



# Lab10

## Image Filtering and Hybrid Images

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# Introduction



- Close look: high frequency
- Far away: low frequency
- A hybrid image is obtained by blending low and high frequency parts of two images

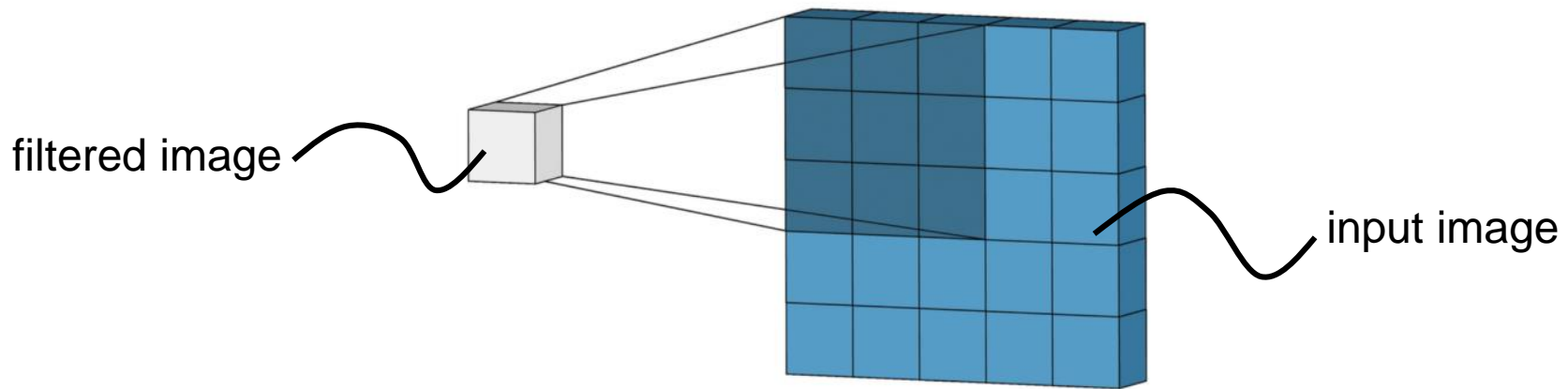


# About Lab10

- TO-DO
  - In-Class Demo: show your results to TAs today or next week (12/5 Mon.) in class
  - Report

# Image Filtering (1/2)

- AKA convolution. Specifically, 2D convolution.
- Take 3x3 kernel as an example



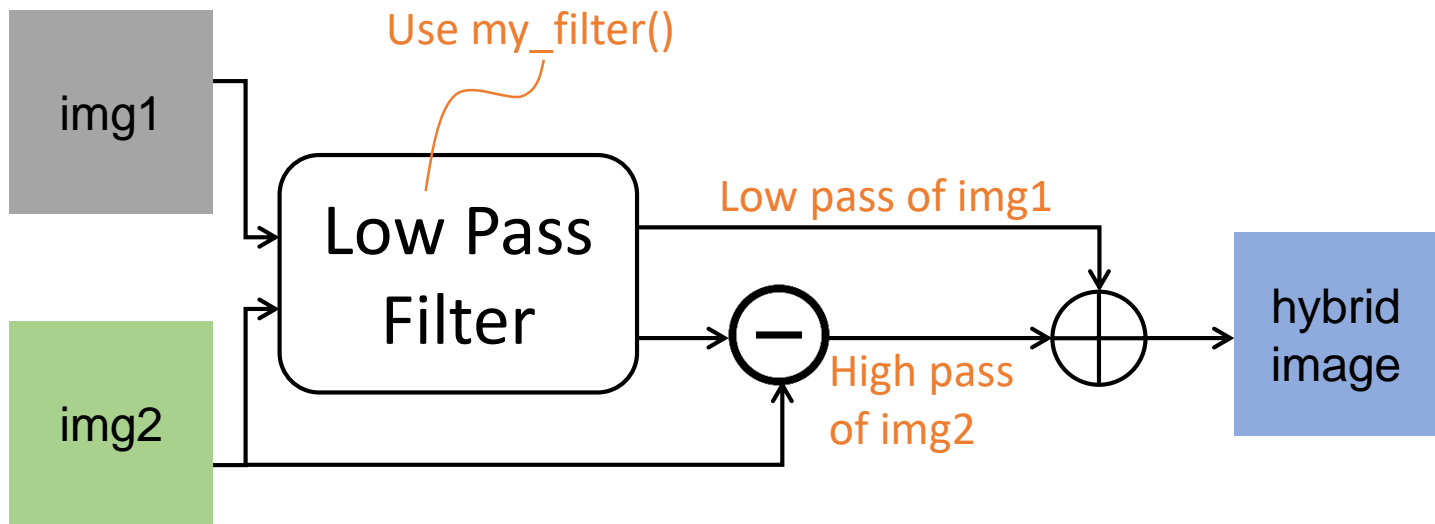
- 5x5 in, 3x3 out

# Image Filtering (2/2)

- Implement in `my_imfilter.m`
  - Support grayscale and color (RGB) images
  - Support arbitrary shaped filters, as long as both dimensions are odd (e.g. 7x9, 3x21)
  - **Pad the input image with zeros** so that filtered image remains the same resolution as input
- We have provided a script, `test_my_imfilter.m`, to help you debug your image filtering algorithm.



# Generate Hybrid Image



# Report (1/2)

1. Explain why the high frequency images will be seen at close distance (larger one) while the low frequency images will be seen at far distance (smaller one)?
2. Discuss different low pass filters (box filter and Gaussian filter under the same size). Which one generates visually-pleasing hybrid images?
3. Reverse the flow when generating low-passed filtered image and high-passed filtered image. **Specifically, low pass filtered image is obtained by subtracting high pass filtered image.** Please discuss the difference between this reversed flow and flow with Gaussian filter used in this lab. (e.g. quality of hybrid image and low-pass filtered image)



# Report (2/2)

4. Try different settings of the cutoff frequency (e.g. 3, 7, 11...). Show your results and explain what you observe (e.g. differences between the results of different cutoff frequencies, execution, blurred quality...)
5. Try to create your own alignment flow for two arbitrary images. **These two images should be in different scales. The sizes and the locations of the objects in the images that you want to blend should also be different.** (Note: the larger portion of your flow implemented with coding, the higher score you will get.)





# Submission

- Deadline
  - 12/05 (Mon.) 23:59
- Submit to eeclass
  - Make sure the file delivery and organization meet the requirement
  - Wrong file delivery or organization will get up to 5% punishment
- If you have any question, feel free to
  - Ask on eeclass discussion (maybe other students also have the same question !)
  - Do not show your code on eeclass discussion or email your code to TA. Coding and debugging by yourself !

