



Course Code:	CSCE460301– Fundamental of Computer Vision
Title of Assignment:	Computer Vision: Research Paper
Assignment Weighting:	20%
Submission Date:	3rd December 2024
Learning outcome	Learn something new and, perhaps, to contribute something to the field of computer vision.

Requirements & Marking Scheme

1. General Guidelines:

This is a GROUP project. Most projects should be done in groups of three or Four. Larger projects could have a group of Five, and in special cases groups of one are OK. One report per group to be submitted.

1.1 Proposal (send description by November 8)

List the group members and a short (1/2 page) description of the goals of the project. If known, sketch a potential approach. You could switch later, but think it through as best you can now. As a guide to scope, you should expect to spend around 15-20 hours per person on the project. If you want to work by yourself, explain why it's not possible to work with a partner (e.g., because you're building on your own existing research). Otherwise, indicate what each group member will work on and how the project will be evaluated.

The proposal is not graded, but 5 points will be deducted from the final project grade if it is late.

Deliverables: Upload the proposal to Canvas by November 8. You must send the short-written proposal for your proposal to be complete.

A digital copy of the proposal should be submitted using Canvas (email submission will not be accepted), more instructions will be given for this by your instructor(s).

You are permitted ONE submission for the project proposal – this means that there are no resubmissions, there are no late submissions. Please make sure that the version of your assignment that you produce is the version that you wish to be marked.

1.2 Assignment detail

Use the style files here for your paper: https://media.icml.cc/Conferences/CVPR2023/cvpr2023-author_kit-v1_1-1.zip

Submit two files to Canvas:

1) Five-page paper including: Abstract that briefly describes the motivation, Related Work that reviews the literature, Technical approach, and Key results. Include a statement of individual

contribution if there is more than one group member. The project will be graded as a whole, but I may modulate individual grades based on this feedback. Finally, list any source code used that is not part of a standard package. (pdf format)

2) A zip file containing your code. Please do not include images or results in this zip (we may ask for them later if needed).

Five-Page Paper Requirements:

Your paper should be formatted as follows:

- **Abstract:** Provide a concise summary of the motivation and objectives of the project.
- **Related Work:** Review relevant literature and contextualize your project within existing research.
- **Technical Approach:** Describe the methodology and techniques used in the project in sufficient detail.
- **Results:** Present and analyze the main findings or outcomes.

If the project is done in a group, please include a **Statement of Individual Contribution** section, outlining each member's specific role and contributions. Although the project will be graded as a whole, individual contributions may impact individual grades.

Additionally, please list any external source code or libraries used that are not part of a standard package.

Format: Submit as a PDF document.

Only one team member should upload files. The pdfs should clearly indicate all team members!

2. Topic Ideas

Try something new or interesting: apply vision to a mobile robot, make a data-driven interface for image editing, organize home photos, do visual search in a home photo collection, reconstruct a 3D scene from multiple images, estimate material properties, etc.

Compare two or more approaches: Implement two approaches (e.g., for object recognition) and try to understand when one works better than the other. As part of this, you could try to create a better benchmark dataset (maybe a smaller prototype).

Some specific ideas (though it's often best if you come up with your own idea):

- **Shadow detection:** Try to find cast shadows in outdoor images
- **Pedestrian detection:** Build a detector for standing/walking people
- **Multiview reconstruction:** Build a system to reconstruct an object or a scene from multiple images.
- **Evaluation of object detection:** Run a state-of-the-art detector on a PASCAL VOC dataset and study (quantitatively and qualitatively) which factors make detection difficult.
- **Similar category differentiation:** Make a classifier that can tell the difference between dogs/cats or bicycles/motorbike, etc.
- **Material detection:** Try to classify materials on natural objects in images.
- **Action recognition:** Try to detect when somebody is performing a particular action in a video.
- **Tracking:** Try to track players and the ball in a sports video.
- **Photo organization:** Build a system that can organize your photos by the people in them.

- **Gender/age classification:** Given a face, try to predict the age and gender.
- **Fake or Real:** Try to predict whether an input image is natural or was generated by a computer.

3. **Grading**

Grades will be based on the quality of the project (originality, thoroughness, extent of analysis, etc.) and the clarity of the written report and poster presentation. Ideally, you will try something new or apply ideas from class to your application domain or research. More will be expected of larger groups. It's great if you do something publishable, but you can also get full marks if you do something challenging or interesting that helps you learn something new.

Criterion (weighting)	Mark			
	0 -39	40-59	60 - 69	70 - 100
Introduction (20%)	Introduction section is not clearly defined, with no definitive start to the report.	Some evidence of a defined introduction section, which shows an attempt at introducing the reader to the content of the report.	A good, well-defined, introduction section is apparent which informs the reader of the contents of the report, although this is limited in detail.	An excellent introduction section which is clear and well defined. Introduces the report to the reader well, ensuring that they are informed as to the report. Excellent use of structure to increase understanding of the report.
Related Work (30%)	Report is a very limited and vague review of some literature – although with no evidence of academic rigour or source selection. Sources are poorly chosen and basic, with no consideration of peer-reviewed sources. Arguments are poorly defined, with no evidence of narrative or joined-up thinking.	Report is more of a general overview of the topics that are covered. Some evidence is shown of a review of existing literature. Sources are poorly chosen with very limited evidence of peer-reviewed sources. Arguments are somewhat defined, with limited evidence of narrative and joined-up thinking.	A good report which discusses the topics in some detail, rather than being a general overview. A good review of existing literature is evident in the report. Sources are well chosen, with evidence of peer-reviewed source selection. Arguments are defined and structured to ensure that the reader understands the points that are being discussed.	An excellent report which discusses the topics in a high level of detail, and is clearly different from a general overview of the topics. The review of existing literature is excellent, with clear use of peer-reviewed and academically robust sources. Arguments are exceptionally well defined, with clear review of existing works. Evidence of independent thought, which shows understanding and thought over the topic, rather than repeating what is in the literature.
Technical Approach (40%)	No defined technique, which tails off without coming to any form of point. No evidence of bringing together what has been presented in the literature review.	A defined technique is present, however, is largely unrelated to the arguments and discussions from the literature review. Limited evidence of tying arguments and sources together. There is some attempt at a conclusion to the arguments.	A good technique is presented, which is well defined and relevant to the discussions from the literature review. There is clear evidence of tying together the arguments and discussions from the report. There is a technique given, which is apparent but limited in terms of independent thought and is largely a summing up of what has already been proposed in the literature.	An exceptional technique is presented, which is clear and wholly relevant to the literature review from the report. There is an excellent evidence of tying together the arguments that are presented in the rest of the report. There is a clear technique given, which is defined and shows an excellent level of understanding of the material and shows evidence of independent thought beyond what is shown in the existing literature.
References (10%)	No real attempt at referencing evidence in the report. Either limited or no evidence of citations within the body of the report. References are provided in the wrong style.	Some, limited, attempt at referencing shown in the report, although with clear errors shown in style and execution. Limited citations shown in the body of the text, with the formatting of the citations largely correct although with some errors. References in the correct style with some errors shown.	Good attempt at referencing apparent in the report with very few errors which are limited in scope. Good citations shown in the body of the text, with the formatting correct with very limited or no errors. References are in the correct style with no, or limited, errors.	Excellent referencing apparent in the report which go beyond the standard and show at least an attempt at picking academically robust sources – evidence of academic rigour at a level above Level 4. No errors apparent in either citations or reference lists – which are entirely in the correct style.

Criterion (weighting)	Mark			
	0 -39	40-59	60 - 69	70 - 100
Structure and Presentation (10%)	<p>No clear and coherent structure present in the report.</p> <p>Report presentation is unclear and lacks any form of consistency.</p> <p>Multiple and/or severe presentation errors which limit the reader's ability to understand what is being written.</p> <p>Formatting makes the report difficult to read and follow.</p>	<p>No clear and coherent structure present in the report.</p> <p>Report presentation is unclear and lacks any form of consistency.</p> <p>Multiple and/or severe presentation errors which limit the reader's ability to understand what is being written.</p> <p>Formatting makes the report difficult to read and follow.</p>	<p>Report is presented in a structured way, with a good attempt at logical progression from section to section.</p> <p>Presentation is clear and makes the report easy to read. Presentation is consistent from section to section with some formatting errors which are only minor in nature and do not affect understanding.</p> <p>Formatting is clear and the report is easy for the reader to follow.</p>	<p>Report is presented in a clear and professional structure, showing clear evidence of thought behind the structure of the report as well as the content that is given.</p> <p>Presentation is professional in execution and allows for easy reading and understanding. No formatting errors shown with consistent layout shown throughout the report.</p> <p>Formatting is absolutely clear, with apparent thought given to how to improve the understanding and ease-of-access on the part of the reader.</p> <p>Clear reference to the learning objectives that have been identified in the Module Handbook and specified in this document.</p> <p>Evidence of clear, logical and thorough additional research, going above and beyond the base-level material given in the sessions themselves.</p>