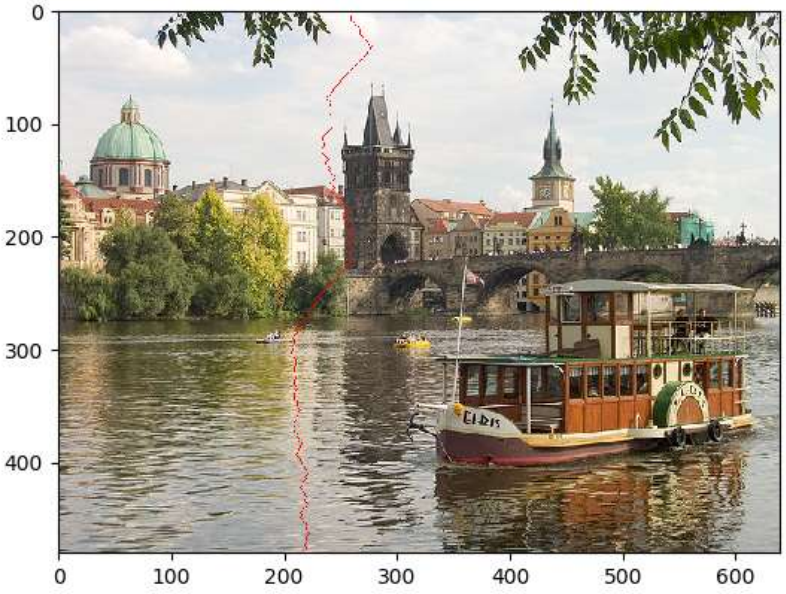
Energy Map



The energy map highlights the images edges y taking both directional derivatives into accound. That is why the sky is solid, as there is little change between the shades of blue. The horizontal cumulative graph reflects this as well as the filter is able to carve a path along the sky and around the trees. The cumulative vertical starts low and quickly increases as the ripples from the water generate more energy.

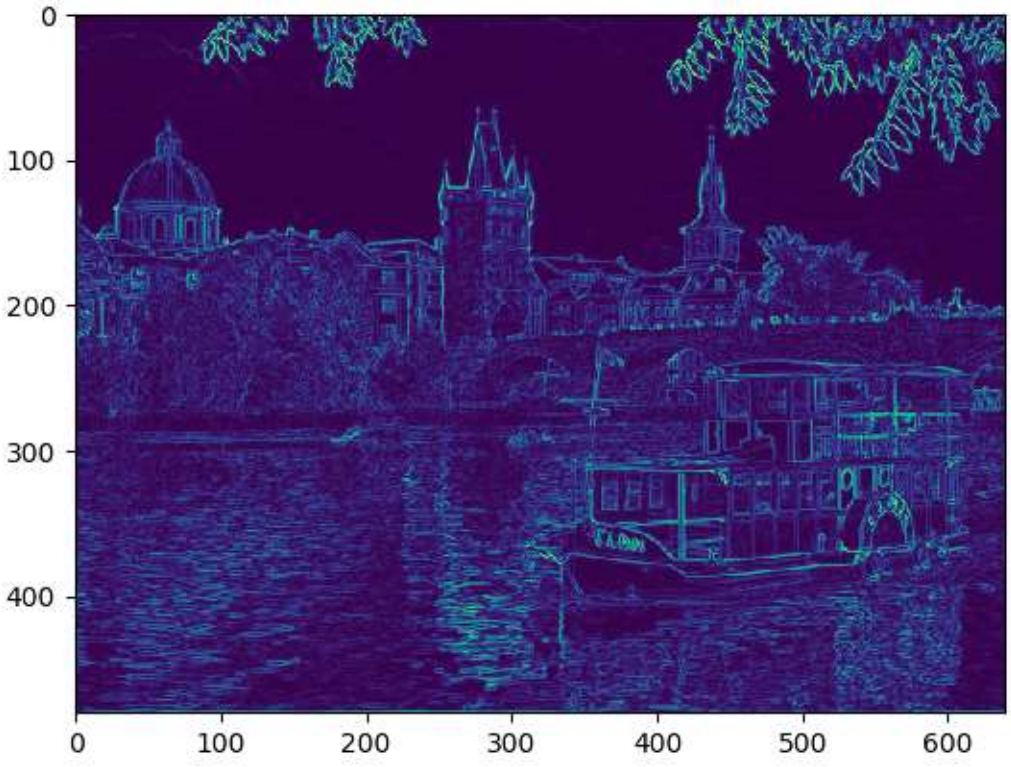
Horizontal Seam

Vertical Seam



The seams follow the darker paths found in the cumulative energy map. Because there is little change in color in the sky, the horizontal seam follows the skyline and avoids the leaves and buildings. The vertical seam follows the sides of buildings and finds the most consistent part of the water to follow, where the reflections of the buildings are not as noticeable.

Custom Energy Map



For this filter I preprocessed the image to have a higher contrast level. This intensified the edges before applying the Sobel filter.

0
50
100
150
200
250
300
350
400
0
100
200
300
400
500

Skyline: 507x338, 407x338, 407x338, reduce width by 100. There is a clear gap that was closed between two buildings on the right side of the skyline making the city look denser.

Cliffs: 620x414, 520x414, 520x414, reduce width by 100. Areas in the water were compressed where there was little to gradient caused by the waves.

Trump: 325x425, 225x425, 225x425, reduce width by 100. Facial features were kept intact, but the sides of the head which are more consistent were deleted.