

# COMPUTER VISION

## ASSIGNMENT 1

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Deadline: 13-April-2023

***Important note: This assignment must be done individually***

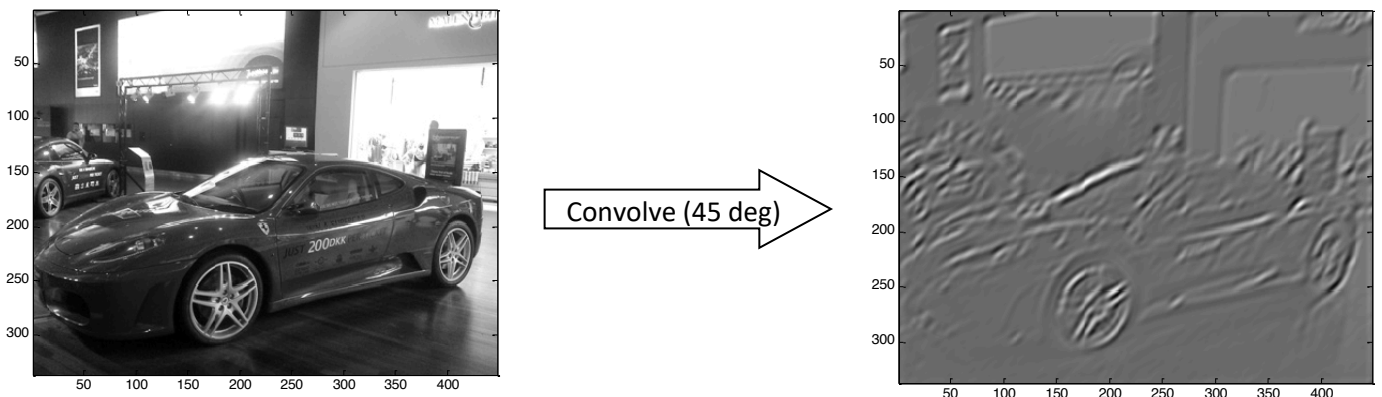
1. (0.5 points) Install OpenCV
2. (0.5 points) Take a picture with your smartphone, resize the picture as to be 448x336 pixels.
3. (2 points) Apply a Gabor filter at 4 orientations. What are the differences you note among the 4 orientations? Combine the 4 orientations (max or sum), what do you see.
4. (1.5 points) Play with the parameters of the filter and show how the filter works with 3 different parameter values.
5. (2 points) Implement a Gaussian Pyramid. Show the results using the same image. Comment on the results. What are the low frequencies?
6. (1.5 points) Create a Laplacian Pyramid using the code from (5). Show the pyramid and comment on the results.
7. (2 points) Apply the Fourier transform and provide the magnitude and phase images.

*Hint: You can use the sampled version of the Gauss filter:  $[1\ 4\ 6\ 4\ 1]/16$ . To reduce size, get every two rows and two columns*

*Hint 2: Remember the Laplacian can be obtained from the Gaussian filter*

**Deliverables: Document report in PDF with solutions and code snippets for the 7 exercises.**

Example of running Gabor filter with one orientation ( $\pi/4$ )



More information on Gabor filters:

<http://mplab.ucsd.edu/tutorials/gabor.pdf>

[http://bmia.bmt.tue.nl/education/courses/fev/course/pdf/Gabor\\_functions.pdf](http://bmia.bmt.tue.nl/education/courses/fev/course/pdf/Gabor_functions.pdf)