COURSE OVERVIEW IT0009
AI Digital Image Processing

Course Title
AI Digital Image Processing

Course Date/Venue
Session 1: May 19-23, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: November 23-27, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
IT0009

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Objectives

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Artificial Intelligence Digital Image Processing. It covers the fundamentals of digital image processing, basics of images and pixels and image processing with OpenCV; the image enhancement techniques, morphological image processing and image segmentation basics; the features in image processing, edge detection and contour analysis, feature descriptors and keypoint detection; and the image classification using AI, deep learning for image processing and simple image classifier with TensorFlow/Keras.

Further, the course will also discuss the advanced image segmentation techniques, object detection using AI and convolutional neural networks (CNNs) in image processing; the image augmentation and data preprocessing and image denoising techniques; implementing image processing pipelines for AI applications; the advanced object recognition, image segmentation with deep learning and facial recognition and emotion detection; and the generative adversarial networks (GANs), super-resolution and image enhancement and deep learning for image-to-image translation.

During this interactive course, participants will learn the AI in medical image processing, AI in autonomous vehicles and surveillance, image processing in robotics and cloud-based AI image processing; the models for mobile and embedded devices and TensorFlow Lite and OpenCV for edge AI; deploying AI models as APIs using Flask/Django; and integrating AI image processing into mobile applications.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a good working knowledge on artificial intelligence digital image processing
- Discuss the fundamentals of digital image processing, basics of images and pixels and image processing with OpenCV
- Illustrate image enhancement techniques, morphological image processing and image segmentation basics
- Discuss the features in image processing and apply edge detection and contour analysis, feature descriptors and keypoint detection
- Carryout image classification using AI, deep learning for image processing and simple image classifier with TensorFlow/Keras
- Employ advanced image segmentation techniques, object detection using AI and convolutional neural networks (CNNs) in image processing
- Apply image augmentation and data preprocessing, image denoising techniques and implementing image processing pipelines for AI applications
- Carryout advanced object recognition, image segmentation with deep learning and facial recognition and emotion detection
- Explain generative adversarial networks (GANs), super-resolution and image enhancement and deep learning for image-to-image translation
- Describe AI in medical image processing, AI in autonomous vehicles and surveillance, image processing in robotics and cloud-based AI image processing
- Export models for mobile and embedded devices and discuss TensorFlow Lite and OpenCV for edge AI
- Deploy AI models as APIs using Flask/Django and Integrate AI image processing into mobile applications

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of artificial intelligence digital image processing for computer science, software engineers/developer, engineering students, data scientists, AI enthusiasts, image processing engineers/researchers, AI and machine learning practitioners, industry professionals and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Pan Glou, PhD, BSc, is a **Senior IT, Telecommunications, Control & Electronics Engineer** with over **29 years** of extensive experience in the areas of **Web Programming**, **Gamification Techniques**, Internal & External Auditing, **E-Commerce Strategies**, **Advanced Database Management Systems**, **Web Design**, **HCI**, **3D Animation**, **Multimedia Design**, **OS Architectures** and **Network Security, Information & Technology Architectures**, **Application Architecture**, **Portfolio Management**, **Application Security**, **Application Integration Technologies** & **Strategies**, **Solution Architecture Patterns**, **Web Applications** & Services, **Logical Applications**, **Interface**s & Services, Logical & Physical Components, **Mobile** & **Cloud Applications**, **Blended Learning Programs**. Further, he is also well-versed in SQL Server, ASP.NET Web Core Apps, Power BI, Web Services, IIS, MS Access Databases, MS Excel & Word, HTML5, CSS3, jQuery, Javascript and Syncfusion.

During his career life, Dr. Glou has gained his practical and field experience through his various significant positions and dedication as the **IT Director**, **Head IT**, **Senior Analyst, Analyst**, **Senior Data Analyst**, **Head** of **Development**, **Project Manager**, **Senior Developer**, **Database Administrator**, **Development Team Leader**, **Team Leader**, **Supervisor**, **Senior Developer**, **Technical Consultant**, **Database Administrator**, **Developer (Part time), Technical Supervisor**, **IT Manager**, **Instructor**, **Professor** and **Assistant Professor** for various companies and universities such as METAdrasi, KPI Metrics Solution, Athens Doctors Association, Athens Dentists Association, Chania Bank, Medical Office, INTERFINAN Single P.C., ODEON, Business or Sector Entertainment Industry, NERIT, Supermarket AB Vasilopoulos, VIVODI Telecommunications, CITIBANK, Eurobank Cards, OASP, Ministry of Environment and Public Works, VIKELAS J. & A., Colgate Palmolive Hellas S.A.A. and Tsaoussoglou.

Dr. Glou has a **PhD** in **Partial Query Evaluation** on **Very Large Databases** with **Error Probability** from the **National Technical University of Athens**, and a **Bachelor's degree** in **Mathematics** from the **University** of **Patras**, **Greece**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Fundamentals of Digital Image Processing*** *Definition & Importance of Digital Image Processing • Applications of Image Processing in AI • Difference Between Image Processing, Computer Vision & Deep Learning • Overview of Image Processing Tools (OpenCV, PIL, NumPy)*
0930 – 0945	*Break*
0945 – 1030	***Basics of Images & Pixels*** *Image Representation in Digital Format • Grayscale versus RGB Images • Image Resolution & Bit-Depth • Image Histograms & Their Significance*
1030 – 1130	***Image Processing with OpenCV*** *Installing OpenCV & PIL in Python • Reading, Displaying & Saving Images • Converting Color Images to Grayscale • Resizing & Cropping Images*
1130 – 1215	***Image Enhancement Techniques*** *Contrast Stretching & Histogram Equalization • Image Filtering (Smoothing & Sharpening) • Noise Reduction Techniques (Gaussian, Median & Bilateral Filters) • Edge Detection Using Sobel, Prewitt & Canny Operators*
1215 – 1230	*Break*

1230 – 1330	***Morphological Image Processing*** *Dilation & Erosion Operations • Opening & Closing Techniques for Noise Removal • Structuring Elements in Morphology • Practical Applications in AI & Computer Vision*
1330 – 1420	***Image Segmentation Basics*** *Concept of Thresholding in Segmentation • Global versus Adaptive Thresholding • Otsu's Method for Automatic Thresholding • Region-Based Segmentation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Understanding Features in Image Processing*** *Definition of Features in Images • Importance of Feature Extraction in AI • Types of Features: Edges, Corners, Textures • Feature Extraction versus Feature Engineering*
0830 – 0930	***Edge Detection & Contour Analysis*** *Basics of Edge Detection (Sobel, Canny, Laplacian) • Contour Detection & its Importance • Convex Hulls & Contour Approximation • Shape Detection Using Contours*
0930 – 0945	*Break*
0945 – 1100	***Feature Descriptors & Keypoint Detection*** *Harris Corner Detection • Scale-Invariant Feature Transform (SIFT) • Speeded-Up Robust Features (SURF) • Oriented FAST & Rotated BRIEF (ORB)*
1100 – 1215	***Image Classification Using AI*** *Introduction to Machine Learning for Images • Dataset Preparation for Classification Tasks • Using Traditional ML Models (SVM, Decision Trees) • Evaluating Classification Performance*
1215 – 1230	*Break*
1230 – 1330	***Deep Learning for Image Processing*** *Difference Between Traditional ML & Deep Learning • Basics of Convolutional Neural Networks (CNNs) • Understanding Convolutional Layers & Pooling • Overview of Deep Learning Frameworks (TensorFlow, PyTorch)*
1330 – 1420	***Implementing a Simple Image Classifier with TensorFlow/Keras*** *Loading Image Datasets in TensorFlow • Building a Basic CNN for Image Classification • Training, Testing & Evaluating the Model • Improving Accuracy Using Data Augmentation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Advanced Image Segmentation Techniques*** *Region-Based Segmentation versus Edge-Based Segmentation • Watershed Algorithm for Segmentation • GrabCut Algorithm for Foreground Extraction • Marker-Based Segmentation Using OpenCV*
0830 – 0930	***Object Detection Using AI*** *Basics of Object Detection versus Image Classification • Popular Object Detection Models (YOLO, SSD, Faster R-CNN) • Labeling & Preparing Datasets for Object Detection • Training A Custom YOLO Model for Detection Tasks*
0930 – 0945	*Break*
0945 – 1100	***Convolutional Neural Networks (CNNs) in Image Processing*** *Understanding CNN Architectures (AlexNet, VGG, Resnet) • Role of Convolutional & Pooling Layers • Implementing CNNs From Scratch in TensorFlow • Transfer Learning with Pre-Trained CNN Models*
1100 – 1215	***Image Augmentation & Data Preprocessing*** *Why Data Augmentation Is Important in AI Models • Implementing Augmentation Techniques (Rotation, Flipping, Cropping) • Image Normalization & Standardization • Improving Model Generalization with Augmentation*
1215 – 1230	*Break*
1230 – 1330	***Image Denoising Techniques*** *Understanding Noise in Digital Images • Noise Removal Using Gaussian & Median Filters • Non-Local Means Denoising Algorithm • Denoising Autoencoders in Deep Learning*
1330 – 1420	***Implementing Image Processing Pipelines for AI Applications*** *Building an End-to-End Image Processing Pipeline • Combining OpenCV with Deep Learning Models • Real-Time Image Processing Using OpenCV • Optimizing Image Processing Pipelines for Deployment*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Advanced Object Recognition*** *Difference Between Object Detection & Object Recognition • Understanding Feature Matching Techniques • Implementing Object Tracking in OpenCV • Object Recognition with Deep Learning*
0830 – 0930	***Image Segmentation with Deep Learning*** *Overview of Fully Convolutional Networks (FCN) • Understanding U-Net & Mask R-CNN • Implementing Image Segmentation Using TensorFlow • Applications of Segmentation in Healthcare & Autonomous Vehicles*
0930 – 0945	*Break*

0945 – 1100	***Facial Recognition & Emotion Detection*** *Basics of Facial Recognition Technology • Using Haar Cascades & DeepFace for Face Detection • Training a CNN for Face Recognition • Implementing Emotion Detection Using Deep Learning*
1100 – 1215	***Generative Adversarial Networks (GANs)*** *Understanding How GANs Work • Difference Between Generator & Discriminator • Implementing a Simple GAN for Image Synthesis • Applications of GANs (DeepFake, AI-Generated Artwork)*
1215 – 1230	*Break*
1230 – 1330	***Super-Resolution & Image Enhancement*** *What Is Super-Resolution in AI? • Implementing SRGAN for Super-Resolution • Upscaling Images Using Deep Learning Models • Applications in Medical Imaging & Satellite Imagery*
1330 – 1420	***Deep Learning for Image-to-Image Translation*** *Understanding CycleGAN & Pix2Pix Networks • Image Style Transfer Using Deep Learning • Implementing Sketch-To-Image Conversion • Applications in Creative AI & Digital Media*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***AI in Medical Image Processing*** *Role of AI in Medical Imaging • Detecting Diseases Using CNN Models • Implementing AI-Based Tumor Detection • Challenges & Ethical Concerns in AI Medical Applications*
0830 – 0930	***AI in Autonomous Vehicles & Surveillance*** *Role of AI in Self-Driving Cars • Object Tracking & Pedestrian Detection • AI-Based Surveillance Systems for Security • Challenges of AI in Real-Time Vision Systems*
0930 – 0945	*Break*
0945 – 1030	***Image Processing in Robotics*** *How Robots Use Computer Vision for Navigation • Implementing Image-Based SLAM (Simultaneous Localization & Mapping) • Object Grasping & Manipulation Using Vision • AI-Powered Quality Inspection in Manufacturing*
1030 – 1130	***Cloud-Based AI Image Processing*** *Overview of Cloud Services for AI Image Processing • Deploying AI Models on AWS, Google Cloud & Azure • Using TensorFlow Serving for Scalable AI Applications • Real-World Case Studies on Cloud-Based AI Image Processing*
1130 – 1230	***Deploying AI Image Processing Models in Production*** *Exporting Models for Mobile & Embedded Devices • TensorFlow Lite & OpenCV for Edge AI • Deploying AI Models as APIs Using Flask/Django • Integrating AI Image Processing into Mobile Applications*
1230 – 1245	*Break*

1245 – 1345	***Hands-on Capstone Project: Building an AI Image Processing System*** *Selecting a Real-World Problem • Implementing Preprocessing, Feature Extraction & Classification • Training & Optimizing the Model • Deploying & Presenting Project Results*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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