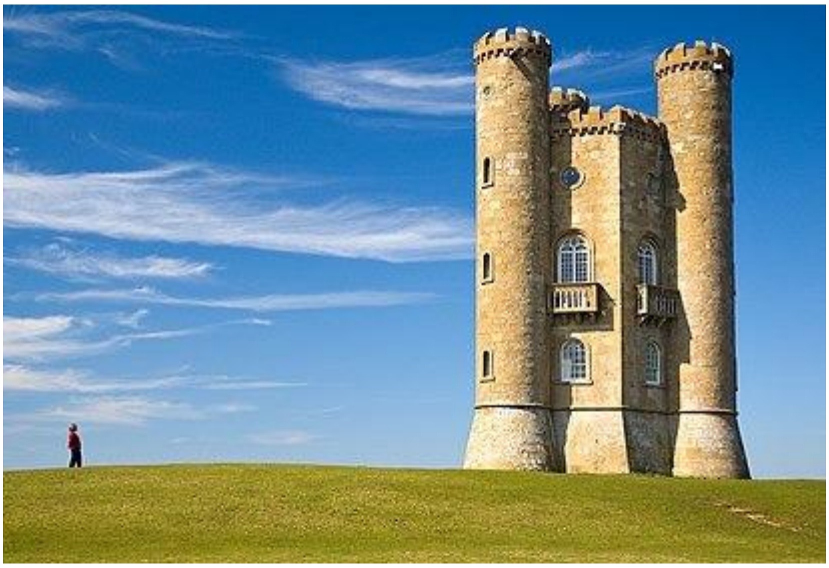
Assignment 3 Seam Carving: Report

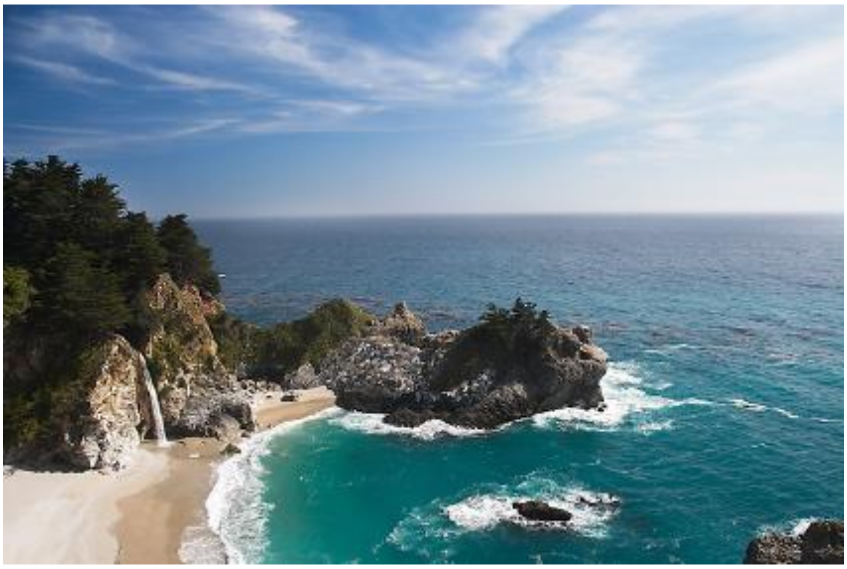
Seam Carving

We use **content aware** methodology for seam carving. We've used the following two images for testing purposes.

1.



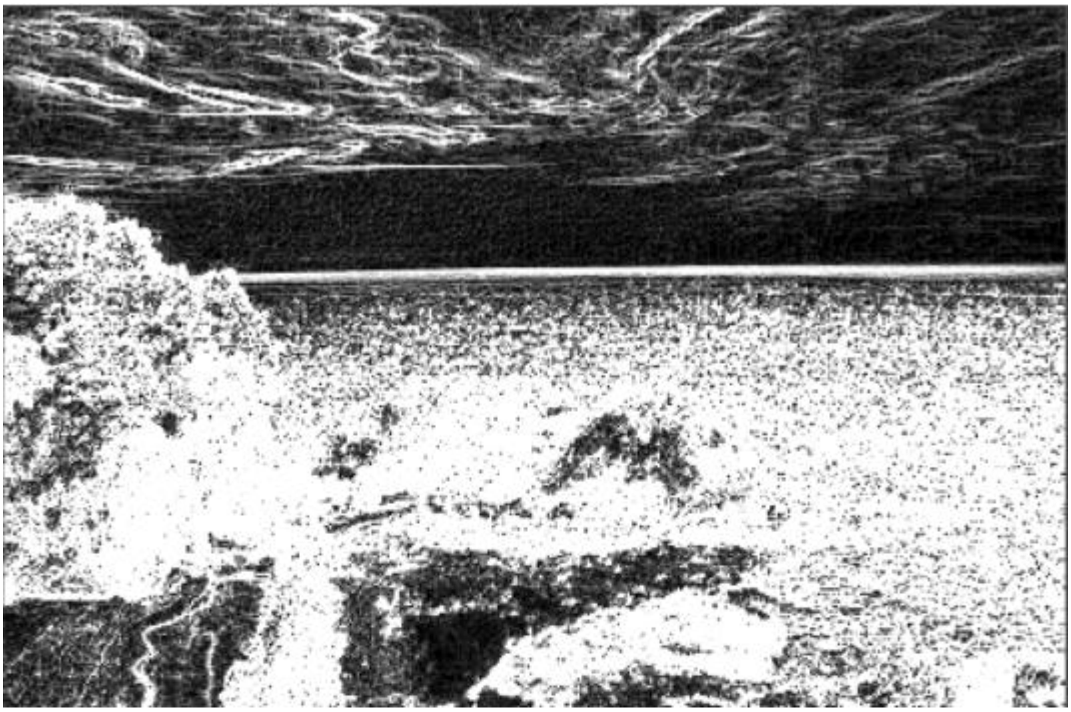
2.



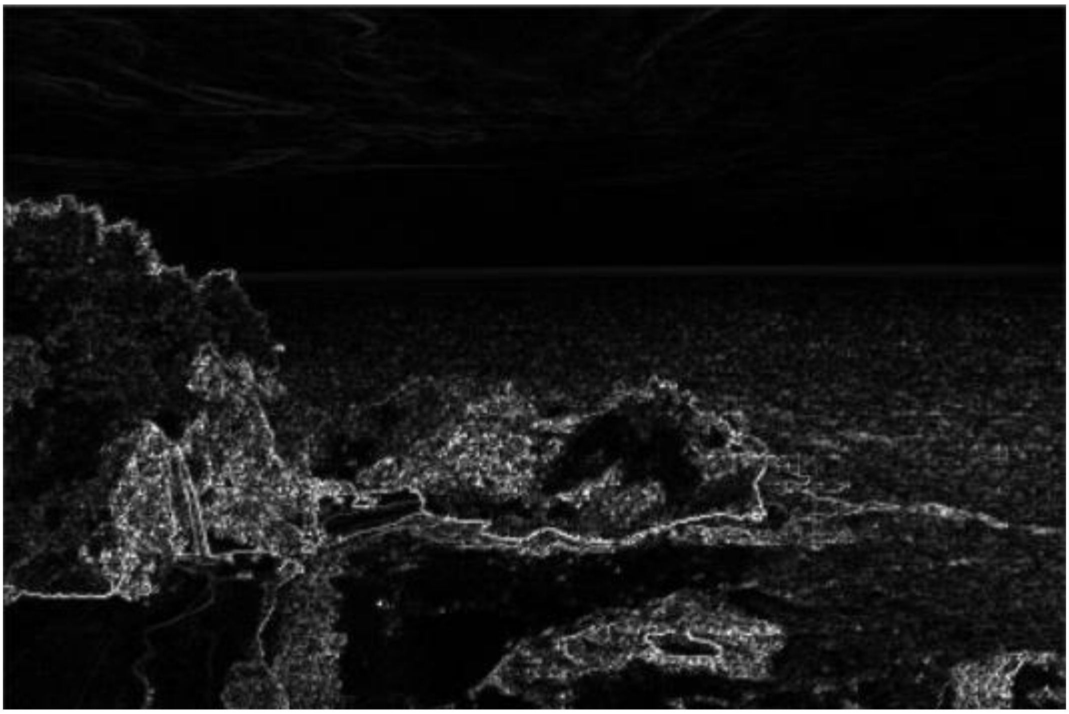
Energy Functions

We've used HOG and e1 as the measures of energy for quantifying the content/energy in the pixels.

1. HOG



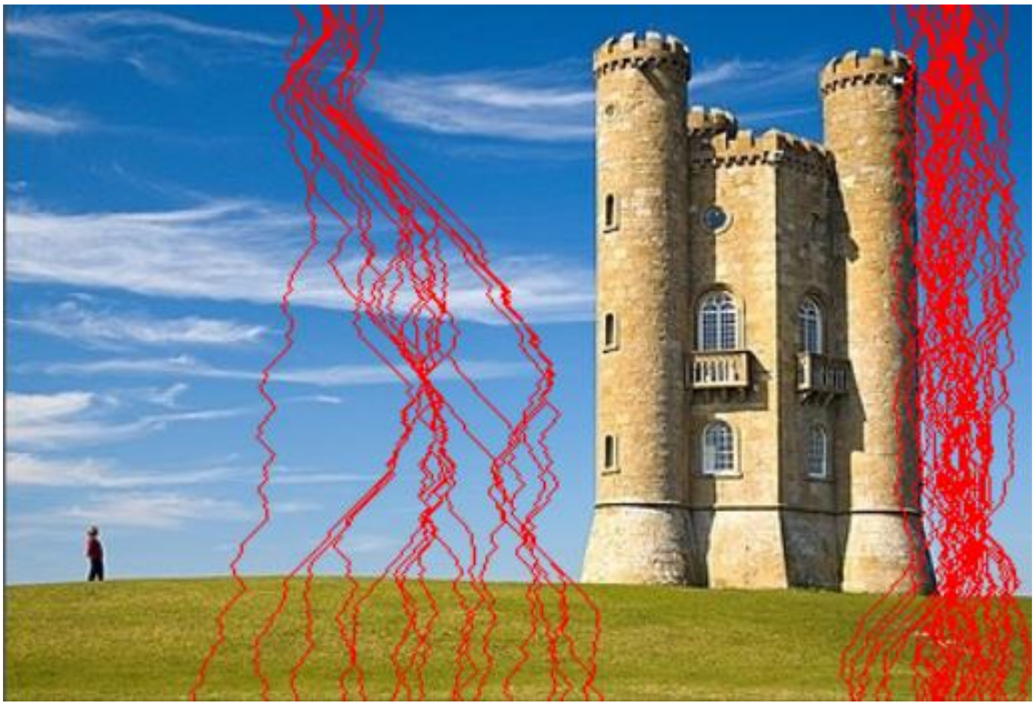
2. E1

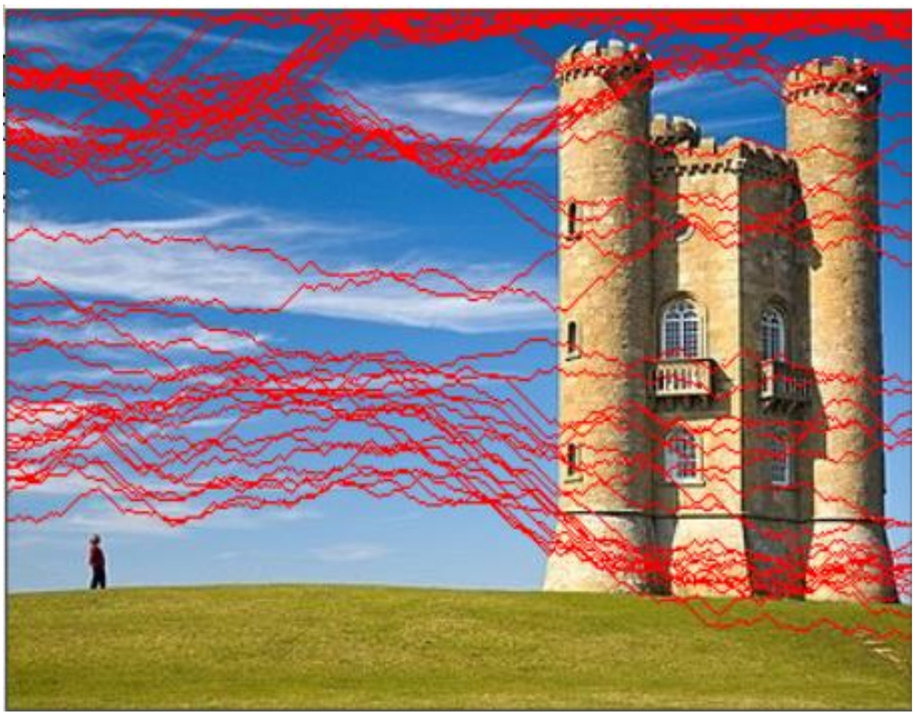


Size Reduction

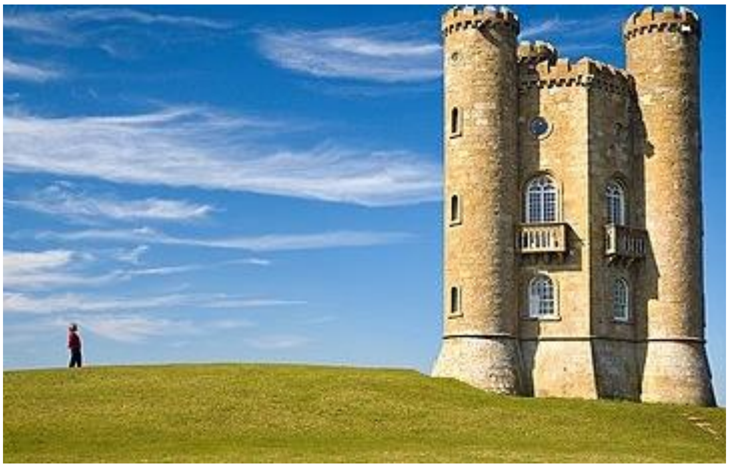
We’ve used the algorithm described in the paper for removing the minimum energy seams for size reduction. **Dynamic programming** was used to find the path along the minimum energy. In this algorithm, we make sure to change the energy function (forward pass) after each seam removal as described in the paper. Further, we’ve also implemented the dynamic programming algorithm to find the optimal order of removal of rows and columns to most efficiently modify the image size.

Example: Reducing 50 rows and 50 columns





Seams removed



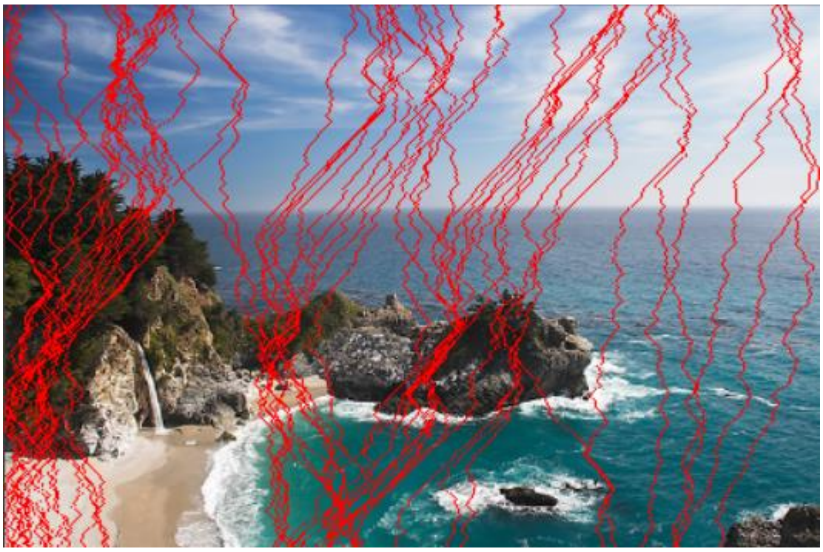
Final Image

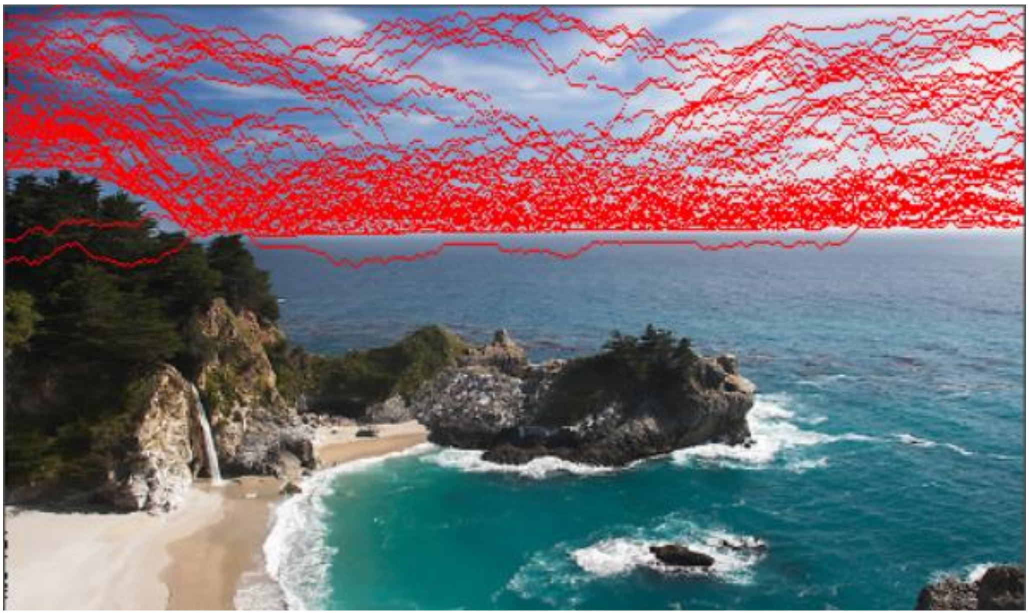
Size Enlargement

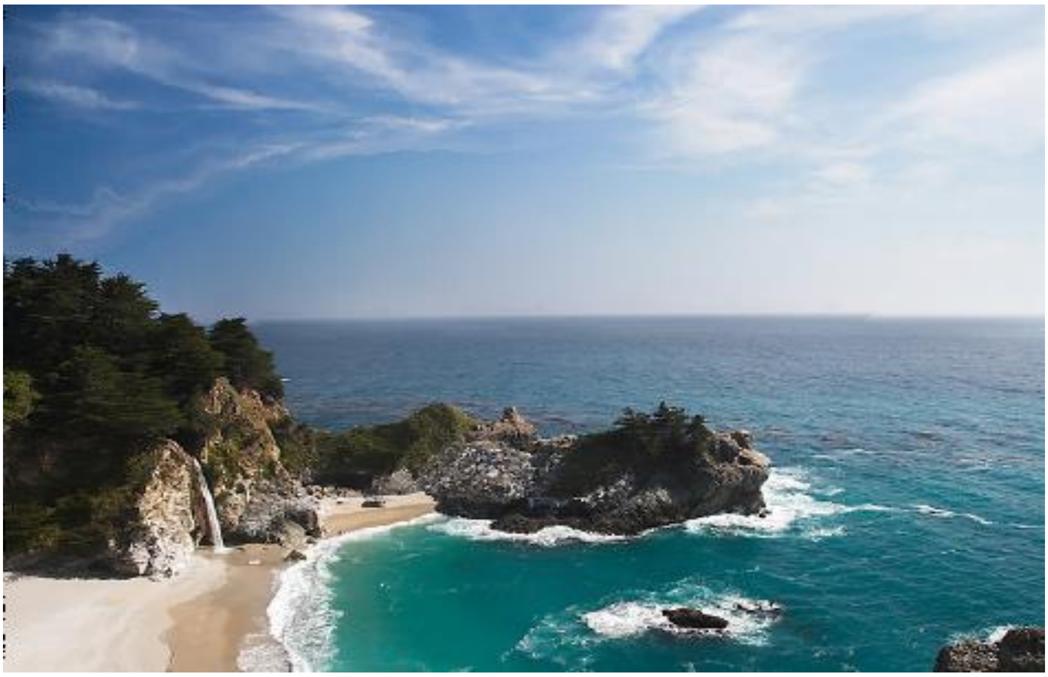
This is somewhat to different to the algorithm for size reduction. Here, we don't insert seam one by one, calculating the energy at each step. Instead, we find k (optimizable parameter) minimum energy seams that would have been removed and then insert a seam beside those seams, with each pixel being an average of minimum energy pixel and its neighbouring pixels (left-right or top-bottom).

Here again, we've implemented the algorithm required to find the optimal order of insertion to reach the modified image efficiently (taking least time).

Example: Adding 50 rows and 50 columns







Final Image

Object Removal

We first mask the region of interest (object to be removed) using red colour. The object selection is done through **visually interactive program**. We then use the seam removal algorithm and force the seams to pass through the object by making the energy of object pixels negative. This ensures that the object is removed through seam removal. Finally after object removal, we insert back the same number of seams to ensure size doesn’t change.

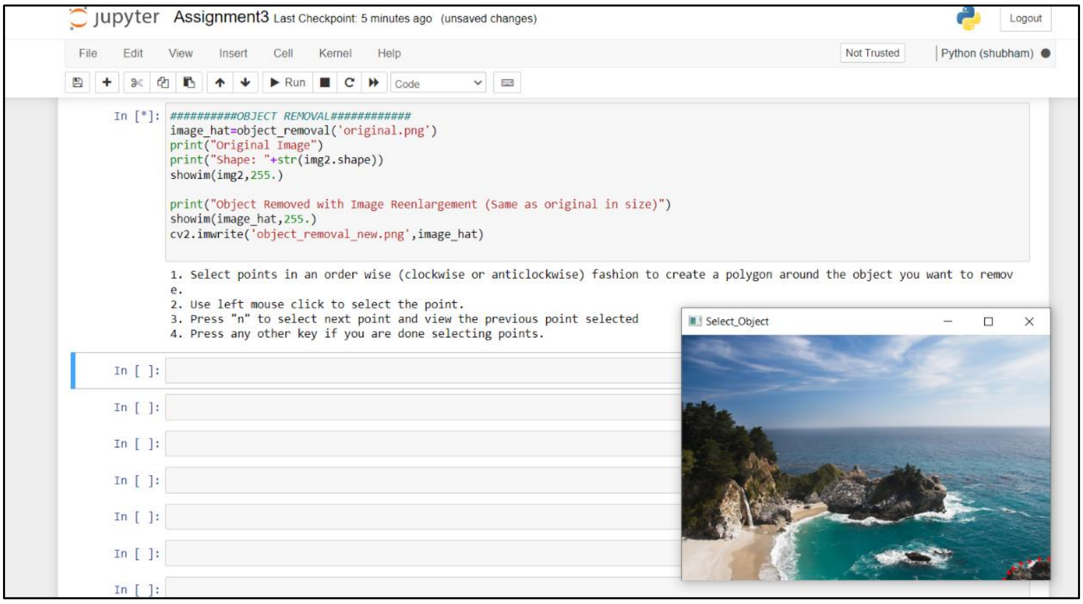
Selecting the object:

1. Select points in an order wise (clockwise or anticlockwise) fashion to create a polygon around the object you want to remove.

2. Use right mouse click to select the point.

3. Press "n" to select next point

4. Press any other key if you are done selecting points.



jupyter Assignment3 Last Checkpoint: 5 minutes ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Help
Not Trusted
Python (shubham)
Run
Code
Select_Object

```
In [*]: ##########OBJECT REMOVAL############
        image_hat=object_removal('original.png')
        print("Original Image")
        print("Shape: "+str(img2.shape))
        showim(img2,255.)

        print("Object Removed with Image Reenlargement (Same as original in size)")
        showim(image_hat,255.)
        cv2.imwrite('object_removal_new.png',image_hat)
```

```
1. Select points in an order wise (clockwise or anticlockwise) fashion to create a polygon around the object you want to remov
e.
2. Use left mouse click to select the point.
3. Press "n" to select next point and view the previous point selected
4. Press any other key if you are done selecting points.
```

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In [ ]:
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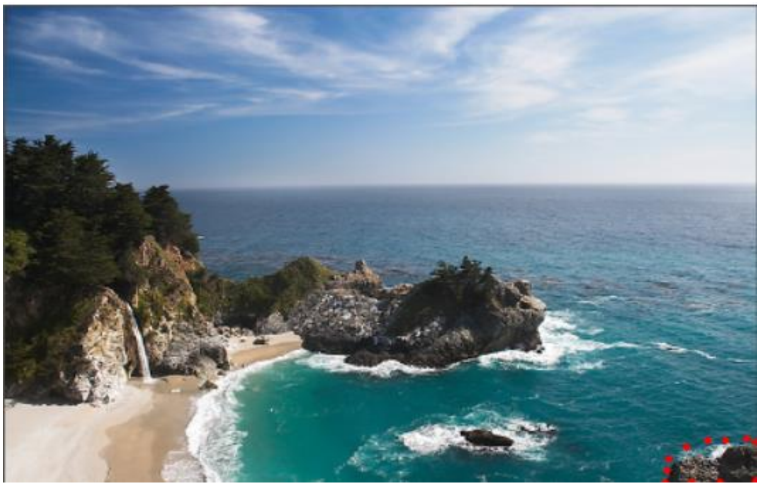

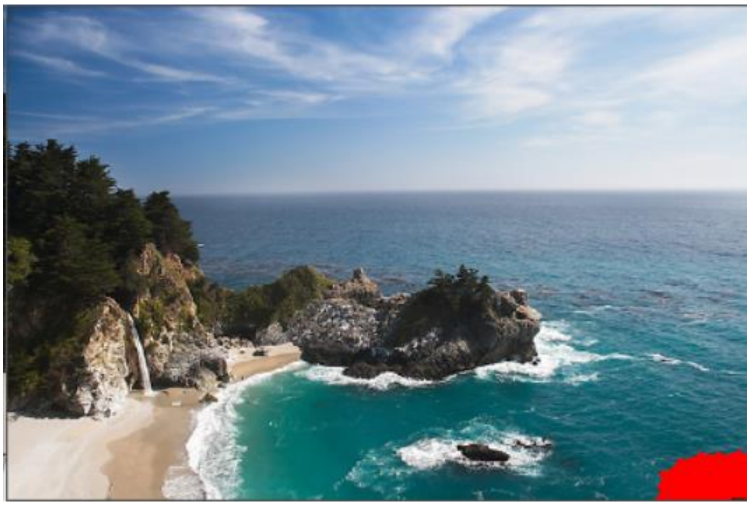

Final Image