

Digital Image Processing

Instructor Dr. Yuan (xiaohui.yuan@unt.edu)
Office Hours NTDP F282, Tuesday 11:00 AM – 12:30 PM or by email appointment
TA/IA Yen Pham (YenPham@my.unt.edu)

Description

Digital image processing involves changing the nature of an image to improve its pictorial information for human interpretation or render it for autonomous machine perception. The subject is cross-disciplinary and has many applications, including medical diagnosis, surveillance, remote sensing, space exploration, and practical solutions of digital image/video perception, etc.

Outcomes

- Demonstrate understanding of the basic concepts of image acquisition, sampling, and quantization.
- Demonstrate understanding of the color spaces and color transformation.
- Demonstrate understanding of spatial and frequency filtering techniques.
- Demonstrate understanding of the fundamental image enhancement algorithms, such as histogram modification and edge detection.
- Develop writing and presentation skills to communicate digital image processing-related topics.

Textbook

Digital Image Processing, Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Prentice Hall, ISBN 9870131687288

Grading

Assignments 800 points
Project 400 points
Exams 300 points

1. Assignments

- All assignments must be completed individually.
- Discussions are allowed. However, duplicating or copying is prohibited, which is considered plagiarism, and the parties involved will receive zero points for the assignment or an F grade for the course. Each assignment is evaluated based on correctness, formatting, comments, evaluation, and documentation.
 - Correctness: The program that achieves the expected results will receive full marks. Otherwise, partial credits will be awarded.
 - Formatting and comments: Each program must be properly formatted with indentation and line spacing. Comments are required to explain the function of code blocks to make the program readable. In case of improper indentation, 5 points are deducted. If statements are poorly placed, 5 points are deducted. If no or few comments are included, 5 points are deducted.
 - Evaluation and documentation: Extensive experiments are required to evaluate the program. Multiple repetitions are necessary if non-deterministic results are expected, and results, as well as statistics, are expected. A brief report is expected to document the implementation details, evaluation results, problems the program may have, etc.
- Updated programming assignments that address the issues stated in the feedback are acceptable, and grades will be updated accordingly. In addition to the updated assignment, a clear statement of how each issue is addressed must be included as a separate file. The resubmission is not graded without this statement. The resubmission cannot be later than two weeks after the feedback is provided.

2. Project

- A project is assigned to each group of students. The project report will be evaluated based on technical details and experimental results.
 - Technical details: The report needs to clarify the details of the method.
 - Experimental results: The report needs to present the data used for the experiments, explain the parameters used in the evaluation, and discuss the implications of the results.

- The project presentation and source code are part of the project.
3. Exams: There are two exams.
 4. Bonus points are available for completion of the SPOT evaluation.
 5. Cheating
 - Cheating will **NOT** be tolerated. Students who are guilty of cheating will receive an F in the course.
 - Allowing others to copy your work is also considered cheating. For further details and clarification regarding collaboration and cheating, please visit the University Student Rights and Responsibilities webpage.
 - Using an LLM (e.g., ChatGPT and Copilot) for the assignments is not considered cheating as long as the submission is not a direct duplication of the LLM outputs. The instructor and TA decide on what constitutes a direct duplication.

Absenteeism Policy

- Attendance is not mandatory. However, students who miss two or more class meetings without the instructor's approval will not be considered for bonus points.
- Students who are absent from any class are responsible for any missing course materials, including but not limited to slides, notes, and assignments.
- No make-up exams will be accommodated except for extreme circumstances, e.g., a medical emergency. Written evidence is required no later than 5 days after the class.

Course Evaluation

At the end of the semester, you will be asked to participate in the SPOT evaluation. Ten bonus points will be granted to those who complete the survey with proof.

ADA

UNT complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA). If you have a disability and need reasonable accommodation for equal access to education or services, please contact the Office of Disability Accommodation.

Collaboration and Cheating

Discussion among students is allowed. But you **must not** share source code or any kind of implementation. All work you turn in must be completely done by yourself for the individual assignments, or by the group members for the team project/assignment.

Cheating will not be tolerated. Students who are guilty of cheating on a test or an assignment will receive a zero mark for the test or assignment or an F grade for the course. Allowing others to copy work is also considered cheating and is treated the same way. For further details and clarifications regarding collaboration and cheating, view the university Student Rights and Responsibilities web page.

Emergency Procedures and Notifications

Students will be notified by Eagle Alert if there is a campus closing that will impact a class, and describe that the calendar is subject to change, citing the Campus Closures Policy (<https://policy.unt.edu/policy/15-006>). UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials. If Canvas is not accessible during an emergency, contact me via email or phone for more information. Additional information about emergency preparedness may be found at www.emergency.unt.edu.

While working in laboratory sessions, students are required to follow proper safety procedures and guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions, and hot and cold products. Students should be aware that UNT is not liable for injuries

incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.