

# CSC320 Visual Computing: Assignment 4 Report

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## 1 Result for Supplied Source / Target

Note: I make analysis for these supplied image after Deer

### Result of Jaguar

Below are the reconstructed source image, NNF image for **Jaguar**.

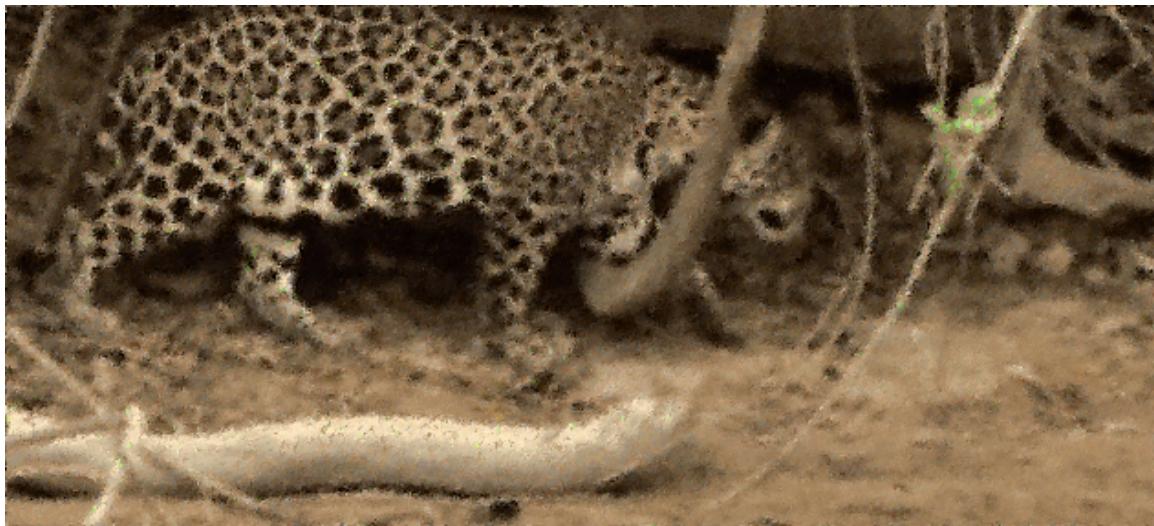


Figure 1: Reconstructed Jaguar

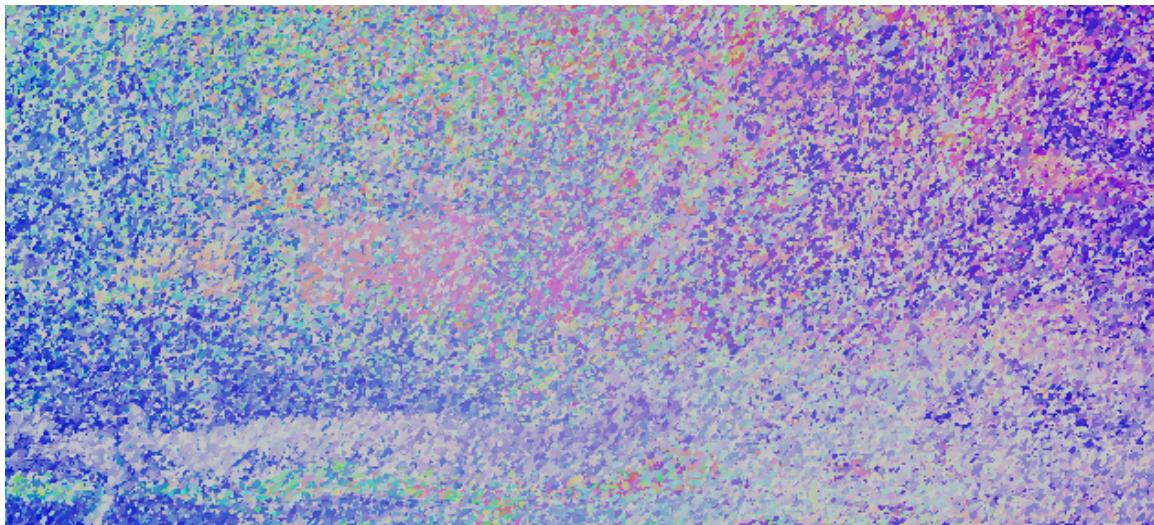


Figure 2: Reconstructed Jaguar: NNF

## Result of Jaguar2

Below are the reconstructed source image, NNF image for **Jaguar2**.

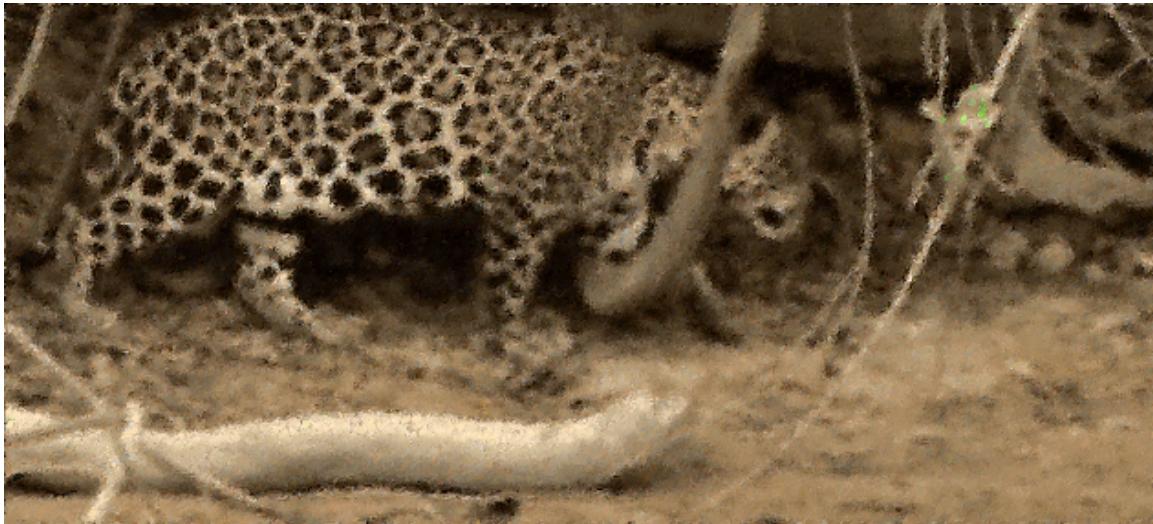


Figure 3: Reconstructed Jaguar2

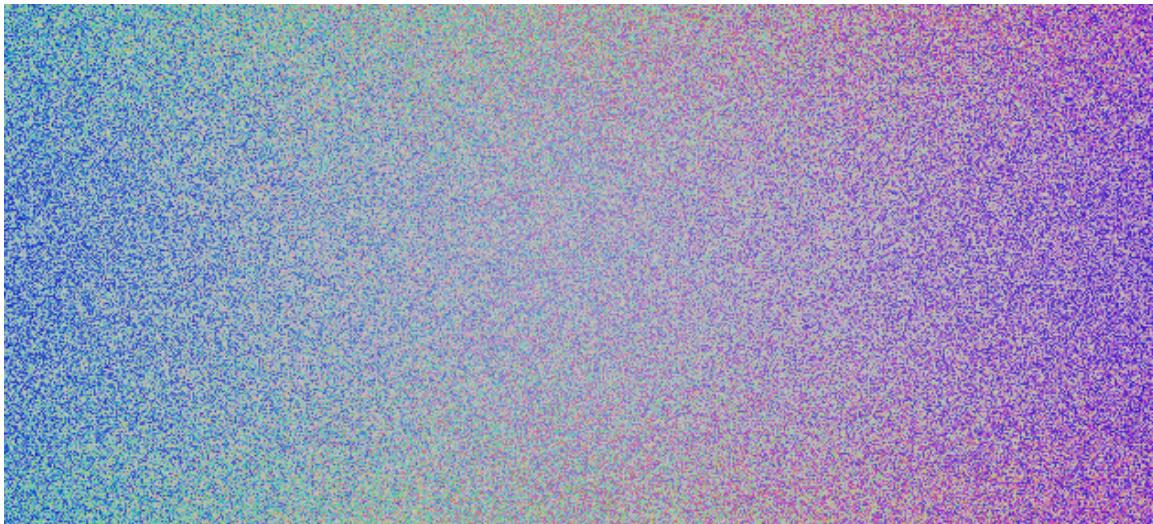


Figure 4: Reconstructed Jaguar2: NNF

## Result of Jaguar3

Below are the reconstructed source image, NNF image for **Jaguar3**.

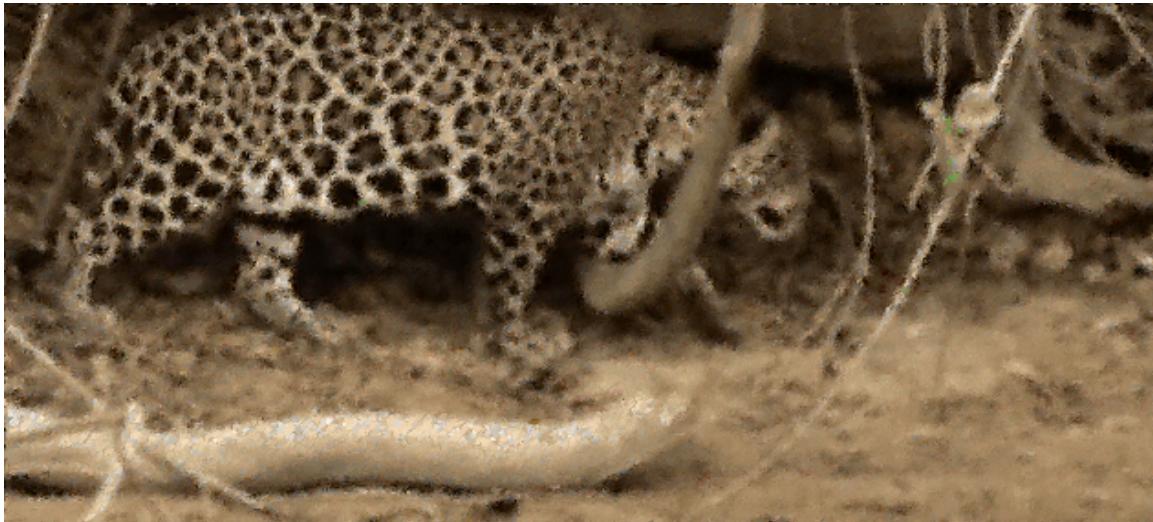


Figure 5: Reconstructed Jaguar3

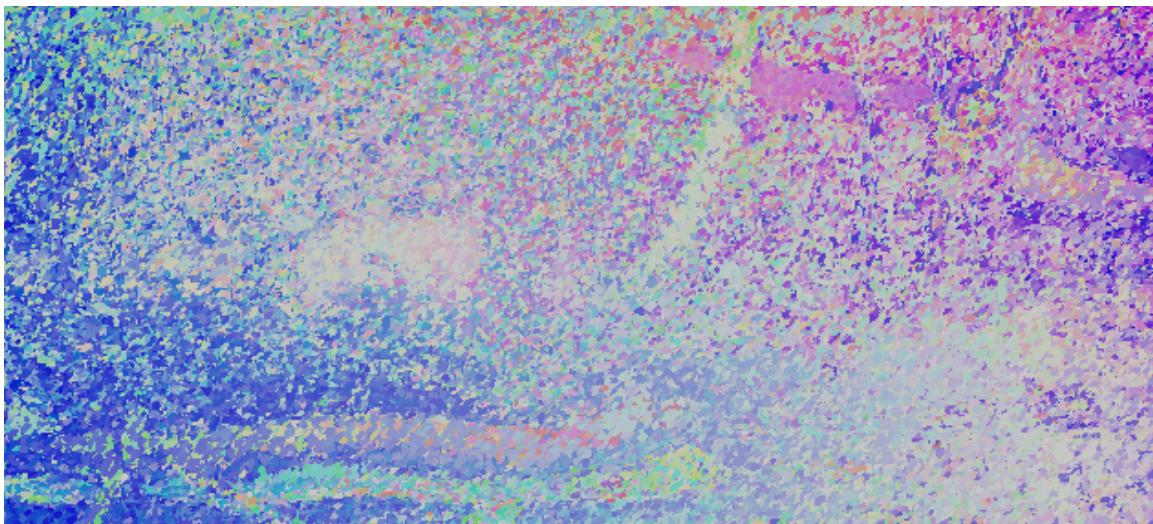


Figure 6: Reconstructed Jaguar3: NNF

## Result of Deer

Below are the reconstructed source image, NNF image for Deer.



Figure 7: Reconstructed Deer

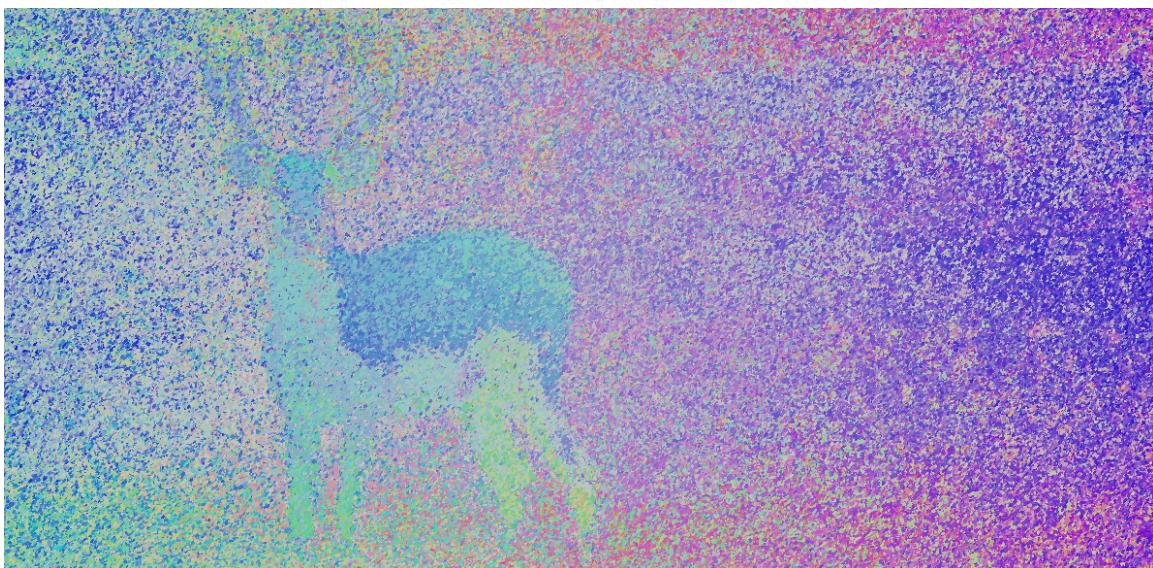


Figure 8: Reconstructed Deer: NNF

### My Teletubbies (weak performance)

Below are the source image, target image on my experiment:



Figure 9: Teletubbies Source



Figure 10: Teletubbies Target

Below are the reconstructed source image, NNF image for **Teletubbies**.

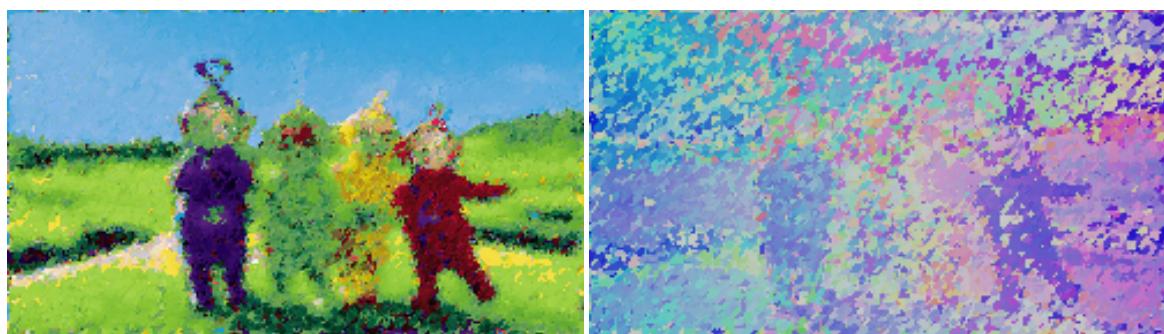


Figure 11: Reconstructed Source and NNF

### TopGun Film (strong Performance)

For this experiment, I get a screenshot for the movie TopGun 2: Maveric. The reason I choose the image is that I would like to test if the patch match algorithm work well for human figure image with detailed facial and detailed navy clothing features.



Figure 12: Top Gun Source and Target (Right)



Figure 13: Reconstructed Source and NNF

## 2 Comments for the Performance and Analysis

After displaying the result of all of the supplied images and my own experiment data, I am now making some comments and analysis regarding those output.

### Comments:

1. For the first three jaguar images reconstruction, I consider my algorithm perform well to reconstruct source images, and it is obvious that all three reconstructed images do not have significant differences with the real source image.
2. However, thought the color images seem to be good, the NNF images are quite different. For the Jaguar1 and Juguar3, the NNF are very similar, which both could show some features in the original images, like the white tree trunk on the ground and the tree branch that get across jaguar's neck. However, for the second image, the NNF is totally random and shows nothing. And I believe this is the reason of its target image, which is cropped and then stick together.
3. For that deer image, I consider my algorithm perform very well on this task. Specifically, the reconstructed source image is in very well condition and we could easily get the contour of the deer with the corresponding NNF image.
4. For the Teletubbies experiment, the result is in pretty low quality. You may see that the faces of those figures are not well constructed at all.
5. For the TopGun Movie screenshot, I consider that my algorithm perform verl well on this specific task. Specifically, almost all of the features of the source image are very well reconstructed and the NNF image has very clear contour of Tom Cruise as well.

### Analysis:

1. First of all, I would to mention when my algorithm would perform poor.
2. The algorithm perform poor when the image has medium / low resolution and the color of the object has very similar color with the background. Specifically, you may refer to Jaguar1 and Juguar2, whose source images are in a pretty low resolution and the color of the Jaguar are very similar to the color of the soil and the tree branches.
3. The reason of the above point is intuitive. When the resolution of the image is low, even the original source images are in bad quality, not to mention a reconstructed image with some random search algorithms that contains high uncertainty. My Teletubbies is a very good example that verifies the point, where the resolution of the Teletubbies is very low:  $250 \times 141$ .
4. For the second point above, when the object and the background have similar color, intuitively, it would make the algorithm more confused than before; technically, while performing propagation and random search, for a single pixel, the error between the current patch and its target patches might have very tiny differences on the error computed. Similarly, it further confuse the algorithm.
5. The algorithm would also perform bad when the target image has too much difference with the source image, specifically, you may refer to the Teletubbies example of my own experiment, where the two images have too many easily observable differences.
6. The reasoning for the point above is that, since we are initializing the NNF randomly and searching quite randomly, it becomes harder for the algorithm to search for similar patches in the target, as they are too far away geometrically.
7. Secondly, I would like to briefly talk about when the algorithm have strong performance.

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## *2 COMMENTS FOR THE PERFORMANCE AND ANALYSIS*

8. Still, resolution should be a very important criterion, as well as two features should not have too much differences. (Deer and TopGun are very good examples that demonstrate the importance of this point.)
9. Secondly, the main object of the image should show significant difference in color comparing with its background. My Top Gun example and Deer examples are very good examples that further verifies the point.

### **3 Reference**

I would like to acknowledge that I use the images of Teletubbies TV Series for testing the algorithm of this assignment.

I would like to acknowledge that I use two screenshots from the movie: Topgun2 Mavericks ,for testing my algorithm.