KOENIG SOLUTIONS · COURSE OUTLINE

Applied Computer Vision Using Deep Learning

Learn to apply deep learning techniques for image processing, feature detection, object detection, segmentation and image generation.

5 Days	10	30
40 HOURS	MODULES	TOPICS

COURSE OVERVIEW

This course covers computer vision fundamentals and the role of deep learning, followed by image processing techniques such as edge detection, thresholding and morphological operations. It then addresses feature detection and matching, object detection with YOLO and R-CNN, and image segmentation using U-Net and SegNet. Further modules explore deep learning foundations, convolutional neural networks, recurrent neural networks, generative adversarial networks and transfer learning for computer vision tasks.

WHO THIS COURSE IS FOR

- **Computer Vision Engineers**
- **Machine Learning Engineers**
- **Data Scientists**
- **AI Developers**
- **Software Engineers**
- **Research Engineers**

LEARNING OBJECTIVES

- Understand computer vision fundamentals and deep learning applications
- Apply image processing techniques for enhancing and manipulating images
- Master feature detection and matching for image analysis and recognition
- Implement state-of-the-art object detection algorithms for accurate and efficient detection
- Apply advanced deep learning techniques for various computer vision tasks

COURSE SYLLABUS

10 Modules, 30 Topics

01

Introduction to Computer Vision

TOPICS

- Definition and overview of computer vision
- Different types of computer vision problems, such as image classification, object detection, and image segmentation
- Introduction to deep learning and its application in solving computer vision problems

02

Image Processing

TOPICS

- Basic image processing techniques used in computer vision
- **Edge detection:** Identifying boundaries between objects in an image
- **Thresholding:** Converting grayscale images to binary images based on pixel intensity
- **Morphological operations:** Modifying the shape and structure of objects in an image

03

Feature Detection and Matching

TOPICS

- Finding distinctive features in images using techniques like SIFT (Scale-Invariant Feature Transform) and SURF (Speeded-Up Robust Features)
- Matching features across multiple images to establish correspondences

04

Object Detection

TOPICS

- Introduction to object detection in computer vision
- **YOLO (You Only Look Once) algorithm:** An efficient real-time object detection system
- **R-CNN (Region-based Convolutional Neural Networks):** A popular object detection framework

05

Image Segmentation

TOPICS

- Segmenting images into meaningful regions using techniques like U-Net and SegNet
- **U-Net:** A convolutional neural network architecture for image segmentation
- **SegNet:** A deep encoder-decoder architecture for pixel-wise segmentation

06

Deep Learning

TOPICS

- Definition and explanation of deep learning
- Overview of deep neural networks and their structure
- Training deep learning models using backpropagation and gradient descent

07

Convolutional Neural Networks (CNNs)

TOPICS

- How CNNs are specifically designed for image processing and computer vision tasks
- Convolutional layers, pooling layers, and fully connected layers in CNNs
- Popular CNN architectures like VGG, ResNet, and Inception

08

Recurrent Neural Networks (RNNs)

TOPICS

- Introduction to RNNs and their applications beyond natural language processing
- Utilizing RNNs for sequential data processing in computer vision, such as video classification and object tracking
- Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) as popular RNN variants

09

Generative Adversarial Networks (GANs)

TOPICS

- How GANs work for generating realistic images and creative content
- The generator and discriminator components in a GAN
- Training GANs using adversarial learning and loss functions

10

Transfer Learning

TOPICS

- Leveraging pre-trained models and transfer learning for computer vision tasks
- Fine-tuning pre-trained models on new datasets
- Improving the performance of deep learning models with limited data by utilizing knowledge from larger datasets

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

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