2-DAY INTENSIVE AND PRACTICAL COURSE ON

DIGITAL IMAGE PROCESSING USING MATLAB

By Dr Alasdair McAndrew
School of Computer Science and Mathematics
Victoria University, Australia

Kuala Lumpur:
27 & 28 Sep 2010
The Melia Kuala Lumpur Hotel

Singapore:
30 Sep & 1 Oct 2010
Swissotel Merchant Court Hotel

Two major benefits from attending this course:

• Participants will have full understanding of the theory and practice of digital image processing and be able to apply digital image processing methods to a wide range of problems arising in industry, science and graphics.

• Participants who have no prior knowledge of MATLAB will acquire solid foundation on this software and use it not only for digital image processing but for any other future applications. Participants who already have some knowledge of MATLAB will learn how it can be used for digital image processing.

Features of the course
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• Theory and practice are treated as equally important. Each day will consist of alternating lectures and practical work using MATLAB.

• Even though digital image processing can require some advanced mathematics, in this course the mathematical requirements are minimal - a year's tertiary mathematics.

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No. 9 Jalan Syed Mohd Mufti
80000 Johor Bahru, Johor
Malaysia
OBJECTIVES

The course is designed at introducing basic digital image processing in a setting which emphasizes practice as much as theory. Thus, the theory will be presented in a manner from which the practice develops naturally.

Applications from a wide range of scientific, engineering and graphical settings will be used to provide examples in the course.

LEARNING OUTCOMES

At the conclusion of the course the participants should:

• have a good foundation for the understanding of digital image processing,
• be able to build on that foundation by using the course text, or other texts,
• apply image processing methods to a wide range of problems arising in industry, science and graphics.
• be able to use the MATLAB software not only for digital image processing applications, but for many other applications as well.

AIMS AND OUTLINE OF THE COURSE

This course provides a solid basic foundation in modern digital image processing theory and applications. The course will cover the following topics:

• Image files, formats and types: binary, greyscale, truecolour and indexed colour. Sampling and aliasing. Image display: quantization, resolution, dithering.
• Point and neighbourhood processing: image arithmetic, spatial filtering. Low and high pass filters.
• The Fourier transform and its applications. Ideal filtering, Gaussian, Butterworth and Wiener filtering.
• Image restoration: noise and its definition. Types of noise; means of removal.
• Mathematical morphology; basic set theoretic operations of translation, erosion and dilation. Higher order operations and applications to binary images. Extension to greyscale images.
• Use of Matlab: data types, loops and vectorization. Matrix and image handling, script and function writing.

TIME-TABLE

Day One.
9:00 - 10:30. Lecture 1.
  • Introduction to the course.
  • Definition of some common terms.
  • Digital images: their structure and format.
  • Different types of images and means of display. Spatial resolution and colour depth; dithering.
10:30 - 11:00. Tea/Coffee break.
11:00 - 12:30. Practical class 1.
  • Introduction to Matlab.
  • Image handing and display; image information. Loading and saving images.
  • Use of functions and scripts.
12:30 - 1:30. Lunch.
1:30 - 3:00. Lecture 2.
  • Point processing: image arithmetic, histograms and
  • histogram processing.
  • Spatial filtering: low and high pass filters; blurring, edge detection and edge sharpening.
  • (If time permits) Image geometry: rotation and scaling
3:00 - 3:30. Tea/Coffee break.
3:30 - 5:00. Practical class 2.
  • Image arithmetic in Matlab; uses for image enhancement.
  • Histogram display and histogram processing in Matlab.
  • Defining and applying spatial filters.

Day Two.
9:00 -10:30. Lecture 3.
  • The Fourier transform: continuous and discrete forms.
  • Definition and analysis; the convolution theorem. Properties and the information it provides.
  • The Fast Fourier Transform (FFT); uses for image processing: low and high pass filtering.
10:30 - 11:00. Tea/Coffee break.
11:00 - 12:30. Practical class 3.
  • The FFT in Matlab; uses for image filtering.
  • Homomorphic filtering.
12:30 - 1:30. Lunch

1:30 - 3:00. Lecture 4.
- Image restoration: different types of noise.
- Means of noise removal.
- Introduction to Mathematical morphology: binary set operations; extensions to greyscale images.
- (If time permits) Colour spaces, colour filtering and enhancement.

3:00 - 3:30. Tea/Coffee break.

3:30 - 5:00. Practical class 4.
- Noise in Matlab: its creation and appearance.
- Comparison of noise removal methods.
- Morphology: creation of structuring elements; applications and examples.

WHO WILL BENEFIT FROM THIS COURSE

Engineers, scientists, academics, web designers and graphic artists who wish to obtain a good foundation in modern imaging methods.

PREREQUISITE FOR THIS COURSE

At least one year's tertiary mathematics will be needed for this course.

COURSE LEADER

Dr Alasdair McAndrew

Dr McAndrew obtained his PhD from Monash University in 1996, with a thesis on the application of algebraic topology to problems arising from the analysis of multidimensional binary images. He is now a senior lecturer at Victoria University in Melbourne, Australia, where he has been responsible for the introduction of image processing as a major area of study and research.

The courses he has designed and implemented have been taught both locally and internationally. He has given seminars on his research and teaching in Australia, South-East Asia and the USA, and has also presented material at numerous conferences, as well as publishing articles.

He is interested also in educational matters relating to the teaching of image processing, and has published and spoken on this topic, as well as having the opportunity to chair conference sessions relating to this field of research.

He has convened and managed the Australian Pattern Recognition Society Student Conference, and has edited their proceedings. He is an active reviewer for several journals, particularly in the areas of mathematical image processing.
Register Now:
By phone: (65)-6877 9275
By fax: (65)-6767 2961
By email: tekbac@singnet.com.sg
By post: Woodlands Central Post Office
P O Box 152 Singapore 917309
ENQUIRY: Please contact Cynthia on the phone or the email address.

REGISTRATION FEES

<table>
<thead>
<tr>
<th>Course Fee</th>
<th>Singapore (S$) No GST</th>
<th>Kuala Lumpur (RM)</th>
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<tbody>
<tr>
<td>Individual</td>
<td>990.00</td>
<td>1,990.00</td>
</tr>
<tr>
<td>Group Fee*</td>
<td>890.00</td>
<td>1,890.00</td>
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</tbody>
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* Send three or more delegates from the same organization at the same time and each delegate is entitled to this group fee.

Registration fee includes lunch, refreshments, full training documentation. The fee does not include hotel accommodation.

Payment terms: Fee must be paid before the event.

Methods of Payment

Singapore event: Please make payment in Singapore dollars using crossed cheque in favour of TEKBAC Singapore Pte Ltd

Malaysia event: Please make payment in Malaysia Ringgit using crossed cheque in favour of TEKBAC (M) SdnBhd

CANCELLATION POLICY

All cancellations must be made in writing by fax, email or post. If you are unable to attend,

- A substitute delegate is welcomed at no additional charge.
- Your registration fee paid can be credited to a future event.
- You will receive a full refund less 10% administration charge if cancellation is received in writing more than 14 days before the event.

No cancellations will be accepted within 14 days of the date of event. Full documentation will, however, be sent to the delegate.

Time Schedule
The course starts at 9.00 am and ends at 5.00 pm daily. Please arrive at 8.30 am on day one to allow time for registration and collection of documentation. Lunch is from 12.30 pm to 1.45 pm. There will be two refreshment breaks at 10.30 am and 3.30 pm.

CERTIFICATE OF ATTENDANCE
This training programme is designed to meet your continuing professional development. A Certificate of Attendance indicating the no. of training hours will be awarded at the end of the programme. This serves as evidence of your commitment to your career.

REGISTRATION FORM
Course on Digital Image Processing with MATLAB
- 27 & 28 Sep 10 Kuala Lumpur
- 30 Sep & 1 Oct 10 Singapore

Contact Person:
Name: Dr/Mr/Mrs/Ms*
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Name: Dr/Mr/Mrs/Ms*
Job title:
Faculty/Dept:
Email:

Delegate 2:
Name: Dr/Mr/Mrs/Ms*
Job title:
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Faculty/Dept:
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* Please indicate accordingly

Please fax the completed registration form to (65) 6767 2961

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