Image Filtering and Hybrid Images

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Abstract

Image filtering is a popular application and technique in Computer Vision. In the assignment, I created my own image filtering function which used correlation for filtering. Some filters were also applied which give information relevant to a given situation. Edge detection, blurring and areas where most change occurs in an image can be done using different types of filters.

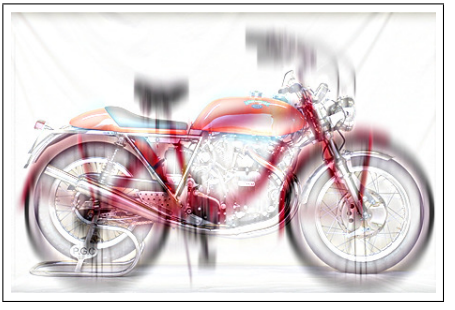
Correlation for RGB images was constructed by applying correlation on each components and then stacking them together.Hybrid Images are created by superimposing two images over one another one of which has low frequency components and other has high frequency components.

1 Output Images

2 Algorithm

3 Conclusion

Output of imfilter function was the same as expected by testing correlate. Filters are able to isolate relevant information such as edges, gradients and can increase or decrease contrast and brightness. Matlab's fspecial function for gaussian filtering 's behaviour was replicated correctly .Hybrid images generated looked different closely and when further away from observer. Some pair of images responded better to the sigma used. For better results, custom standard deviation in fspecial for all images could be used.



Algorithm 1 imfilter()

$rows \leftarrow filter.rows/2$
$cols \leftarrow filter.col/2$
$imgrows \leftarrow img.rows$
$imgcols \leftarrow img.col$

Convert 3 channel image to 1 channel each for R, G ,B Component

Create imagenew for each of 3 images with Dimensions and entries 0 [img.shape[0] + 2*rows, img.shape[1] + 2*cols]

while $x < imgrows$ **do**
    while $y < imgcols$ **do**
        imagenew[x+rows][x+cols] = img[x][y]
    end while
end while

while $x < imgrows$ **do**
    while $y < imgcols$ **do**
        while $z < 2 * rows + 1$ **do**
            while $w < 2 * cols + 1$ **do**
                output[x][y] += img[i+z-rows][j+w-cols]*filter[z+rows][w+cols]
            end while
        end while
    end while
end while

return output