CSCI 8820 Computer Vision and Pattern Recognition

Guidelines for the Self-Study Project

The self-study project should **not** be a duplication of work you are doing or have done for another course, your MS thesis or Ph.D. dissertation. The project could, however, be in the same general area as some of your other present or past work as long as it does not address the same specific problem. In some cases, continuation of work done previously may be allowed as long as the continuation involves a substantial amount of work. You are expected to do the following for your class project:

- Identify a problem or a topic that interests you. Skimming through the textbook for potential topics is a good idea.
- Refer to the research literature and identify the papers that deal with your topic. You may need to refer to more recent papers than the ones cited in the textbook. You can use the literature cited in the textbook to search for more recent literature on a given topic.
- Select a subset of papers to focus on (typically 3-4).
- Study and implement the techniques/algorithms mentioned the papers. At least three (and preferably four) different implementations are expected.
- Carry out a comparative analysis of the implementations mentioned above.

The topics suitable for the self-study project are as follows (this is not an exhaustive list):

- Edge detection
- Techniques for extracting 3D shape information from 2D images
- Image segmentation
- Texture analysis
- Motion analysis
- Feature extraction
- Object recognition
- Parallel processing for computer vision
- Parallel architectures for computer vision
- Neural networks for computer vision
- Visual information systems
- Computer vision-based decision support systems
- Computer vision for multimedia
- Computer vision for robotics
- Biomedical image analysis

The projects should reflect a fair amount of thought, implementation effort and understanding of the topic. Original ideas are especially encouraged and will be specially rewarded in the final assessment. A mere *cut-and-paste* approach is strongly discouraged and will be penalized. Since a fair amount of implementation effort is expected, you may work in teams of up to 3 students. The work, however, should be equitably shared between the students in a team.

On **March 12, 2024** (Tuesday) each team is expected to submit a formal project proposal of about 2000-2500 words (about 5 pages single-spaced with Times New Roman 12-point font). The project proposal should include:

- A brief abstract (about 200 words) stating and describing the problem.
- A brief introduction to the problem, which gives the background (literature survey) and the motivation for the problem and the goals to be achieved (about 1000 words).
- A research plan that outlines the various tasks to be performed to achieve the goals (about 1000 words).
- A weekly schedule or time table for the research tasks. In the case of research teams also mention who will be tackling which specific task.
- Status of work done so far. Mention any important results obtained so far (if any).
- Citation of references.

Journals: International Journal of Computer Vision, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Systems, Man and Cybernetics, Pattern Recognition, Pattern Recognition Letters, Artificial Intelligence, Applied Intelligence, Computational Intelligence, Computer Vision, Graphics and Image Processing, Computer Vision and Image Understanding, Journal of Mathematical Imaging and Vision, Image and Vision Computing, International Journal of Pattern Recognition and Artificial Intelligence, International Journal of Robotics Research, IEEE Transactions on Medical Imaging, IEEE Transactions on Geosciences and Remote Sensing, IEEE Transactions on Neural Networks, Neural Networks, IEEE Transactions on Robotics and Automation, Computerized Medical Imaging and Graphics, Medical Image Analysis.

Conference Proceedings: International Conference on Computer Vision (ICCV), International Conference on Image Processing (ICIP), IEEE Conference on Computer Vision and Pattern Recognition (CVPR), AAAI National Conference on Artificial Intelligence, International Joint Conference on Artificial Intelligence (IJAI), International Conference on Pattern Recognition (ICPR), European Conference on Computer Vision (ECCV), International Conference on Robotics and Automation (ICRA), International Conference on Neural Networks (ICNN), International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), IEEE International Symposium on Biomedical Imaging (ISBI).

For more recent recent publications/preprints you may refer to the *arXiv* repository: https://arxiv.org/corr/home