The University of Texas Rio Grande Valley

CSCI 4303 Computer Vision (Spring 2021)
M, W: 5:30 PM-7:30 PM Lecture, LHSB 1.402

Instructor Contact Information

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Course Website: https://mycourses.utrgv.edu

Course Description (Catalog Description)

This course covers the fundamental and advanced ideas of developing computerized procedures to extract numeric and symbolic information from images. Key ideas include image formation, acquisition, calibration, object recognition, video understanding, stereo imaging, optical flow and classification methods. System implementation and applications in communications, medicine, robotics and manufacturing are introduced.

Course Prerequisites

- Digital Image Processing
- Calculus and Statistics
- Solid Programming

Textbooks Recommended

- Computer Vision: Algorithms and Applications by Richard Szeliski. Draft PDF Version at: http://szeliski.org/Book/

Publisher: Springer. ISBN-13: 978-1848829343.

- Other material and papers from the web.

Software Required

We will use Python, OpenCV, TensorFlow, and other Pythonic libraries.

Technology:

- Devices
  Laptop or desktop with webcam (internal or external).
  Specifications: 16-GB RAM or higher, 512 GB SSD or 1 TB HDD, Quad-core processor with 2.5 GHz or higher; internet connectivity with wired (Ethernet) or wireless (Wi-Fi) connection with speed of at least 20 Mbps.
- Accessories
  Noise-cancelling headphones with mic
- Generic Software/programs
  Office 365 suite; Adobe Creative Cloud

Class Delivery:

Course Modality: Online Synchronous Courses (OSYNC)

Due to Covid-19, this class will be delivered as ***Online Synchronous Course***: The course will be delivered fully online. There will be a designated class meeting time for real-time instructor/student interaction, which will be conducted remotely via online platforms from the safety of your home. This real-time interaction will be supplemented by the digital presentation of course content. ***Lectures, quizzes and exams will be conducted during this time***, and will provide you with feedback on assigned work and communicate with you electronically regarding any upcoming events or deadlines. I will be available in real-time to answer your questions during office hours.

Covid-19 Resources:

Please visit the UTRGV COVID-19 Website via the following link for the most up-to-date information and resources (https://www.utrgv.edu/coronavirus/index.htm). This includes information on self-screening questions, links to forms for travel and contact, etc.

Face Covering Protocol:

As part of the university's ongoing COVID-19 mitigation efforts to maintain a healthy environment for all members of our campus community, anyone entering a campus building must wear a face covering that covers the mouth and nose. The covering must be worn in all hallways, public spaces, research labs, teaching/computer labs, libraries, classrooms, automobiles with a passenger, stairwells, elevators and common areas, as well as office spaces. In office spaces, when social distancing of 6 feet is possible and maintained, face coverings may be removed. Face coverings also are required in outdoor settings when safe social distancing and gathering practices are not possible.

Learning Outcomes:

Students who successfully complete this course should demonstrate the following learning outcomes:

1. Understand basics of Digital Image Processing including image acquisition, image storage and transmission.
2. Perform basic Image operations including point operations, image enhancements, image filtering in both time and frequency domains.
3. Explain various segmentation approaches, along with their characteristics, differences, strengths, and weaknesses.
4. Describe object recognition based on contour- and region-based shape representations.
5. Explain the advantages of two and more cameras, stereo vision.
6. Explain differential motion analysis methods.
7. Describe the differences in object tracking methods.
8. Implement computer vision algorithms or models in a high-level programming language.

Grading Policy

Bi-weekly Quizzes/Mini-exams proctored (each includes Programming)	30%
Homework/Individual Projects (in-class and outside class)	40%
Final Group Project (Teams of 2 Students)	25%
Attendance/Participation	05%

Alphanumeric Grading System

Your course grade will be calculated based on the total percentage points that you earn:

A: > 90% B: 80-89% C: 70-79% D: 60-79% F: 0-59%

Homework and Project assignments

Homework and Project assignments Homework/Projects are assigned periodically with a due date. Late homework is penalized at a rate of ***2% per hour*** for a maximum of 1 day; therefore, it is your responsibility to submit your work in a timely manner to avoid penalties. No Exceptions. Illnesses and emergencies should be documented with appropriate excuses.

Class Attendance

Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV's attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

Warning: when in class, you are allowed to do work related to the class. You will receive an ***F*** for the class if you are caught texting, using your cell phone, browsing the internet, or doing any work not related to the class. If you plan to come late or leave early, then **make sure** to let me know.

Fair Use of Computers

The Lecture lab is equipped with computers to enhance your learning experience by mixing the lecture with hands-on lab sessions whenever needed. After one warning, any person caught using the computers for any purpose other than the class, e.g. checking emails, surfing the web, doing other classes' work, will be punished by a penalty decided on by the instructor.

Cell Phones and other Electronic Gadgets:

Students must get into the habit of turning off cell phones once a class has begun and should not take or return calls during class time. Use of cellphone for any purpose or use of the laptops/desktop for anything not related to class will result in an **instant penalty of 5% of the total grade** for each incident.

Academic Dishonesty

Although students are encouraged strongly to work together to learn the course material, all students are expected to complete homework, labs, quizzes and exams ***individually***, unless permitted otherwise. Cheating, in all its forms, is not tolerated under any circumstances. Students collaborating on assignments without permission will receive a score of zero on the relevant assignment. Cheating during exams or quizzes will result in an "F" in the final course grade.

UTRGV Policy Statements

Students with Disabilities

If you have a documented disability (physical, psychological, learning, or other disability which affects your academic performance) and would like to receive academic accommodations, please inform your instructor and contact Student Accessibility Services to schedule an appointment to initiate services. It is recommended that you schedule an appointment with Student Accessibility Services before classes start. However, accommodations can be provided at any time. **Brownsville Campus**: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at accessibility@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at accessibility@utrgv.edu.

Mandatory Course Evaluation Period

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades.

Scholastic Integrity

As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism, and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

Sexual Harassment, Discrimination, and Violence

In accordance with UT System regulations, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and so must report any instance, occurring during a student's time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.

Course Drops

According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.