

Topic	Description
Module	Digital Image Processing
Module Code	MRV
Semester	WS 2024
Lecturer	Daniel T. McGuiness, Ph.D
ECTS	5
SWS	4
Lecture Type	ILV
Teaching UE	60
Coursework Name	Assignment
Work	Individual
Suggested private Study	10 hours
Submission Format	Online via SAKAI
Submission Deadline	27.11.2024 23:59
Late Submission	Not accepted
Resubmitting Opportunity	No re submission opportunity
Feedback	Via Comments on SAKAI

No lecture time is exclusively devoted to the aforementioned assignment.

*Points on Style*

15 points of the assignment will be dedicated to the formatting of the assignment documentation, such as formatting, TOC, title page, captions, ...)

A portion of the mark for every assignment will be, where applicable, based on style. Style, in this context, refers to organisation, flow, sentence and paragraph structure, typographical accuracy, grammar, spelling, clarity of expression and use of correct IEEE style for citations and references. Students will find *The Elements of Style (3rd ed.)* (1979) by Strunk & White, published by Macmillan, useful with an alternative recommendation being *Economist Style Guide (12th ed.)* by Ann Wroe.

Assignment Question	Maximum Point	Result
Different Types of Blurring Filters	15	
Colour Channels	10	
Perlin Noise	15	
Morphological Operations	15	
Detecting Objects	30	
<b>Sum</b>	<b>85</b>	

**[Q1] Different Types of Blurring Filters** 15

Below is an image with the image name `sunflower.jpg`. Please use the following blurring filters and showcase their results: (15)

- Gaussian blur,
- Blur filter,
- Bilateral filter.

You are allowed to use python modules for this question.



Figure 1: A generic Sunflower image.

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**[Q2] Colour Channels** 10

Below is an image with the image name `innsbruck.jpg`. Please analyse the images colour content and determine, for each channels R, G, and B, the most frequent brightness value (i.e., 0-

255). Following this please convert this image to simulate what a person with without a red cone would see. You are allowed to use python modules for this question.

(10)



Figure 2: The Innsbruck skyline to be used in Question 2.

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**[Q3] Perlin Noise**

15

You are to create a custom random generated world using a seed, which will be your student number. This world will be in dimension of (1024, 1024). Please generate a 2D and 3D world of this random world. You are allowed to use python modules for this question.

(15)

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**[Q4] Morphological Operations**

15

Below is an image with the image name `fingerprint.png`. Please use the proper morphological operation to remove the noise. You are allowed to use python modules for this question.

(15)



Figure 3: A noisy fingerprint image to be used in Question 4

**[Q5] Detecting Objects** \_\_\_\_\_ 30

Below is an image with the image name `coin.jpg` showcasing a different denominations of the Indian currency, rupee. Please use the proper method(s) to detect and identify the coins. In this context identify implies understanding the shape of the coin, and not its denomination. You are allowed to use python modules for this question.

(30)



Figure 4: An image containing a collection of rupees