

Deep Learning Vision: CNNs, YOLO & Transformers

Pothole Detection and Traffic Data Collection

10 Days

80 HOURS

27

MODULES

121

TOPICS

COURSE OVERVIEW

Start your Image Processing and Transformer journey today

WHO THIS COURSE IS FOR

Computer Vision Engineers

Machine Learning Engineers

Data Scientists

Deep Learning Developers

AI Researchers

Software Developers

PREREQUISITES

- Basic understanding of Python programming and Machine Learning
- Familiarity with Computer Vision concepts is recommended

LEARNING OBJECTIVES

What You'll Learn :

- Learning Deep Learning Concepts and Tensor Flow
- Exploring Computer Vision, Image Processing,
- Explore different models, datasets, documents, and ecosystems
- Pothole Detection and Traffic Data Collection using YOLO
- Transformers, HuggingFace,

TRAINING APPROACH

“Hands-on Approach. The hands-on labs will provide practical experience with setting up.”

27 Modules, 121 Topics

01

Deep Learning Basics for Computer Vision

TOPICS

- Introduction to Deep Learning for Computer Vision
- Machine Learning Basics
- Understanding Classification Metrics
- Introduction to Deep Learning Topics
- Understanding a Neuron
- Understanding a Neural Network

02

Introduction to Tensor Flow 2.0

TOPICS

- Introduction To Tensor-Flow
- How to define Tensor
- Operations on Tensors
- Variable and Variable Type Tensors
- Introducing Google Colab
- Tensorflow basic syntax
- What is Tensor flow?
- Tensor Flow code-basics
- Graph Visualization
- Constants, Placeholders, and Variables
- Tensor flow and basic operations

03

Neural Networks

TOPICS

Introduction to Perceptron · History of Neural Networks

ACTIVATION FUNCTIONS

Sigmoid · Relu · Softmax · Leaky Relu · Tanh

04

Deep Learning Networks

TOPICS

What is a deep learning network? · Why Deep Learning Networks · How Deep Learning Works · Feature Extraction · Working of Deep Network · Training using Backpropagation

05

Artificial Neural Network (ANN)

TOPICS

- What is artificial neural network?
- Machine Learning Vs Artificial Neural Networks
- History of ANN
- Building Blocks
- Network Topology
- Evaluating the ANN

06

Convolutional Neural Network

TOPICS

What is Convolution? · Convolution on Color Images · CNN Architecture · CNN Code Preparation · CNN - MNIST

07

Working with Images and CNN Building Blocks

TOPICS

Introduction - Working with Images · Reshaping understanding · Sampling and Quantization · Working with images - Filtering

08

CNN Architectures and Transfer Learning

TOPICS

CNN Architecture and LeNet Case Study · GPU vs CPU · Transfer Learning Principles and Practice

09

Introduction to Computer Vision

TOPICS

Introduction to Computer Vision · Applications · Recent Research in Computer Vision · Introduction to Segmentation · Why transfer learning? · Basic Terminologies

10

Mathematics for Computer Vision

TOPICS

Linear Algebra · Calculus · Probability Theory · Aligning RGB channel

11

Introduction to OpenCV

TOPICS

Introduction to OpenCV · Image basics with Numpy · Open an Image with Matplotlib · Get familiar with RGB channels · Differences between Matplotlib and OpenCV

12

Image Features

TOPICS

Feature Detection · Feature descriptors · Model fitting

13

Lighting

TOPICS

Photometry · Lightness

14

Image Classification

TOPICS

Introduction to Image Classification · Image Classification with KNN

15

Image Processing

TOPICS

What is a digital image? · Manipulating Images · Manipulating Images One Pixel At a Time

16

Semantic Segmentation

TOPICS

Semantic Segmentation · The Segmentation process · U-Net Architecture

17

Image Segmentation

TOPICS

Image Segmentation Overview · Upsampling Methods · Encoder · Decoder

18

Object Tracking

TOPICS

Introduction to Object Tracking · Optical Flow · Optical Flow Coding · Overview of various Tracking API Methods

19

Object Detection

TOPICS

Object Detection and Sliding Windows · R-CNN · Fast R-CNN · Faster R-CNN

20

YOLO

TOPICS

Introduction to YOLO v3 · YOLO Weights Download · YOLO v3 with Python

21

Transformer

TOPICS

Introduction to transformers · Introduction to Hugging Face transformers · IMDB project Implementation · Why are Transformers unique? · A Developer's View of Transformers

22

Fine-Tuning

TOPICS

- Text classification (e.g. spam detection, sentiment analysis)
- Named entity recognition
- Text summarization
- Machine translation
- Question-answering
- Generating text
- Masked language modeling

23

Transformers In-Depth

TOPICS

- Named Entity Recognition (NER) and POS Tagging
- Seq2Seq and Neural Machine Translation
- Question-Answering

24

Understanding the Datasets

TOPICS

Introduction to Datasets · Data Exploration and Visualization

25

Pothole Detection

TOPICS

- Problem Definition
- Data Preprocessing for Pothole Detection
- Building a CNN for Pothole Detection
- Training and Evaluating the Pothole Detection Model
- Improving Model Performance

26

Traffic Data Collection

TOPICS

- Problem Definition
- Data Preprocessing for Traffic Data Collection
- Building a CNN for Traffic Data Collection
- Training and Evaluating the Traffic Data Collection Model
- Improving Model Performance

27

Deploying the Models

TOPICS

Introduction to Model Deployment · Deploying the Pothole Detection Model · Deploying the Traffic Data Collection Model

NOTES

- This course can be customized based on the audience's prior knowledge and specific areas of interest.
- Course Highlights: Course Duration - 10 days (80 Hours); Number of Modules - 27

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.

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Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

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