National University of Computer and Emerging Sciences, Lahore Campus

Course:	Fundamentals of Computer Vision	Course Code:	CS-4059
Program:	BS(Data Science)	Semester:	Spring 2024
Duration:	-	Total Marks:	10
Due Date:	21-Feb-24	Weight	
Section:	B	Page(s):	2
Exam:	Assignment 1	Roll No.	

Instruction/Notes:

- Read the assignment carefully. Make sure you have understood the requirements and expectations of the assignment.
- Ensure that you have all the necessary files and documents ready for submission in the CORRECT format.
- This is an individual assignment. Any form of plagiarism will result in an award of ZERO marks.
- The assignment must be submitted before the announced DEADLINE. One mark will be deducted for each day of late submission.

Background

Ever since Anato was a 7 years old, he has always admired the night sky and all the stars that has filled it. He has always wondered how the space scientist has used the telescopes to view the stars and how have they been able to so accurately tell above the changes in stars behavior such as:

[1] the change in the size of stars,
[2] whether the star has moved from its current position,
[3] whether a new star has appeared in the sky

and so much more

When Anato got admission in FAST NU and was able to take the Computer Vision Course. He could finally discover the answers to all his life long questions.

Computer Vision has always played a vital role in the Space Observation Centers to study the behavior of Stars in the Sky.

Help Anato in unravelling the great mysteries of how scientists analyze the images to give such accurate information of the things that lie billions of lightyears away from the earth. Also, so that he can qualify for a job in NASA.

Task # 1

You must first enhance the image “Stars-1.jpg”, so that you can thoroughly analyze it. You can use many methods such as:

- Image Averaging for Noise Reduction
- Changing of Brightness
- Removal of background from Images
- Image Negative

- Point Operations (Intensity Transformation)
- Histogram based processing
- Mask Processing

Apply all the above on the image, observe the behavior then write one advantage that each method has over the rest when it comes to analyzing the sky images.

Task # 2

In the Folder "Ind-Img", there are 51 images, each student is allocated one image (allotted according to their id on the roll call sheet), the students must use whatever method they feel is most effective to find the difference between the "Stars-1.jpg" and the image they were provided with.

Task # 3

The Students must use the methods taught in class to sharpen the "Stars-1.jpg" image and show how much improvement they have achieved in visibility after sharpening the image in exact percentage. Compare the original image and sharpened image to see if there was any change in the size of the stars that were appearing on the image.

Task # 4

The Students must use the methods taught in class to smoothen the "Stars-1.jpg" image and then reverse the effect to recover the original image.

Guidelines:

- All the necessary information is provided in the slides of Lecture 2; however, you are encouraged to explore other methods that best suit your needed.
- All the Functions must be manually implemented and no major logic build-in functions of the OpenCV or any other Python library must be used.
- You must be able to justify your results with statistics that are available in your code, otherwise your claims will be vague and no marks will be awarded.
- In case of detection of using any LLM models such as Chatgpt, Penalty will be awarded

Deliverables:

- A jupyter notebook with properly formatted and documented code.
- Rename file to your student ID before submission "20L-XXXX.ipynb"