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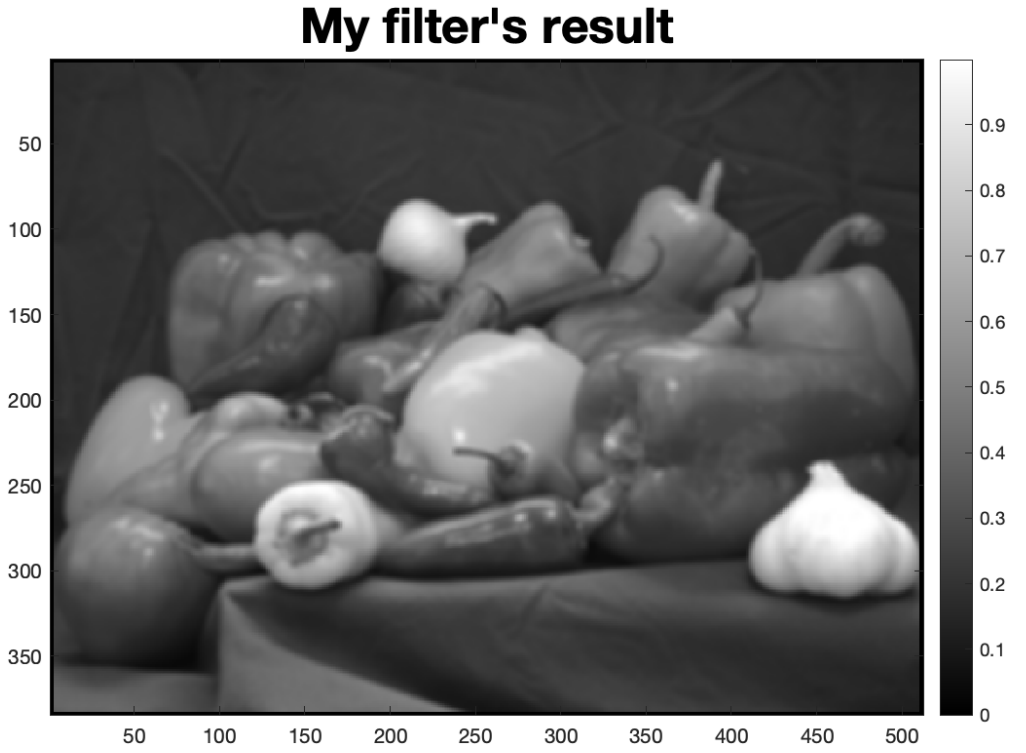
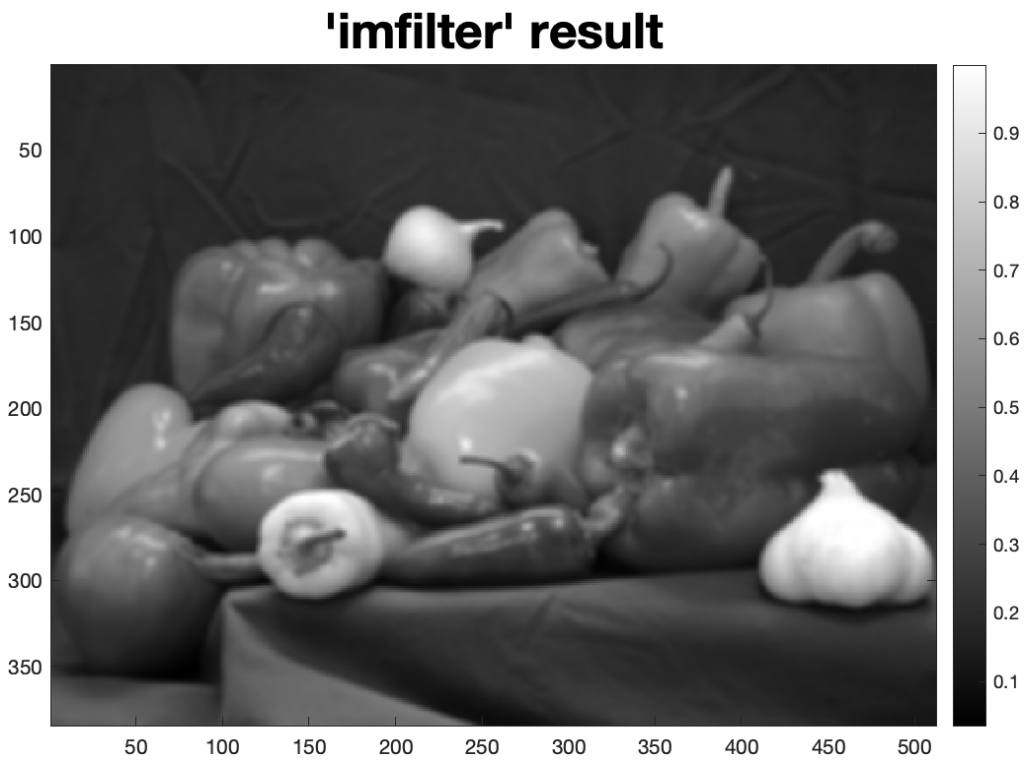
NOTE : Added the lines `addpath( '../TEST_IMAGES');` and `addpath( '../../TEST_IMAGES' );` at the top of the code.

1.

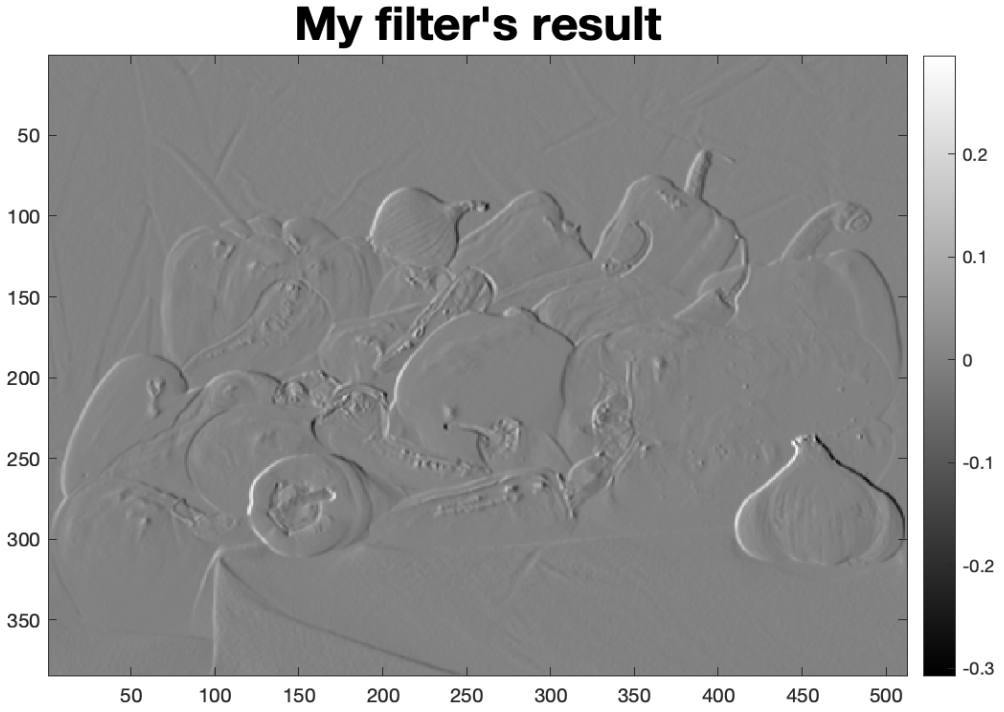
FILTER ONE: Gaussian Filter of kernel size 5 and standard deviation of 2

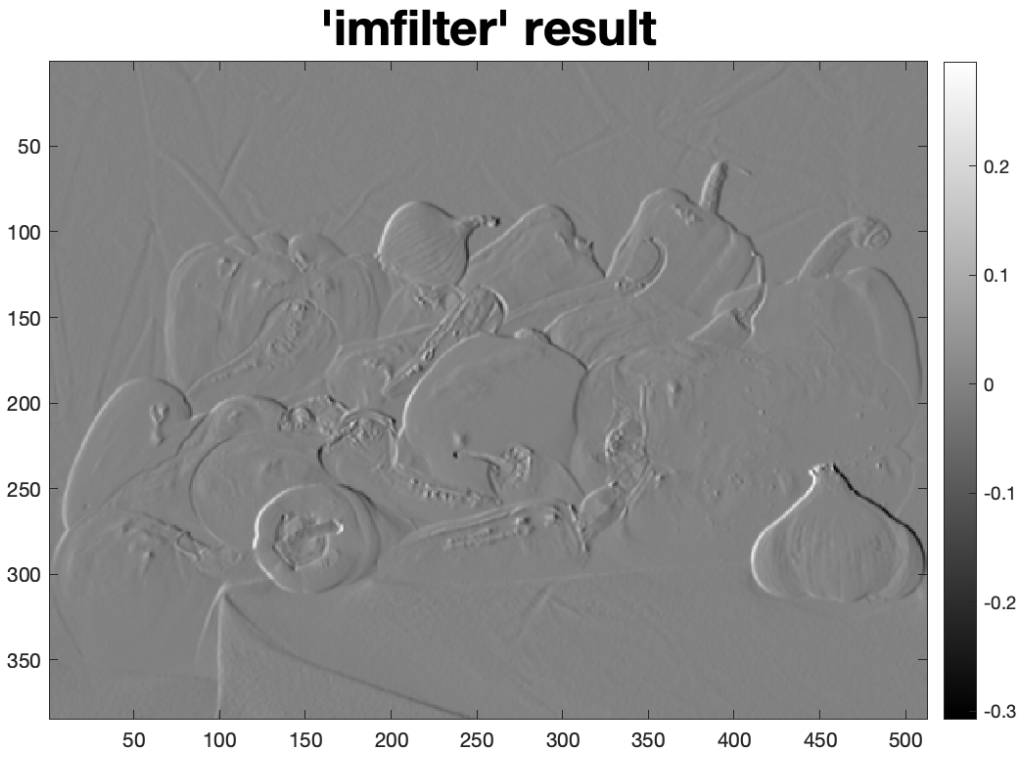




FILTER TWO:

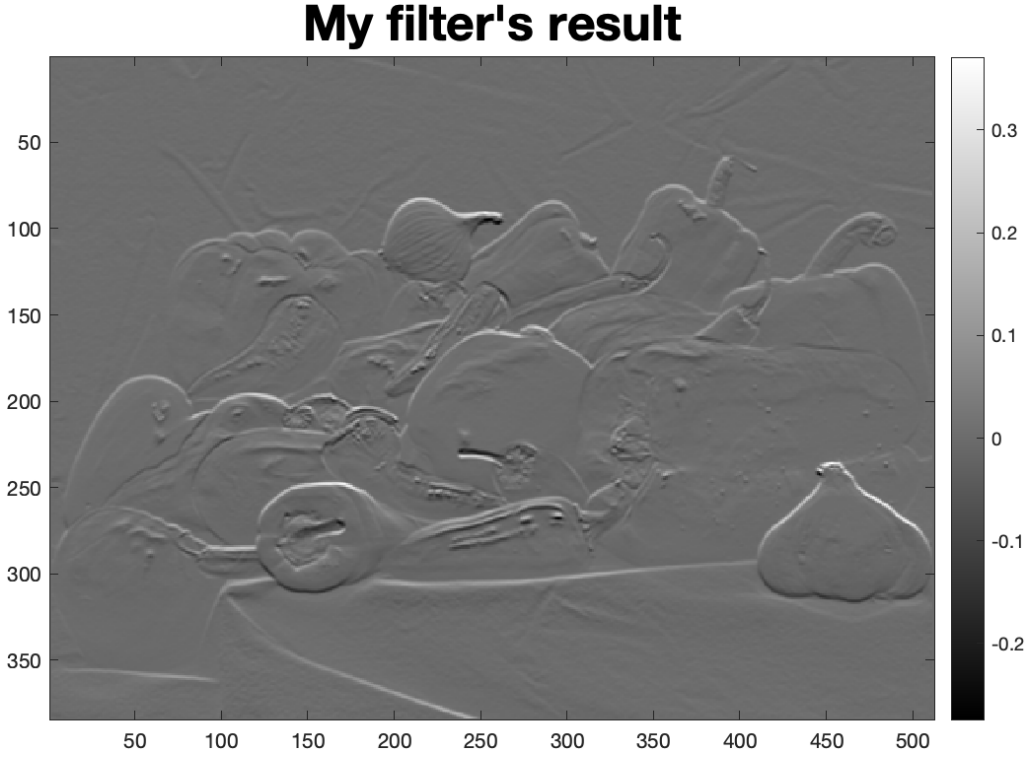
```
[-1   0   1 ;
 -3   0   3 ;
 -1   0   1 ;] / 10;
```

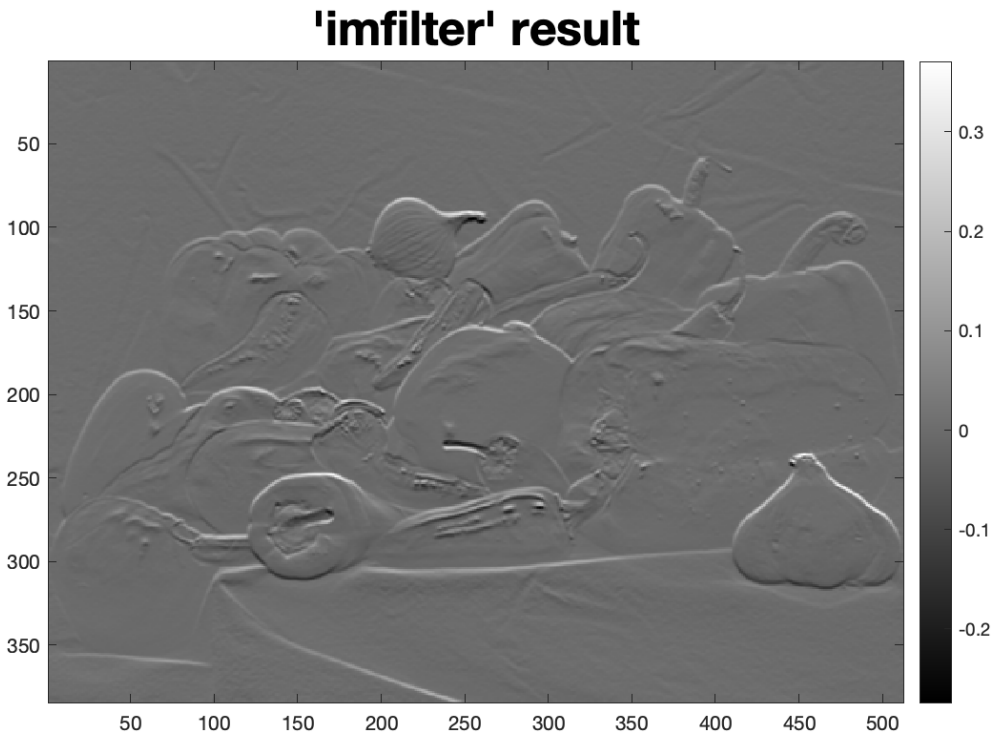




FILTER THREE:

```
[-2  -5  -2 ;
 0    0   0 ;
 2    5   2 ;] / 18;
```

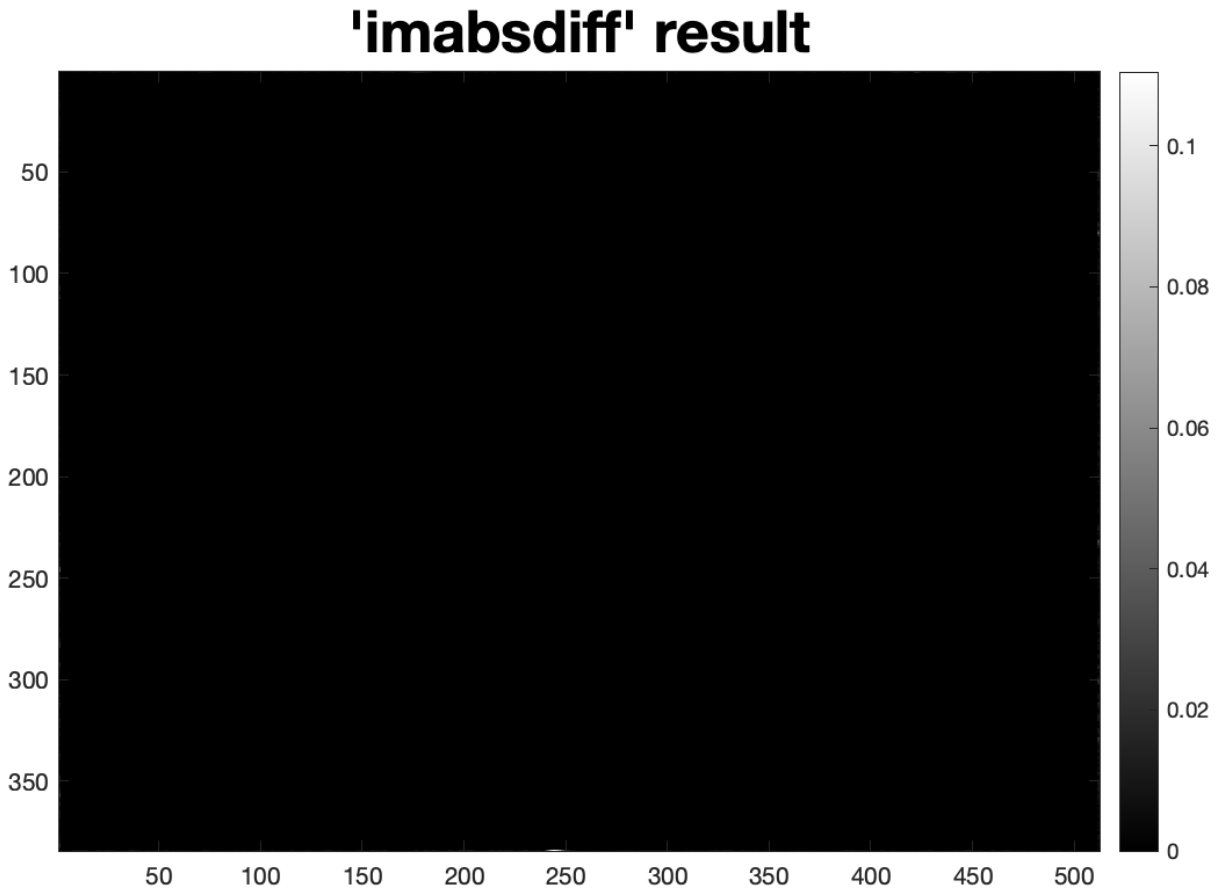




2. I had to add two loops in the given code to loop through the rows and columns, multiply the filter value with the image value and assign it to the output image matrix.

3. Function ‘imabsdiff’ computes the absolute difference between two images. It takes two input images of same size and returns a new image that has values equal to the difference between the corresponding pixels of the two input images.

   The output I got when using ‘imabsdiff’ on the outputs of my filter and ‘imfilter’ function (for all three given filter values) was:



This result means that the two filter algorithms gave identical results, since the absolute difference between them was zero, hence the black image.

4. **CONCLUSION**

While writing the filter, I had to figure out how to take care of the corners, for which a margin value had to be added before multiplying the filter value with image pixels. Getting the loops and the indices took a lot of time and attention to detail. Variables ‘i’ and ‘j’ were used to loop through the filters and images.

To compare images, I used the function ‘imabsdiff’, which has been explained above. I found that there was no difference in the corresponding pixel values of the results.

I have a better understanding now of what convolution does. It is used to apply a filter or a kernel in order to produce a new, modified image. It performs computations on the pixel level. Filter values are combined with corresponding pixels and its neighbours to produce new pixel values, which essentially gives us the desired result as a new image.