Problem Set 1

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Classmate collaborator(s):doing alone.

1 Short Answer Problems

1.1

Lets take a filter as:

1	2	1
2	4	2
1	2	1

Any image window as:

5	4	1
2	1	2
1	1	3

We have to do 9(3*3) multiplications to get the result as 14+12+6=32.
By using Associative property we can reduce it by dividing the filter as part1 and part2:

part1: 1 2 1

1

Part2: 2

1

14

Part1 with image window give's the result as: 6

6

part2 with above result give's the result as 14+12+6=32
The result was same but the number of computations was decreased because of associative property.

1.2

imerode([1,0,1,1,1,1,1,1],[1,1,1])

The result is [0,0,0,1,1,1,1,1]

1.3

Firstly Gaussian noise is for random noise in the given image. When coming to additive there is chance that recent noise created position might coincide with earlier noise locations and this can be considered as possible flaw in the use of Additive Gaussian Noise.

1.4

Assumptions: Our System is already trained with an ideal part data before testing with video data and it is assumed that both are captured from same direction at same angle

The Best way to incorporate the given techniques is to use the derivative of convolution between video data and Filter.

if the part's minute variation also to be checked then I'll increase the value of σ

if the part's minute variation not required then I'll decrease the value of σ

Then I'll subtract the (derivative of convolution between video data and Filter) and (derivative of convolution between ideal data and Filter).

If there is a difference then it report's.

2 Programming Problem

2.1 Reduced width for Input Images

The result's are shown in the below fig's 2.1 and 2.2.

2.2 Reduced Height for Input Images

The result's are shown in the below fig's 2.3 and 2.4.

2.3

2.3.1 Energy Image for Input Prague Image

The result's are shown in the below fig 2.5.

Figure 2.1: Reduced width for InputSeamCarvingPrague by 100 Pixels

Figure 2.2: Reduced width for InputSeamCarvingMall by 100 Pixels

Figure 2.3: Reduced height for InputSeamCarvingPrague by 50 Pixels

Figure 2.4: Reduced height for InputSeamCarvingMall by 50 Pixels

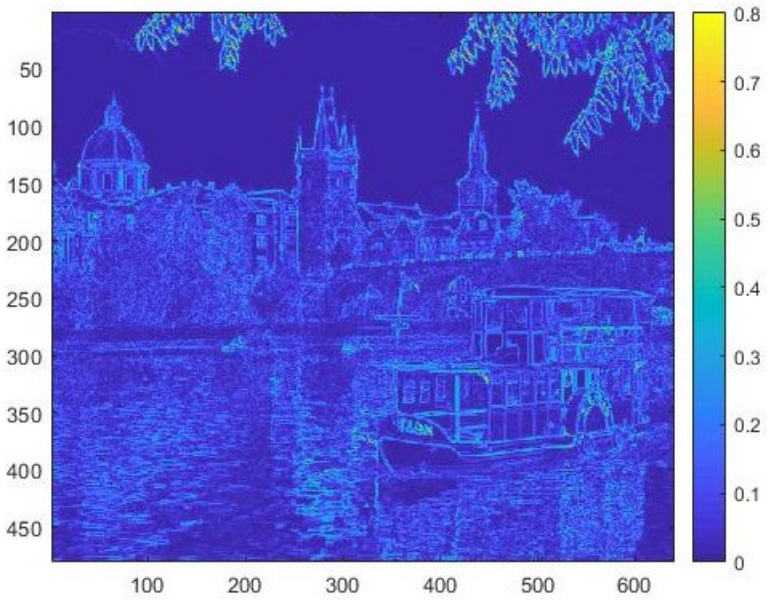

Figure 2.5: Energy Image for InputSeamCarvingPrague

2.3.2 Cumulative Energy Image for Input Prague Image

The result's are shown in the below fig's 2.6 and 2.7.

From fig 2.6 we can clearly see that the place where the sky is contacting the buildings in top to bottom direction there is high value difference because the low-value(black building) is subtracted from the high-value(sky) results in more highlighting in that region which clearly represent the cumulative energy image in vertical direction.

From fig 2.7 we can clearly see that the place where the sky is contacting the buildings in left to right direction there is high value difference because the low-value(black building) is subtracted from the high-value(sky) results in more highlighting in that region which clearly represent the cumulative energy image in horizontal direction.

2.4

2.4.1 Vertical Seam for Input Prague Image

The result's are shown in the below fig 2.8.

In the whole image 2.8 we can see there is a disturbance created by variation w.r.t sky, water, buildings, trees and many other. the only place where there is tal black building is there even though it is creating a disturbances most of the area is covered a black building and plain sea and water which is not the case with other areas of the image resulting in forming a vertical seam at that pixels.

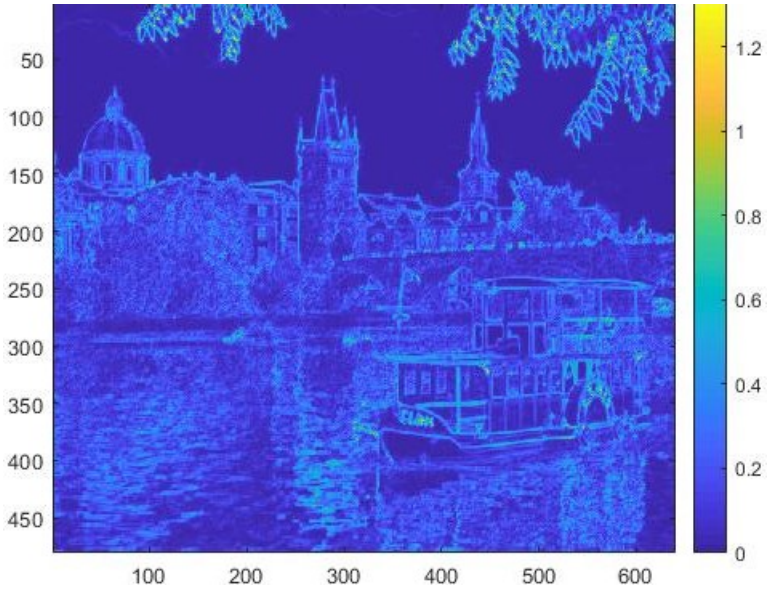

Figure 2.6: w.r.t vertical for InputSeamCarvingPrague

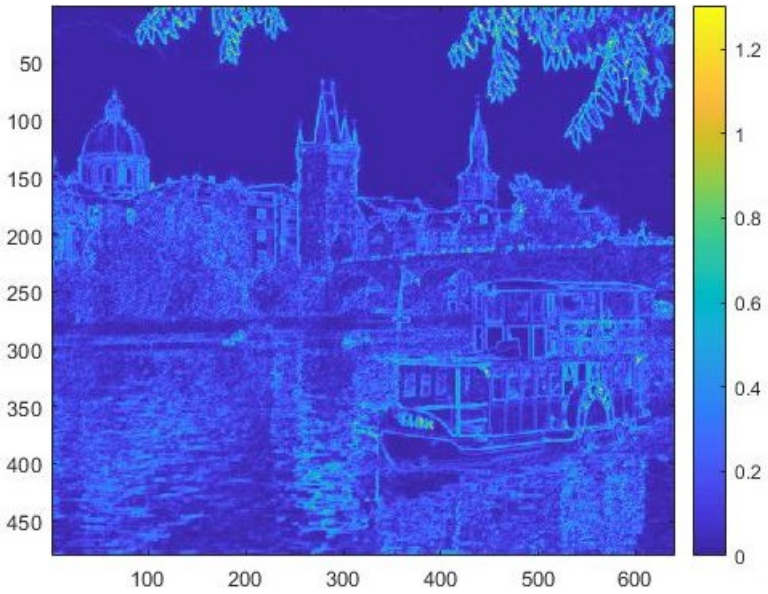

Figure 2.7: w.r.t horizontal for InputSeamCarvingPrague

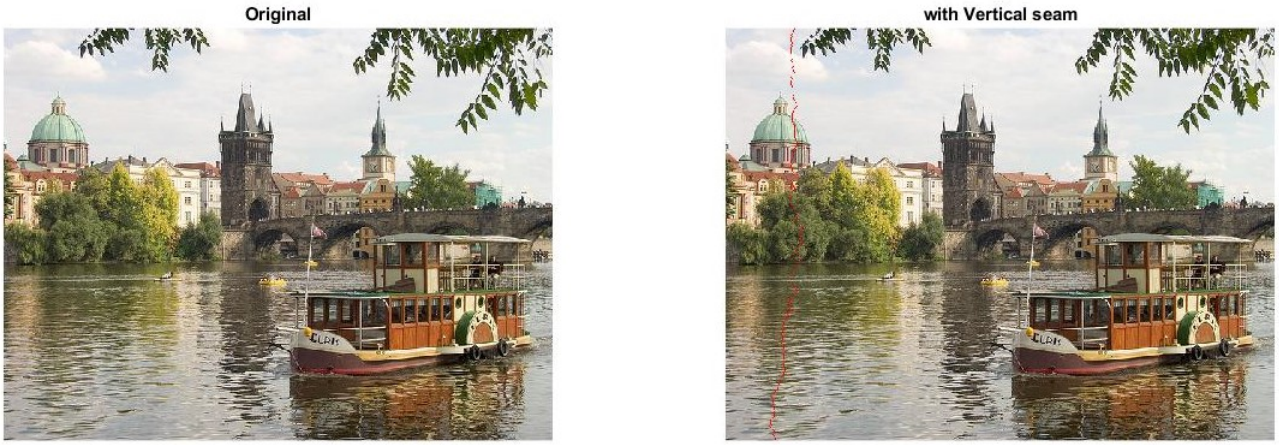

Figure 2.8: Vertical Seam for InputSeamCarvingPrague

2.4.2 Horizontal Seam for Input Prague Image

The result's are shown in the below fig 2.9.

Zoom the image 2.9 where we should see almost right columns of image if we observe from top to bottom the continuous less difference is the place in between the leaves because at bottom there is disturbance w.r.t buildings and zoom again to top right there also you observe complete less difference location is identified and that is the place where our seam is showing.

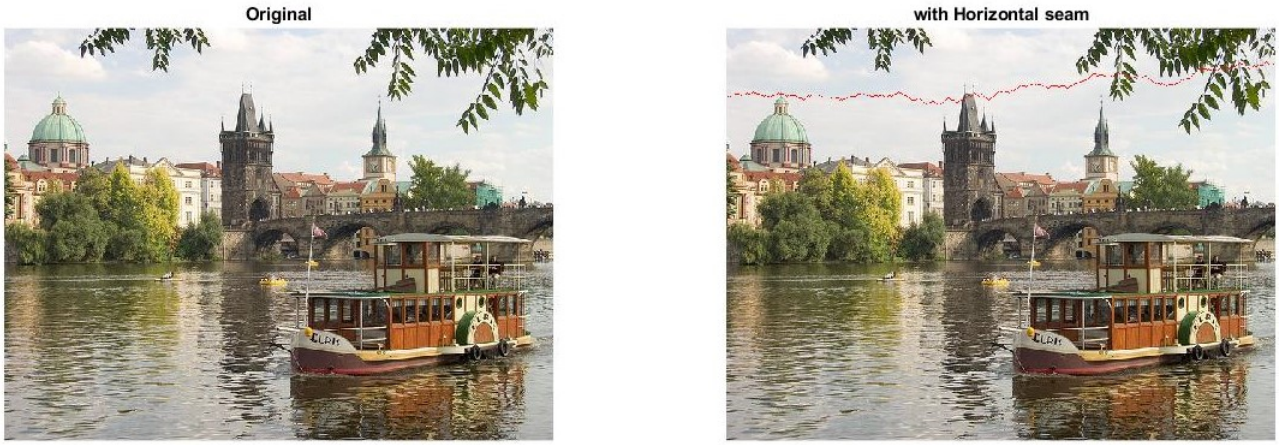

Figure 2.9: Horizontal Seam for InputSeamCarvingPrague

2.5 w.r.t Modified Energy function

The result is shown in the below fig 2.10.
Explanation:
when observed to seam carving car image 2.14 the result with normal sobel method we can see clearly that car's tier is completely lost but we need a method to modify the energy function in which the intensity funtion should have maximum value to result in strong edges and for this I found Perwitt method is suitable. The result was more surprising as shown in fig 2.10. the details of the car are preserved better when compared to previous energy function.

Figure 2.10: Modified Energy function's Image saves car details than earlier

2.6 Example Images

2.6.1 Successful content Aware Re sizing

The Bubble image is shown in the below fig 2.11.

original Bubble image size is 620 by 410
Sequence of steps: -100w, -50h, -100w, -50h, -100w, -10h
modified Bubble image size is 320 by 210

Explanation: Observe the original image 2.11 where the photographer is focusing the soap bubble mostly by blurring the background and to have it's essence bubble should reside even if re-sized as any way's the background is almost blurred the removable pixels should be the background and seam carving successfully handled it almost as ideal one.

The family image is shown in the below fig 2.12.

original Family image size is 485 by 316
Sequence of steps: -100w, -18h, -100w
modified Family image size is 285 by 298

Explanation: Observe the original image 2.12 where most of the image is covered by sea but the in-tension is to show the family moments. To have image's essence person's should reside even if we re-sized as any way's the background is almost sea the removable pixels should be the background and seam carving successfully handled it almost as ideal one by high lighting the persons in image even after reduced it's size by nearly half.

The Taj Mahal image is shown in the below fig 2.13
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original Taj Mahal image size is 1200 by 630
Sequence of steps: -100w, -25h, -100w, -25h
modified Taj Mahal image size is 1000 by 530

Explanation: Observe the original image 2.13 The Taj-Mahal should be re-sized in a way where all the four pillar's are equally aligned with the center. this is successfully handled by seam carving it is almost as ideal one by high lighting the building in image by eliminating the outside trees and equally minimizing on both sides resulting in acceptable Taj-Mahal image.

2.6.2 Failed content Aware Re sizing

The result is shown in the below fig 2.14.

original car image size is 800 by 531
Sequence of steps: -30w, -100h, -30w, -100h
modified car image size is 740 by 331

Explanation: If we observe the modified image 2.14 by seam carving the tires are shown as completely spoiled and no one is interested to show case such a car in advertisement. even though there is a background to remove because as we know that seam carving is constrained by 8 nearby pixels this may happen and we can consider this as failure by seam carving.

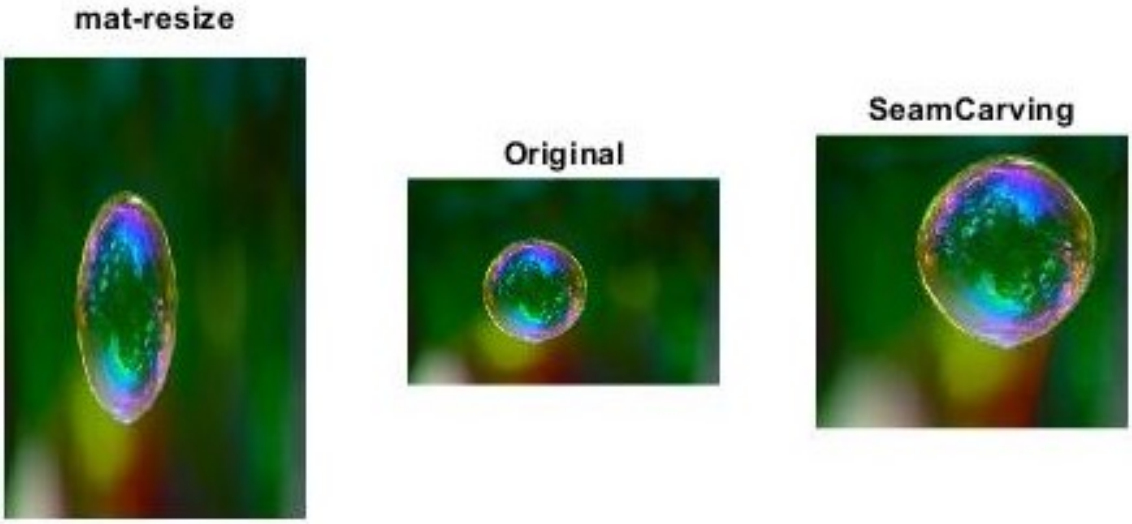

Figure 2.11: Successfully reduced Bubble image by Seam Carving

Figure 2.12: Successfully reduced Family image by Seam Carving

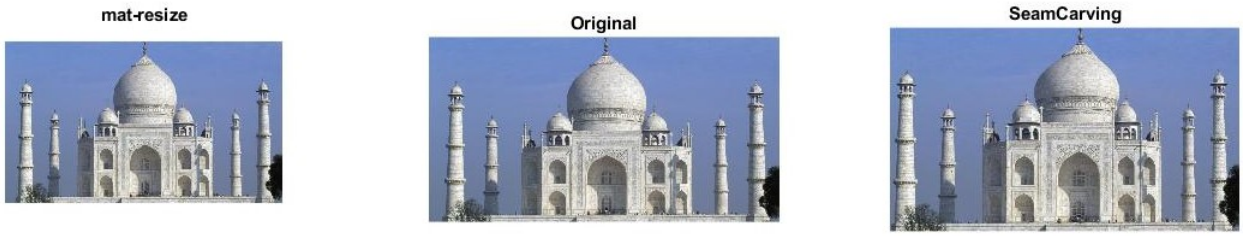

Figure 2.13: Successfully reduced Taj Mahal image by Seam Carving

Figure 2.14: falsely reduced Car Image by Seam Carving