



Image Analysis and Recognition

Fall 2013, Math597/CSCI569

Instructor: Dr. Nikolay Metodiev Sirakov
Room: WTFA131; **Day and Time:** Thursday 7:20PM-10PM,
Meets: 8/26/2013 through 12/13/2013

Instructor:	Dr. Nikolay Metodiev Sirakov	Office: Bin 322
Office Hours:	T 12PM-2PM W 4:30PM-5:30PM F 9AM-11PM 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: Digital Image Processing Using Matlab, by Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Prentice Hall, 2004, ISBN 0-13-008519-7

More information on URL: http://faculty.tamuc.edu/nsirakov/Teaching/Teaching_2013.html

Objectives of the SLO:

- (1) Students will gain knowledge 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 set of image segmentation methods including: Points, Lines, Edge detection, Thresholding and Region-based method. They will be able to implement the studied algorithms;
- (5) Students will learn and will be able to utilize object recognition methods based correlations;
- (6) Students will conduct independent project development, which encompasses: survey, theoretical work, coding, writing and presenting reports.

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

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 out of: C++, Java, C sharp, or Computer algebra programming systems as MatLab or mathematica.

List of Topics

1. Defining of 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 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. Objects rotational and scaling invariant objects recognition using decision theoretic methods, image correlation, square and radial techniques.



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	- 22%
Final Exam (Project Presentation, and corrections)-	22%

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 10 Time: 7:30PM-10PM

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 requesting accommodations for disabilities must go through the Academic Support Committee. For more information, please contact the Director of Disability Resources & Services, Halladay Student Services Bldg., Room 303D, 903 886 5835.

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 learning and developing/writing a very good project/report.

**Commerce, Texas
August 21, 2013**

Dr. Nikolay Metodiev Sirakov