

COMP6223 Computer Vision

Image Filtering and Hybrid Images

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Contents

1	Convolution and Hybrid Images Algorithm	1
1.1	Reading in the Images	1
1.2	Determining the Low and High Frequencies of the Image	2
2	Results	2
3	Conclusion	2

List of Figures

1	Hybrid Image of a fish and a submarine	1
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List of Tables

List of source codes

1	Reading in an image and separation of channels	1
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1 Convolution and Hybrid Images Algorithm



Figure 1: Hybrid Image of a fish and a submarine

The convolution algorithm can be used to generate an hybrid image as shown in figure 1 and it works for any arbitrary image and a given odd numbered kernel size.

The hybrid image algorithm works in 3 parts which are reading in the images, finding the high frequencies and low frequencies of the images and lastly combining them to form an hybrid image. The algorithm was implemented using Matlab and its implementation are further discussed in the following subsections.

1.1 Reading in the Images

Matlab provides functions for reading in images which is the *imread* function. The

```
img1 = imread('data/fish.bmp','bmp');  
img2 = imread('data/submarine.bmp','bmp');  
  
img_1_R = double(img1(:,:,1));  
img_1_G = double(img1(:,:,2));  
img_1_B = double(img1(:,:,3));
```

Listing 1: Reading in an image and separation of channels

images are read and converted into doubles as they are stored as integers and need to be converted to work in Matlab.

1.2 Determining the Low and High Frequencies of the Image

The Low frequency of the image is determined by generating a Gaussian kernel of a specified size. For a given kernel size e.g 7x7, with variance (σ^2) the resulting Gaussian Kernel is calculated by

$$gaussian(x, y) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp -\frac{x^2 + y^2}{2\sigma^2} \quad (1)$$

2 Results

3 Conclusion