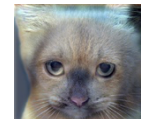
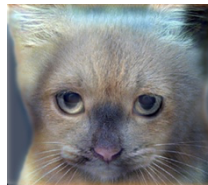

Homework #1 Hybrid Images

Assigned on September 11, 2023

Due by September 25, 2023

Overview



(You can see a cat if looking at the image from very close, and see a dog if looking at the image from far away.)

The goal of this assignment is to write an image filtering function and use it to create hybrid images using a simplified version of the SIGGRAPH 2006 [paper](#) ([slides](#)) by Oliva, Torralba, and Schyns.

Hybrid images are static images that present different interpretation as the viewing distance changes. The basic idea is that high-frequency signal (e.g., edges, textures, etc.) tends to dominate perception when closely observing an object. However, from a distance, only the low-frequency (smooth) part of the signal can be seen. By blending the high-frequency portion of one image with the low-frequency portion of another, you get a hybrid image that leads to different interpretations at different distances.

Details

Please refer to README.md in the homework folder to see more details about how to finish your code implementation in this homework.

1 Implementation (45%)

1.1 Image filtering (20%)

Please finish the function `my_imfilter` in the file `my_imfilter.py` and briefly describe your implementation ideas. Note that you can not use convolution function from any python built-in libraries (eg. numpy, scipy).

1.2 Extract and combine the high-frequency and low-frequency signals (20%)

Please finish the **TODO** in the file `hw1.py`.

1.3 Others (5%)

Please list the additional packages and versions required in your implementation and describe how to run your code. (make sure we can run your code)

2 Experiments (30%)

2.1 Hybrid Image (10%)

Put your hybrid result from the cat-dog pair and briefly explain your result.

2.2 Other hybrid images (10%)

Try different pairs of pictures in the folder **/data** and put your results here.

Comparing the result of Problem 2.1, what's the difference?

2.3 Customized hybrid images (10%)

Gather your own picture pairs and show your results of hybrid results. Briefly explain the difference between customized results and results from Problem 2.1 and 2.2.

3 Discussion (25%)

Do you discover anything special in your experimental results?

What applications do you think this technology can be used for?

Anything you discover while working on your homework.

4 Requirement

You should package the required files in a folder named **HW1_{studentID}**.

1. *****.py** in in folder **/code** (all required files to run your code)
2. *****.png** in folder **/results** (your generated hybrid images)
3. Your report with filename **{studentID}_report.pdf**

Compress the entire folder **HW1_{studentID}** into **HW1_{studentID}.zip** and submit it to eeclass.

Any wrong format or file arrangement will get 5% punishment each time.

5 Appendix and Reference

[1] Assignment modified by Min Sun based on James Hays and Derek Hoiem's previous developed projects.

[2] Oliva, Aude, Antonio Torralba, and Philippe G. Schyns. "Hybrid images." ACM Transactions on Graphics (TOG) 25.3 (2006): 527-532.