Polytechnic University of Puerto Rico
ECECS Department

Course: EE 3002 Signal and Systems
Project FA20

Introduction to 2-Dimensional Low Pass and High Pass Filtering for Biomedical Images using MATLAB

Team of **four** students **Project Due Date:** As Specified in your Schedule

Name _____

Name_____

Name_____

Name_____

1) Upload the sample images provided with the project.

2) Upload similar images (ideally with better resolution) that you find in the web and/or biomedical databases.

3) Use MATLAB to subject these images to **Low Pass Filtering** processing.

- **Use filters discussed in class**.
- Increase number of coefficients in the filter mask.
- Show the before filtering and after filtering effects on the image.
- For each trial provide the 2D filter mask used (filter coefficients)
- Provide the filter frequency response plot.
- Discuss what happens, to the filtered image, when the number of coefficients increases.
- Provide MATLAB Code for all your trial experiments.

4) Repeat part 3) using MATLAB to subject these images to **High Pass Filtering** processing.

- **Use filters discussed in class**.
- Increase number of coefficients in the filter mask.
- Show the before filtering and after filtering effects on the image.
- For each trial provide the 2D filter mask used (filter coefficients)
- Provide the filter frequency response plot.
- Discuss what happens, to the filtered image, when the number of coefficients increases.
- Provide MATLAB Code for all your trial experiments.

5) Provide general conclusions regarding the perceived effects of the type of filter used and the effects, on the filtered image, of increasing the number of filter coefficients.

6) Follow the Project Format provided in the next page.

Report Format:

A. **Cover Page**

B. **Original Problem Proposed to the Student:** Original project pages handed by the instructor (these pages)

C. **Index**

D. **Introduction**

E. **Low Pass Filtering**

i) **Low Pass Filter Experiment 1**

2D filter mask used.
Filter frequency response.
Before filtering and after filtering results.
MATLAB Code
Comments.

ii) **Low Pass Filter Experiment 2**
iii) **etc**

F. **High Pass Filtering**

i) **High Pass Filter Experiment 1**

2D filter mask used.
Filter frequency response.
Before filtering and after filtering results.
MATLAB Code
Comments.

ii) **High Pass Filter Experiment 2**
iii) **etc**

G. **Conclusions**

H. **Bibliography**

Include these project instructions pages in part B of your report.

Display of Filtering Results (Example)

Original Image

High Pass Filter
9X9 mask

-1/81 .....-1/81
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.....
-1/81..... 2 .....-1/81
.....
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-1/81 .....-1/81

Sharper Image

Frequency Response