



Image Analysis and Recognition

Fall 2015 CSCI569

Instructor: Dr. Nikolay Metodiev Sirakov
Room: TBA; **Day and Time:** Thursday 7:20PM-10PM,
Meets: 8/31/2015 through 12/18/2015

Instructor:	Dr. Nikolay Metodiev Sirakov	Office: Bin 322
Office Hours:	T 09AM-11AM W 5:30PM-6:30PM F 9AM-11:30PM Additional by appointment	E-mail: Nikolay.Sirakov@tamuc.edu Office Phone: 903 886 5943

Text: Digital Image Processing, 3rd Edition, by Rafael C. Gonzalez, Richard E. Woods, Prentice Hall, 2008, 0-13-168728-x, 978-0-13-168728-8

A book which provides IA algorithms and Matlab code: Digital Image Processing Using Matlab, by Rafael C. Gonzalez, Richard E. Woods, S. L. Eddins, Prentice Hall, 2004, ISBN 0-13-008519-7

More information on URL: <http://faculty.tamuc.edu/nsirakov/Teaching/>

Objectives of the SLO:

- (1) Students will gain knowledge and skills and will be able to transform one color model to another;
- (2) Students will learn and will be able to utilize the basic multi-resolution methods: Haar Transform, Scaling Functions, Wavelet transforms;
- (3) Students will learn and will be able to utilize the basic Mathematical Morphology operations for image analysis;
- (4) Students will learn, understand and will be able to apply set of image segmentation methods including: Points, Lines, Edge detection, and Region-based method and Active Contour Models;
- (5) Students will learn and will be able to utilize object recognition methods based on correlations and matching;
- (6) Students will conduct independent project development, which will help them develop skills for: survey, theoretical work, coding, performing experiments, writing and presenting reports.

Requirements: *instructor's permission*

Knowledge which may be of help: Integral and Differential Calculus of two variables;

For their programming assignments the students may use any language including: C++, Java, C sharp, or Computer algebra programming systems as MatLab or mathematica.

List of Topics

1. Defining the area of Image Analysis and Recognition;
2. Color Image Processing. Color Models. Colors transformation within a single model. Transformation between models;
3. Multi resolution images and processing. Haar transformation. Multi resolution Expansion. Scaling and Wavelet functions. Discrete and continuous wavelet transformations.
4. Basics of Mathematical Morphology and its applications to image processing and analysis: erosion, dilation, opening, closing, hit and miss transformations;
5. Image segmentation fundamentals: Points, Lines, Edge detection, Thresholding and Region-based method, Active Contour Models;
6. Rotational and scaling invariant objects recognition using decision theoretic methods, image correlation, square and radial techniques.

Contemporary Active Contour models for objects and features extraction will be considered upon time permission.



NOTE: Some assignments may include Lab work, algorithms design and performing experiments with real images and existing software tools.

COURSE EVALUATION

Basis for Evaluation:

Mid Term Exam	- 24%
HW	- 20%
Lab, and in class problems	- 12 %
Project	- 24%
Final Exam (Project Presentation, and corrections)-	20%

Grading Policy:	A:	100%- 90%
	B:	89% - 80%
	C:	79% - 70%
	D:	69% - 60%
	F:	Less than 59 %

The professor reserves the rights to reward students for continuous hard work.

Additional Activities: Experiments; Home Practice Problems; Extra Credit Problems

Final Test : CSCI566/Math597 Date: Tuesday – December 15 Time: 6PM-9PM

COURSE POLICIES

In-class activity: *Problems to be solved during the class period.*

HW: *problems, which involve theoretical and practical skills above the average level. Some of the HW could be assigned as team works.*

Mid term comprehensive exam: *Is to be given around mid semester. It will take 2/3 of a class period.*

Makeup: *Except in the case of a formal institutional excuse, no individual makeup test will be permitted.*

Project (most likely group): *closed itself innovative problem, whose development includes: survey of the present state of the art; development of a theoretical model; numerical analysis of the implementation; algorithm design and coding; performing experiment and deriving conclusions.*

Students with Disabilities: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132
Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, StudentDisabilityServices@tamuc.edu

All students enrolled at the University shall follow the tents of common decency and acceptable behavior conducive to a positive learning environment (See Student's Guide Handbook, Polices and Procedures, Conduct).

The road that will lead you to find a good job is the road of coding, learning, developing and writing a very good project/report.

Commerce, Texas
August 15, 2015

Dr. Nikolay Metodiev Sirakov