

Assignment 1 - Hybrid Image

1 Objective

- Familiarizing with color systems, basic image operations, transformations and filters.
- Obtaining intuition on how these tools can be used in an application.

2 Problem description

In this assignment, you will extract two key pictures from one image and create a hybrid image from them.

2.1 Content extraction

In the given image, there are two pictures placed on two boards that we want to extract. **Your first task is localizing these two images and map them into 2 separates pictures.** Hint:

- To localize the border, you should try using color-based filtering.
- To remove noises, you should try choosing from the kernels introduced in the lecture
- After detected border, feel free to use the method introduced here and here. to extract the image in the original form.
- Please explain the effect of the transformation matrix in terms of rotation, translation and scaling.

2.2 Creating Hybrid Image

The two images that you've just extracted belong to a couple in the same bureau, it's a small office so there's only one frame for both of them. The frame would be placed next to one of them, and the other will be several meters away. Your second task is creating a hybrid image so that they can view comfortably from their seats. Here's what you should do:

- Implement DFT on these images (FFT if possible!)
- Convert these images to frequency domain
- Keep low frequency components from one picture, high frequency from another then merge them (You experiment and choose the frequency)
- Convert them back to spatial domain and write the high-frequency one on top of the low-frequency one.

- Can we achieve similar effects using spatial kernels (convolution)? Which one?

3 Expectation

You should submit your running code (.py or .ipynb extension) along with your document explaining it and other questions given in this assignment.