CS7.404. Digital Image Processing
Monsoon-2022
Assignment-2
Posted on: 02/09/2022
Due on: 13/09/2022, 23:59 Hrs IST

- All your code should be in the `src` directory and images in `imgs` directory.
- Do not use any external library other than **`numpy`** for implementing any of the tasks. You can however use external libraries for I/O operations and plotting. If you are not sure if a library is allowed for a particular task, clarify with your TAs.
- You will be evaluated on correctness and how vectorized your code is - with correctness being the priority.
- Write modular code with relevant docstrings and comments for you to be able to use functions you have implemented in future assignments.
- All theory questions and observations must be written in a markdown cell of your jupyter notebook.
- All academic integrity policies apply. Check the course web page for more clarity.
- Start the assignment early, push your code regularly and enjoy learning!

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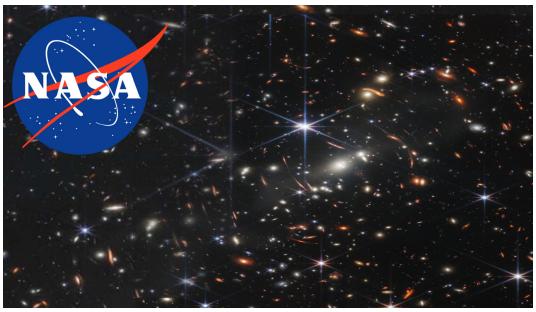
1 Blurry Moments

Michael Scott being the World's Best Manager knows how much precious moments mean to his employees. However, not every perfect moment can be captured perfectly, which can be disheartening. To fix this, Micheal came across some Image Processing Techniques in order to sharpen the blurry images that one might come across. As good as he is at selling papers, Micheal is equally bad at coding. He needs your help to implement two of those techniques namely, **Unsharp Masking** and **High Boost Filtering**.

1. Implement both the functions and test the implementation on `Jam.jpg` so that Michael can gift two of his best employees something special.
2. Choose any three different filter sizes. Compare the two methods for each filter size and report your observations along with the result images for the input `webb.jpg`

(a) Jam.jpg



(b) webb.jpg

2 Intentionally Blurry Moments

Detailing in an image is not always desirable especially when it results in Jim having wrinkles of Creed. However, the basic low pass filters while doing their job of smoothing, do not take into account that smoothing across edges is undesirable at times. However, Bilateral filter is a filter that smoothens the image while taking into account the presence of the edges. As usual, Michael is keen to see this into affect on the images he took on his trip to the lakeside but needs your help with it.

Implement Bilateral Filter and test it on `lakeside.jpg`. Report your observations and explain the results with different combination of domain and range parameters.

Figure 2: lakeside.jpg