

Part 1: Resizing image with a known number of rows and columns



Figure 1: Size of original Image: 694x1024x3

Resizing the image to 674 x 1004 (removing 20 seams in both horizontal and vertical direction)



Figure 2

For each iteration of seam carving, we are displaying the energy function and the seam which is removed corresponding to the energy function:

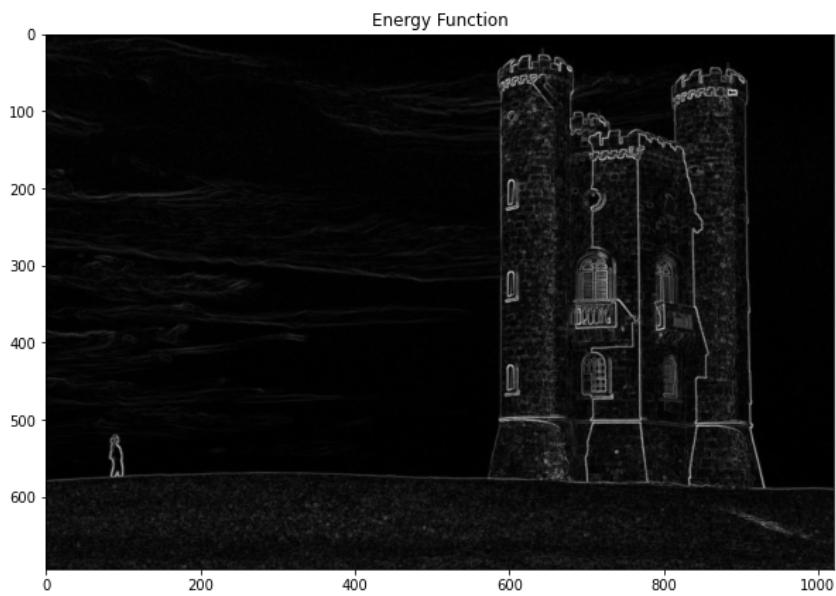


Figure 3



Figure 4

Image Enlargement:



Figure 5: Original Image of size: (694,1024,3)

Increase the image size to (714, 1044,3), that is increase 20 seams in both horizontal and vertical direction.



Figure 6: 20 vertical seams added to the image



Figure 7: 20 horizontal seams added to the image

Result: Final image of shape (714,1044,3)



Figure 8: Result Image

Object Removal:

Experiment 1:



Figure 9: Original Image of size: (694,1024,3)

Select the bounding box around the object to be removed. The bounding box is specified by mentioning the coordinates (x,y) of the two vertices of the main diagonal of the box.



Figure 10: The bounding box coordinates: (80,250) and (110,580)



Figure 11: Result of object removal

The result after object removal is an image with size: (694,994,3). Hence seam insertion is required to make the result of the same shape as the original image (694,1024,3)



Figure 12: Seam insertion to make the result the same size as the original image



Figure 13: Both images of the same size (694,1024,3)

Experiment 2:

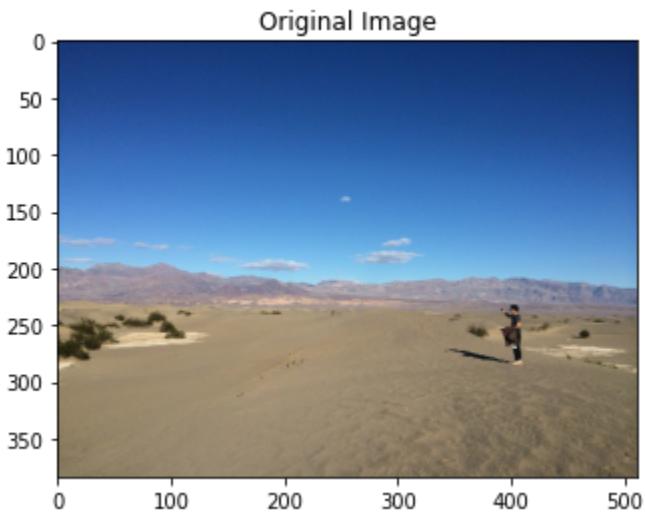


Figure 14: Original Image

Bounding box coordinates: (344,232) and (410,285)

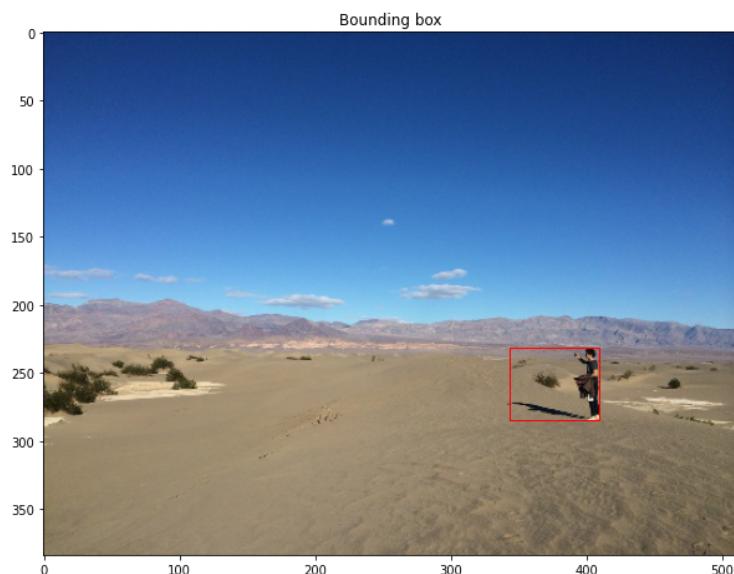


Figure 15: Image with the bounding box

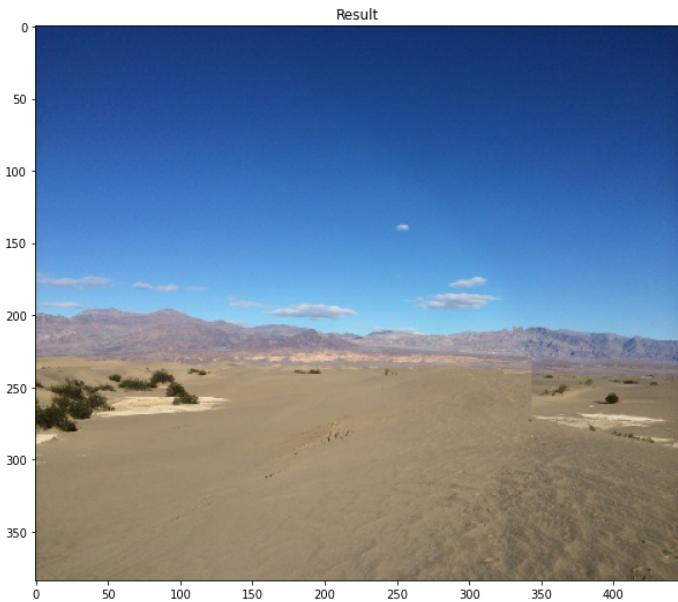


Figure 16: Object removal

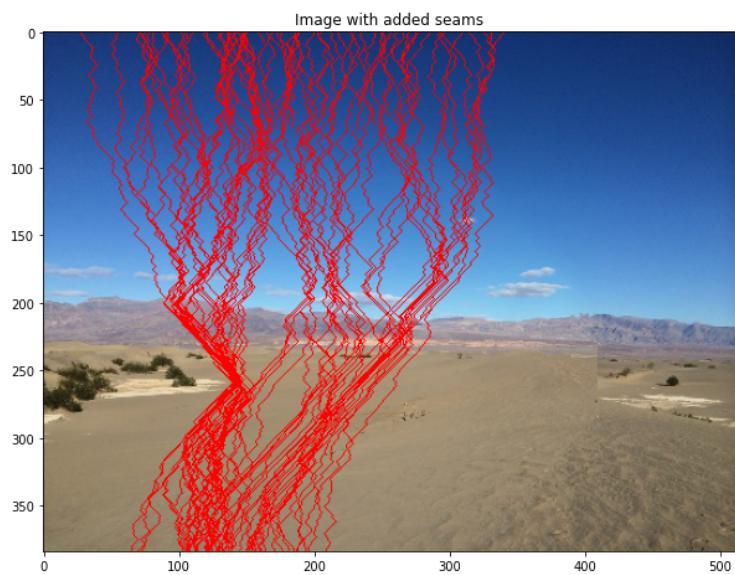


Figure 17: Seam insertion

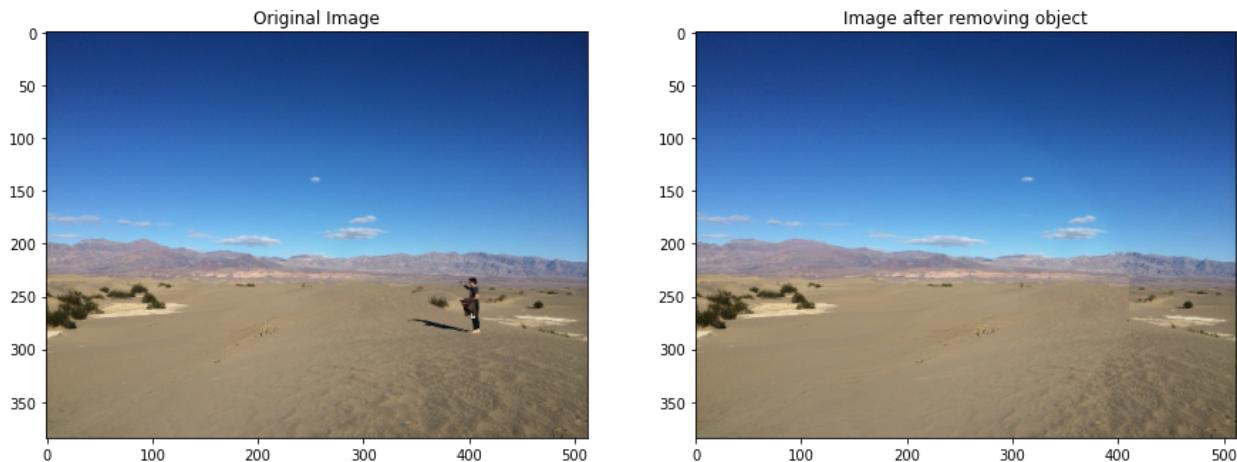


Figure 18: Result

Both the images have the same shape after object removal

Fast Seam method:

	Normal method	Fast seam method
Seam Carving (694,1024,3) -> (674,1004,3)	10.48 minutes	10.65 s
Seam Insertion (694,1024,3) -> (714,1044,3)	8.01 minutes	7.95 s