

# BMDS2133 Image Processing

## Assignment Specifications

Aims	<ul style="list-style-type: none"> <li>• Enable students to analyse and employ appropriate Image Processing techniques to solve problems and design intelligent systems.</li> <li>• Enable students to use relevant tools and technology, such as python programming, to develop intelligent image processing and/or computer vision programs.</li> </ul>
Learning Outcomes Assessed	<ul style="list-style-type: none"> <li>• Practice suitable image processing techniques and algorithms to solve a given problem. (P3, PLO3)</li> <li>• Present solution by utilising the image processing techniques and tools to address real-world problems. (A2, PLO10)</li> </ul>
Outline of Problem	For your assignment, you should critically evaluate current technologies and then propose a project for the selected Image Processing topic, implement an IP solution to solve the problem in the proposed project.
Details	<ul style="list-style-type: none"> <li>• The Assignment consists of <b>TWO (2)</b> parts, please refer to <b>Project Details Part 1</b> and <b>Project Details Part 2</b>. Both parts are related. For Part 2, you are required to develop the program using Python.</li> <li>• Group yourself into a team of <b>4 members</b>. You are given few options of research areas as listed below. Your group shall select one of them for this assignment purpose.</li> <li>• Please note that the following are the basic requirements of the assignment. <b>Fulfilling the requirements may lead you to an Average or Good grade</b>. Achieving Excellent grade requires evident <b>extra efforts</b>, such as learning new skills, introducing new idea, complex Image Processing algorithms, demonstrating the ability to process big data, and/or producing excellent reports with working prototype.</li> <li>• Your group is expected to produce idea that is originated from the members, but not to take the work or an idea of someone else (including the Web) and pass it off as your own. <b>NO GROUP IS ALLOWED to share the same techniques</b>, i.e., each group must propose a unique title or solution.</li> </ul>
Theme	<p>Solving Real-World Problems with Image Processing Aligned with SDG and Malaysia MADANI</p> <p>Topics must demonstrate relevance to one or more SDGs and reflect Malaysia MADANI values such as compassion, sustainability, and innovation.</p>
Topics	<p><b>1. Intelligent Barcode/QR Code Scanner for Graduation Ceremonies</b></p> <p>Design a solution that detects QR/barcodes owned by students during a convocation ceremony. Once detected and confirm with the face from camera, the student's name is displayed or announced.</p>

	<p><b>2. Smart Watermarking for Secure Media Sharing</b> Develop an image watermarking algorithm that can withstand compression and cropping on messaging or social media platforms.</p> <p><b>3. Emotion-Aware Visual Companion for Elderly</b> Develop a computer vision prototype that enhances the well-being of elderly individuals (e.g., emotion monitoring, posture guidance, or simple gesture-based feedback).</p> <p><b>4. Smart Object Counting from a Single Image</b> Allow a user to upload a single image, select a sample object, and count similar instances in the image.</p>
Submission Deadlines	<p>Submit Prototype Source Code and Documentation by:</p> <ul style="list-style-type: none"> <li>• <b>Source Code:</b> Week 11, Monday, before 11.59pm</li> <li>• <b>Documentation:</b> Week 11, Monday, before 11.59pm</li> </ul> <p><i>Please submit to the Google Classroom. Late submission will be penalised. A demo session to present the prototype is required.</i></p>
Contribution	<p>Assignment Part 1: 40% Assignment Part 2: 60%</p> <p><i>Please submit to the designated Google Classroom.</i></p>
Academic Integrity and Plagiarism	<p>There must be originality in your work, i.e., do not copy or refer to other group(s). You may only work with your team member(s) to produce the solution of this assignment. You must not share with nor refer to any part of the assignment (including the code) of anyone else except your team member(s) and your tutor.</p> <p>Before submitting your assignment, please make sure that you have complied with <b>TAR UMT plagiarism Policy</b>. Any cheating attempt to cheat, plagiarism, collusion, and any other attempts to gain an unfair advantage in assessment will cause the students concerned to be penalised.</p> <p>IMPORTANT: Students found to be dishonest are liable to disciplinary action.</p>
Late Submission	<p>Late submission without valid reason will NOT be tolerated. For late submission, there will be a reduction of total marks:</p> <ul style="list-style-type: none"> <li>• Late 1 to 3 days after deadline of submission: minus 10 marks</li> <li>• Late 4 to 7 days after deadline of submission: minus 20 marks</li> <li>• Late more than 7 days after deadline of submission: 0 marks</li> </ul> <p>In certain circumstances, a student may be allowed to submit the assignment late with valid reason. S/he must contact the tutor at least one week before the assignment is due. The tutor will evaluate whether the circumstance warrants submitting the assignment late, but no guarantee that the students will not be penalised.</p> <p>Failed to submit the reports &amp; code will lead to failure of the coursework.</p>

### Project Details: Part 1 Documentation

Introduction	Your task for this part of assignment is to <b>identify a problem</b> for the selected IP topic, perform <b>literature review</b> and propose your respective <b>Image Processing solution(s)</b> that helps in solving the problem in the proposed project.
What to hand in?	Each group is expected to produce a group work regarding the specified items and must not repeat what other groups have done. The report shall be completed using the given Google Doc template in the Google Classroom.
Format for Deliverable	For your proposal, you are required to complete the Documentation using the Google Doc template available in the Google Classroom. <b>Submit the Documentation to the Google Classroom before the stipulated deadline by team leader.</b> Otherwise, the late submission penalty will be applied.

### Project Details: Part 2 Prototype Development

Introduction	Your task for this assignment is to implement the Image Processing solution using Python or any other relevant tools, perform testing and evaluation on the system and finally present the work to your tutor.
What to hand in?	<ul style="list-style-type: none"> <li>• Submit all your source code to Google Classroom submission page.</li> <li>• Your team is required to do a presentation of the work with <b>presentation slides</b> on Week 12 - Week 14 based on the arrangement with the tutor.</li> </ul>
Format for Deliverable	<ul style="list-style-type: none"> <li>• <b>Compress</b> the entire source code using zip format.</li> <li>• Submit the source code by team leader, the rest "Make as done".</li> </ul>

## Documentation Assessment Rubrics (40 marks)

Criteria	Missing or Unacceptable (0-2)	Poor (3-4)	Accomplished (5-7)	Good (8-10)
Introduction	No or very little discussion on existing problem and the project The proposed project already exists, or with very minor change.	Little discussion on existing problem and introduction of proposed project. Minor ideas are modified from existing system(s).	Good discussion and evaluation of existing problem and the proposed project. Ideas modified from existing system, with some creative ideas are added.	A very good discussion and evaluation of existing problem and the proposed project. Majority of the ideas are creative.
Research Background (20)	Background study are retrieved directly from the literature without any paraphrasing. No discussion or very little of introduction given to the related system or technology. 0-4	Background study is lengthy, contents are retrieved directly from the literature without any critical evaluation. Introduction to the related system is given, but no evaluation provided. 5-9	Background study is concise and clear, which integrates critical and logical details from the peer-reviewed theoretical and research literature. Brief discussion and evaluation of the related system. 10-15	Background study is concise and clear, which integrates critical and logical details from the peer-reviewed theoretical and research literature. A very good discussion and evaluation of the related system. 16-20
Methodology (20)	The description does not relate the case study. Brief design of proposed methods provided but lack of explanation or irrelevant. 0-4	Brief description of system design, with some explanations. Introduction to the related application of the methods is given but lack of examples, understanding or explanation. 5-9	System design is well -illustrated, and with clear explanation. Good discussion and evaluation of the methods applied. 10-15	System design is well -illustrated, with good explanation. Good discussion and evaluation of the relevant and practical methods applied to the project 16-20
Results (20)	Testing methods were missing or inappropriately aligned with data and research design. Results were confusing. 0-4	Testing methods were identified but the results were confusing, incomplete or lacked relevance to the research questions, data, or research design. 5-9	The testing methods were identified. Results were presented. All were related to the research question and design. Sufficient metric or measurement is applied. 10-15	Testing methods and results presentation were sufficient, specific, clear, structured and appropriate based on the research questions and research design. Extra metric or measurement is applied. 16-20
Discussion and Conclusion	Discussions or answers to the research objectives and results were omitted or confusing. No or very little discussion on limitation and future improvement.	Little discussions were presented. Answers to the research question and results were unclear or confusing. Only little discussion on limitation and future improvement.	Discussions of the results were presented. The research question and system performance were answered and identified. Some discussion on limitation and future improvement were given.	The significance of the results and achievements of objectives were answered and evaluated. Limitations and future improvements of the studies were identified.
Spelling, Grammar and Writing Mechanics	There were so many errors that meaning was obscured, make the content became difficult to understand. Possibly copied from the source without paraphrasing.	Some grammar or spelling errors were spotted. Some sentences were awkwardly constructed and hard to understand.	There were occasional spelling or grammatical errors, but they did not represent a major distraction or obscure meaning.	Sentences were well-phrased. The writing was free or almost free of spelling and grammatical errors.
References	No proper referencing/citation is done. Only rely on website content, but no research papers.	Reference list is provided with some mixture of reference sources including journal. Proper citation/referencing is missing.	Referencing/citation is done properly but with only little sources/reference	Rich mixture of reference sources especially good quality of research papers. Proper citations are done whenever necessary.

## Prototype Assessment Rubrics (60 marks)

No	Item	Criteria		
		Poor	Accomplished	Good
1	User interface / output (20)	Poor or confusing design of UI or output, which provides inadequate information/outputs Most of the information/outputs generated are less accurate. Layout of information is not organized. 0-8	Adequate information/outputs needed are generated The information/output generated are accurate but some with errors. Layout of information is organized. 9-15	All the necessary information/outputs are generated All or most of the information/outputs generated are accurate. Minor errors can be ignored. Layout of information is well-organized. 16-20
2	Programming (30)	The end product fails with many logic errors, many actions lacked exception handling. Solutions are over-simplified. Programming skill needs improvement. Minimal validations are provided. Business rules are not validated 0-10	Major parts are logical, but some steps to complete a specific job may be tedious or unnecessarily complicated. Program algorithm demonstrates acceptable level of complexity. The student is qualified to be a programmer. Important and necessary validations are provided 11-19	Correct and logical flow, exceptions are handled well. Demonstrates appropriate or high level of complex algorithms and programming skills. Thorough and thoughtful validations are provided. All important business rules are validated 20-30
3	Degree of completion (20)	Too much still remain to be done. Basic requirements are not fulfilled. The end product produces enormous errors, faults or incorrect results 0-8	All required features present in the interface within the required scope, but some are simplified. Or one or two features are missing The system is able to run with minor errors 9-15	All required features present in the interface within or beyond the required scope no bugs during demonstration 16-20
4	System implementation (20)	The end product is produced with different system design or approach, which is not related to the initial proposal 0-8	The end product conforms to most of the system design, but some are different from the specification 9-15	The end product fully conforms to the proposed system design 16-20
5	On-the-spot coding (10)	The student is unclear about the work produced, sometimes not even knowing where to find the source code. 0-4	The student knows the code whereabouts, but sometimes may not be clear why the work was done in such a way. 5-7	The student is clear about every piece of the work done. 8-10