江西理工大學 信息工程学院
JIANGXI UNIVERSITY OF SCIENCE AND TECHNOLOGY SCHOOL OF INFORMATION ENGINEERING


Digital Image Processing

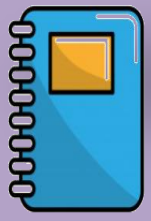
数字图像处理

Lecture 01:

Introduction to Digital Image Processing & Course Information

Dr Ata Jahangir Moshayedi

Prof Associate ,
School of information engineering Jiangxi university of science and technology, China



EMAIL: ajm@jxust.edu.cn

Spring _2021

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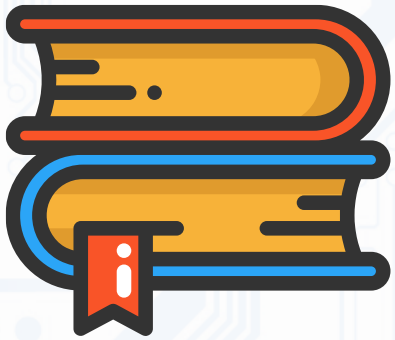
JIANGXI UNIVERSITY OF SCIENCE AND TECHNOLOGY SCHOOL OF INFORMATION ENGINEERING

Jiangxi University of Science and Technology



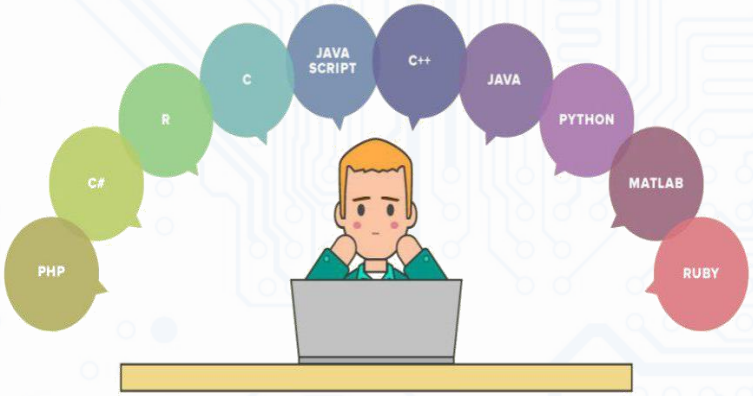
Digital Image Processing
数字图像处理

LECTURE 01: Introduction to Digital Image Processing
&
Course Information

你好

Nǐ hǎo

- Let us have a brief view to our course
- Don’t worry we will learn lots of thing this semester



Who Am I?

Dr. Ata Jahangir Moshayedi

Ph.D. Electronic , in the Field of Mobile olfaction system Pune University, India

Prof Associate :

- **S 203, School of information engineering Jiangxi university of science and technology, China**

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Personal:

drajm@yahoo.com

Researcher in the field of robotic and Automation

MSc. Instrumentation

BE. Power electronic

Web page

www.ajmoshayedi.ir

Course Meeting Times

Subject: Digital Image Processing

江西理工大学 ATAJAHANGIR MOSHAYEDI 教师课表

学年学期：2021-2022-1　教师：ATAJAHANGIR MOSHAYEDI　学院：信息工程学院　打印日期：2021-09-17

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
第一大节 08:30-10:05							
第二大节 10:25-12:00							
第三大节 14:00-15:35							
第四大节 15:55-17:30		数字图像处理 2-3,5-9周 主106[07-08]节 19计算机[3-4]班:12 考查32		数字图像处理 2-3,5-9周 主108[07-08]节 19计算机[3-4]班:12 考查32	数字图像处理1,10周 主106[07-08]节 19计算机[3-4]班:12 考查32	数字图像处理 5,9周, 11,13周 主106[07-08]节 19计算机[3-4]班:12 考查32	
第五大节 19:00-20:35							

备注：数字图像处理实验 19计算机[3-4]班 7-10周;

JOIN NOW

Ask whatever you want here

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- 如果您在此组中添加任何文本，可能会使您的朋友感到困惑。
- 如有任何疑问，请发送我的个人微信ID


DR ajm lectures

Valid until 10/26 and will update upon joining group

Our lecture on MOOC

All source about our course are available here

数字图像处理(DIP 2021)
ATAJAHANGIR MOSHAYEDI
江西理工大学
课程编号：Digital Image Processing

Invitation Code: **13748264**

Enter the code at upper-right corner of Home

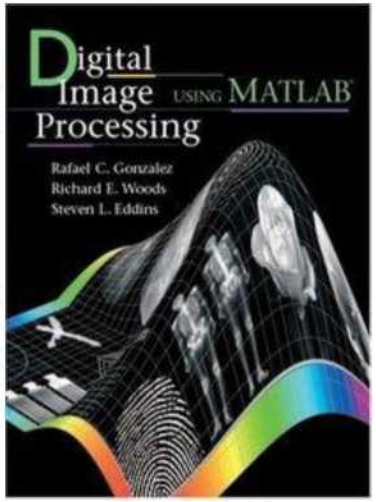
Reference book

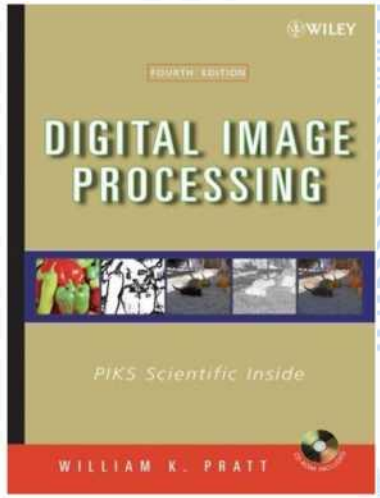
Textbook

Digital Image Processing, *Rafael* C *Gonzalez, Richard E. Woods*, 4th Edition, Prentice Hall, 2018.

Supplemental readings

Digital Image Processing Using Matlab, *Rafael* C *Gonzalez, Richard* E *Woods, Steven Eddins,* 1st Edition, Pearson, 2003.





I Will share this book on our WeChat group

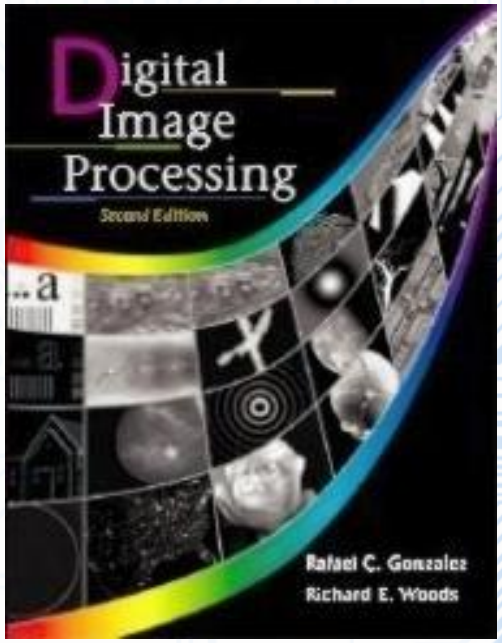
References

Text Book

"Digital Image Processing",

Rafael C. Gonzalez & Richard E. Woods, Addison-Wesley, 2002

- Much of the material that follows is taken from this book



Reference

"Fundamentals of Digital Image Processing"
by Anil K Jain

Reference book

数字图像处理
与应用
（MATLAB版）

Digital Image Processing and Applications (MATLAB Edition)

- Wang Huiqin
- Wang Yanni

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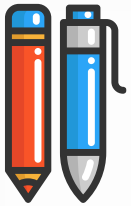


Digital Image Processing Course Information

•***Description***

•Digital image processing consists of the manipulation of images using digital computers. Its use has been increasing exponentially in the last decades. Its applications range from medicine to entertainment, passing by geological processing and remote sensing.

•An image can be regarded as a function ***f (x, y)*** of two continuous variables ***x*** and y To be processed digitally, it has to be **sampled** and transformed into a matrix of numbers. Since a computer represents the numbers using finite precision, these numbers have to be **quantized** to be represented digitally. Digital image processing consists of the manipulation of those finite precision numbers.

•The processing of digital images can be divided into several classes: **image enhancement, image restoration, image analysis,** and image compression.

•In image enhancement, an image is manipulated, mostly by heuristic techniques, so that a human viewer can extract useful information from it.

Digital Image Processing Course Information

•*Description*

•Image restoration techniques aim at processing corrupted images from which there is a statistical or mathematical description of the degradation so that it can be reverted. Image analysis techniques permit that an image be processed so that information can be automatically extracted from it.

Examples of image analysis are image segmentation, edge extraction, and texture and motion analysis.

•An important characteristic of images is the huge amount of information required to represent them. Even a gray-scale image of moderate resolution,say 512 x 512, needs 512 x 512 x 8 « 2 x 106 bits for its representation.

•Therefore, to be practical to store and transmit digital images, one needs to perform some sort of image compression, whereby the redundancy of the images is exploited for reducing the number of bits needed in their representation.

•In what follows, we provide a brief description of digital image processing techniques.

Digital Image Processing
Course Information

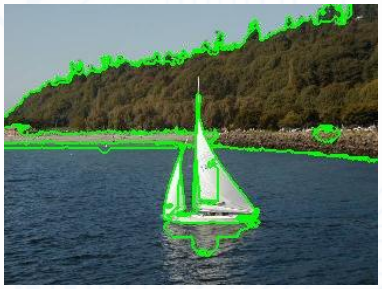
- ***Prerequisites*** advanced undergraduates and graduate students.
- We will be using matlab and Python to do programming assignments.
- No prior knowledge of matlab and Python is assumed.
- This is not a programming class,
- so This is a course for coding style is not critical.
- Familiarity with basic concepts in linear algebra (e.G., Matrices, solving systems of equations), multivariable calculus (e.G., Partial derivatives), probability, and statistics (e.G., Covariance, outliers) is essential in order to follow the material.

Image Processing vs. Computer Vision

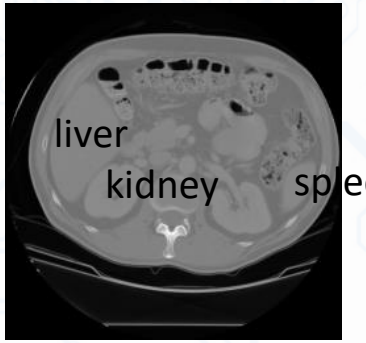
- Image Processing
  - Research area within electrical engineering/signal processing
  - Focus on syntax, low level features

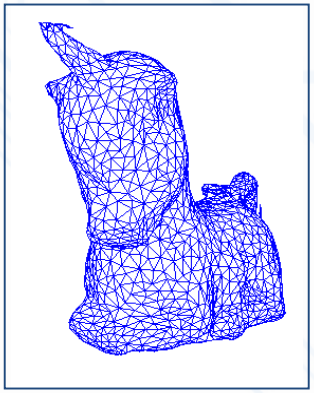
- Computer Vision
  - Research area within computer science/artificial intelligence
  - Focus on semantics, symbolic or geometric descriptions

Goals of Image and Video Analysis



- Segment an image into useful regions
- Perform measurements on certain areas
- Determine what object(s) are in the scene
- Calculate the precise location(s) of objects
- Visually inspect a manufactured object
- Construct a 3D model of the imaged object
- Find “interesting” events in a video





The Three Stages of Computer Vision

- low-level

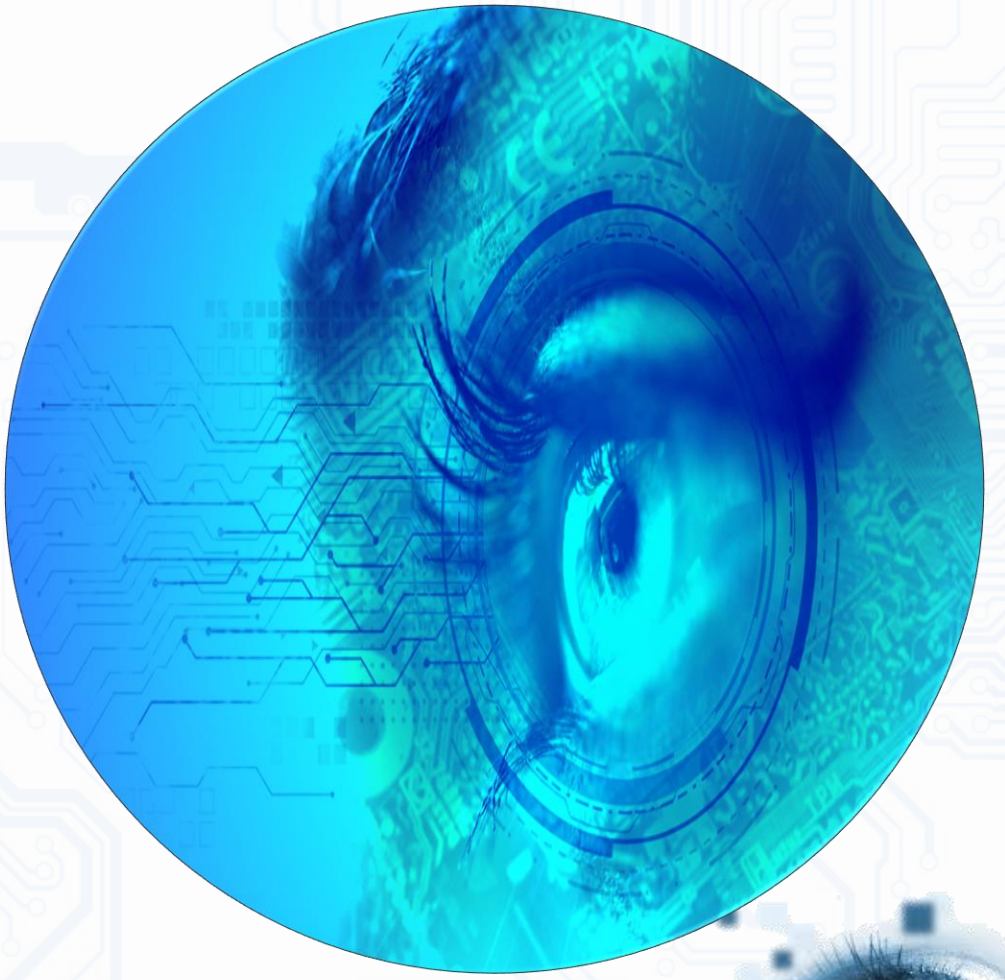
image → image

- mid-level

image → features

- high-level

features → analysis



Low-Level

sharpening

blurring

Low-Level

original image

Canny

edge image

Mid-Level

edge image

ORT

data structure

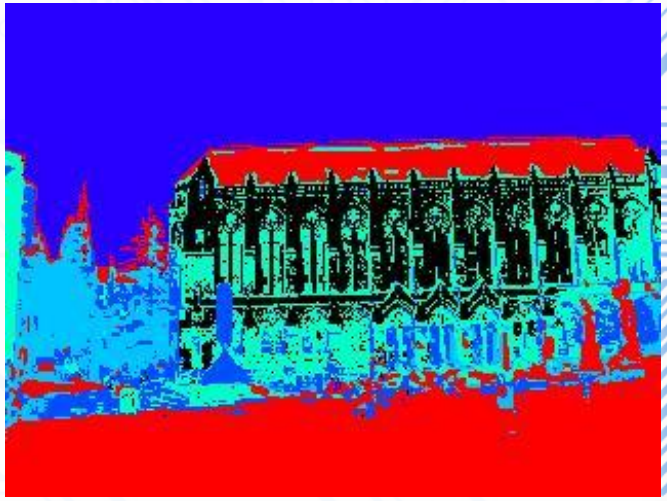
circular arcs and line segments

Mid-level

original color image

K-means clustering

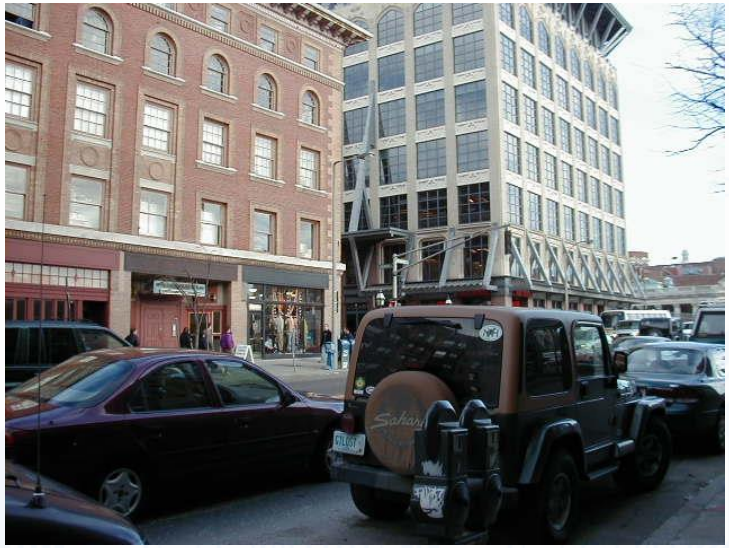
(followed by connected component analysis)



regions of homogeneous color

data structure

Low- to High-Level



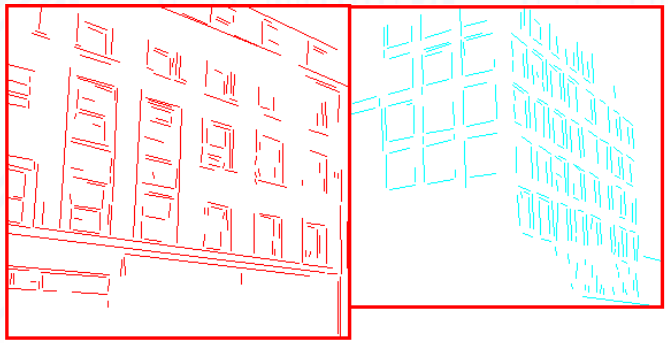
low-level

edge image

mid-level

consistent line clusters

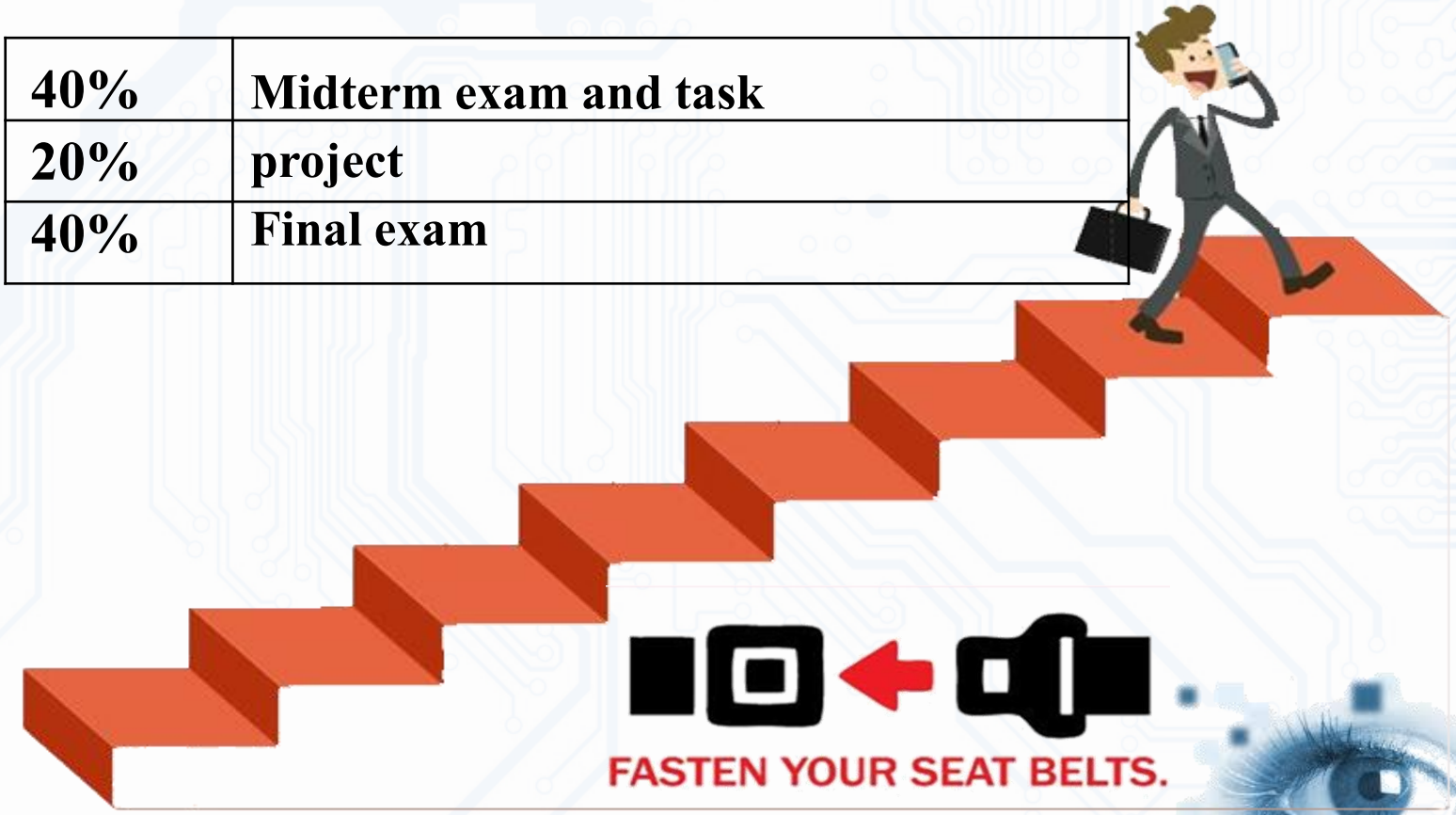
high-level

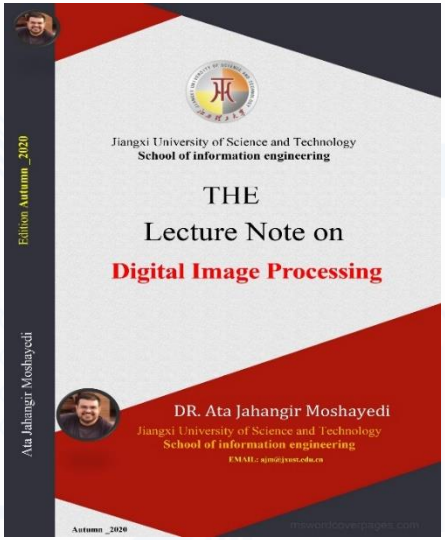


Digital Image Processing
Course Information

Grading

40%	Midterm exam and task
20%	project
40%	Final exam





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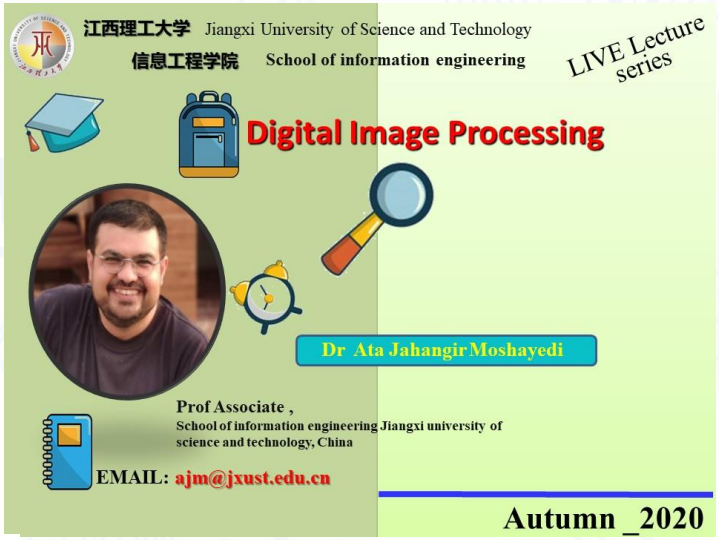

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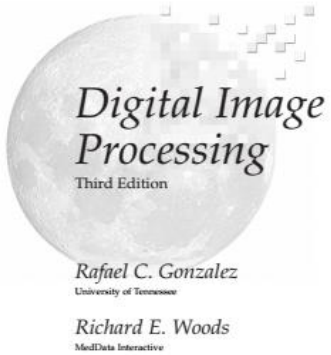

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PEARSON
Prentice Hall
Upper Saddle River, NJ 07458

- 积极参加我的讲座并完成任务
- 享受学习
- 任何时候您可以问和不认为英语问题，我们都会为您解决

- Be active in my lectures and do the task
- Enjoy learning
- Any time you can ask and don’t think for English language problem we will solve it

How to enjoy this Course

100

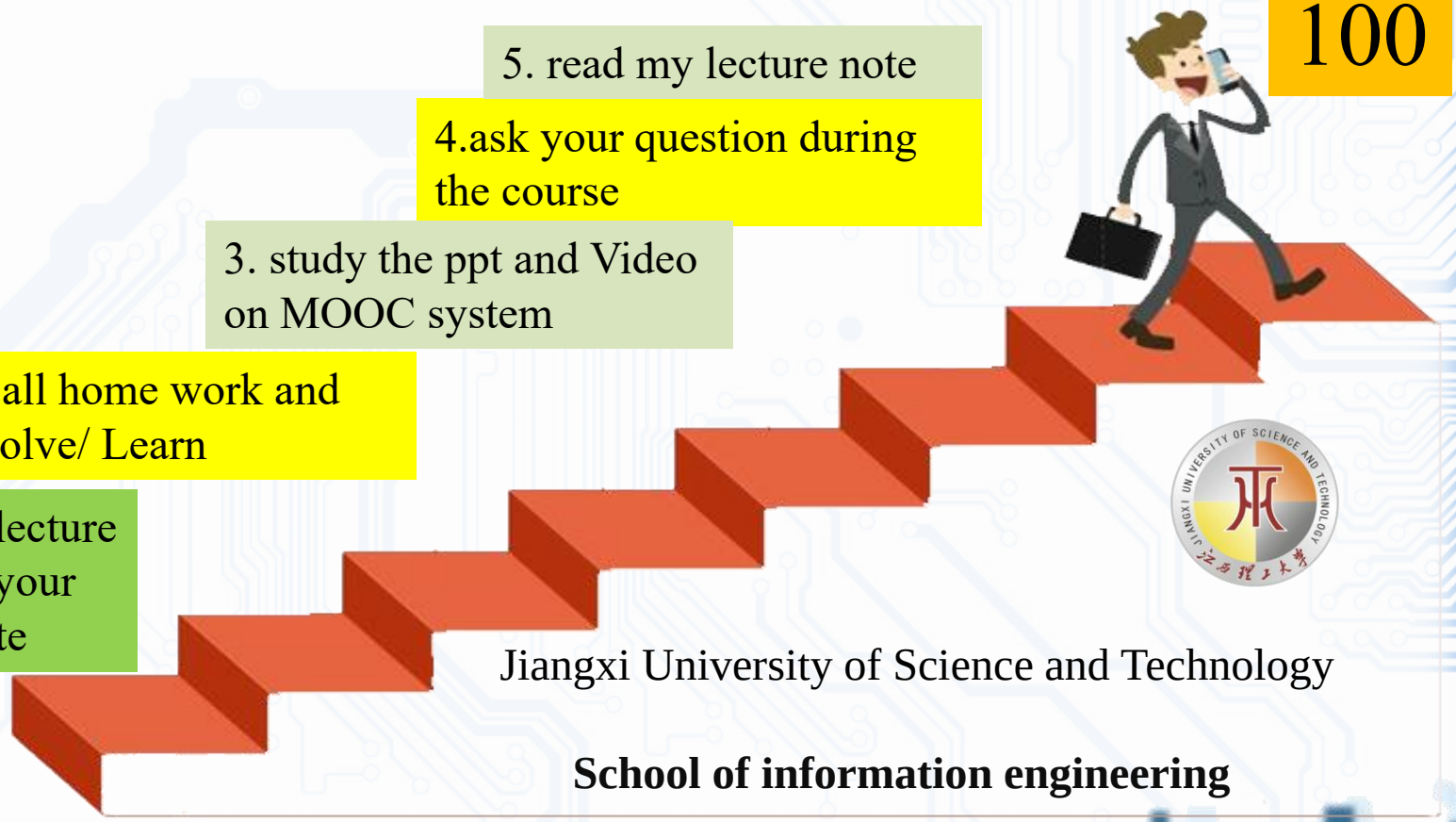
5. read my lecture note

4.ask your question during the course

3. study the ppt and Video on MOOC system

2.send all home work and try to solve/ Learn

1. attend all lecture and write your own note

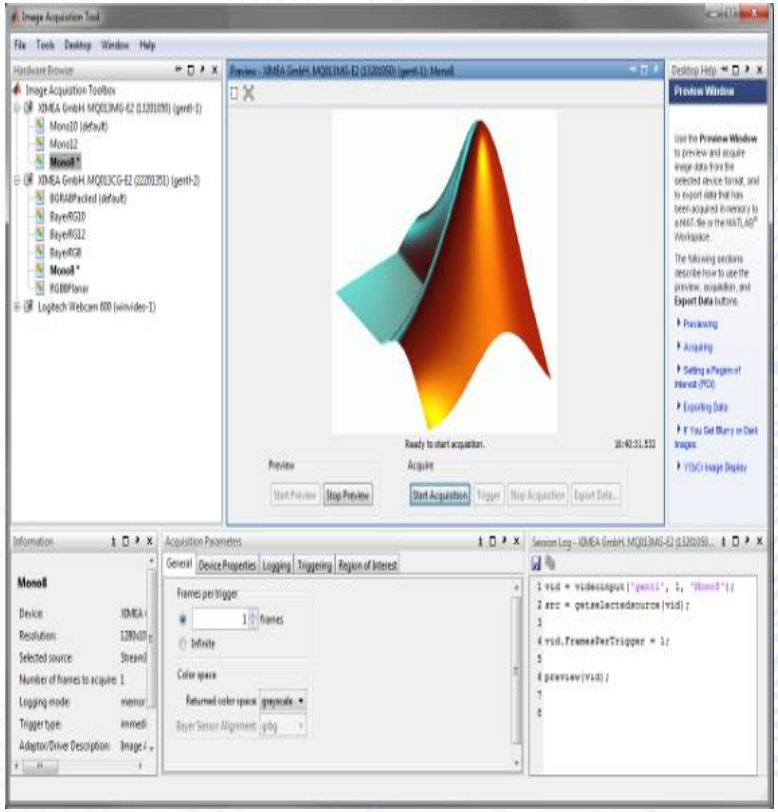


Jiangxi University of Science and Technology

School of information engineering

MathWorks MATLAB

- Math Works® is the leading developer and supplier of software for technical computing and Model-Based Design. The MATLAB® product family provides a flexible environment for solving complex imaging problems in a wide range of applications including scientific imaging, medicine and biotechnology, aerospace and defense, security, and machine vision.
  Image Acquisition Toolbox™ enables users to acquire images and video directly from cameras into MATLAB and Simulink. Image Processing Toolbox™ and Computer Vision System Toolbox™ products provide algorithms and tools for building image processing, video processing, and computer vision applications.

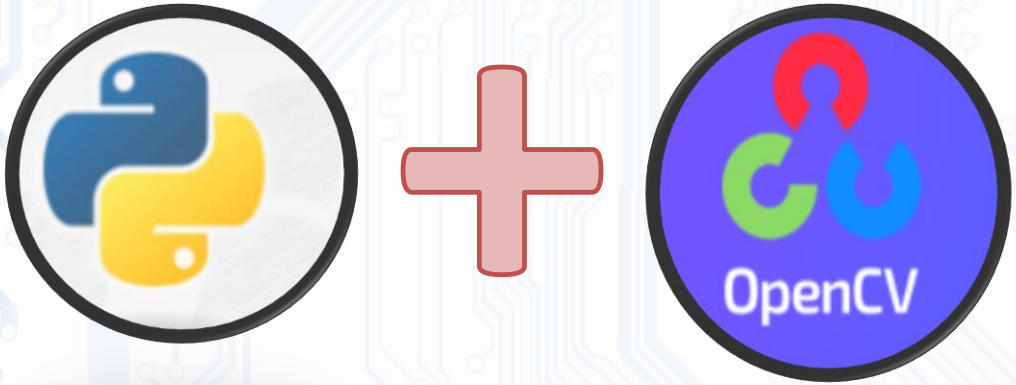


Some important topic

Sr.	Topics	Teaching Hours	Module Weightage
1	Digital image fundamentals: Light and Electromagnetic spectrum, Components of Image processing system, Image formation and digitization concepts, Neighbours of pixel adjacency connectivity, regions and boundaries, Distance measures, Applications.	7	20 %
2	Image Enhancements: Image Enhancements: In spatial domain: Basic gray level transformations, Histogram processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters. In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.	11	30 %
3	Image Restoration: Various noise models, image restoration using spatial domain filtering, image restoration using frequency domain filtering, Estimating the degradation function, Inverse filtering.	7	20 %
4	Colour Image processing: Colour fundamentals, Colour models, Colour transformation, Smoothing and Sharpening, Colour segmentation	4	10 %
5	Image compression: Introduction, Image compression model, Error-free compression, Lossy compression.	3	10 %
6	Image segmentation: Detection of discontinuities, Edge linking and boundary detection, thresholding	4	10 %

What's new this semster

- Python and Image processing



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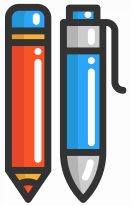
School of information engineering

Digital Image Processing

THANK YOU

"The beauty of research is that you never know where it's going to lead."

RICHARD ROBERTS
Nobel Prize in Physiology or Medicine 1993



"BE HUMBLE. BE HUNGRY. AND ALWAYS BE THE HARDEST WORKER IN THE ROOM."