KOENIG
step forward

KOENIG SOLUTIONS · COURSE OUTLINE

# Advanced ML: NLP, Computer Vision & LLM RAG

Learn to prepare data, apply statistical analysis, and build NLP, computer vision and LLM RAG solutions.

| 10 Days | 8 | 38 | 7 |
|---|---|---|---|
| DURATION | MODULES | TOPICS | HANDS-ON ACTIVITIES |

## COURSE OVERVIEW

This course covers structured data analysis and data wrangling, including data preparation, validation, feature selection and feature engineering, followed by statistical analysis techniques such as hypothesis testing, confidence intervals and ANOVA. It then addresses univariate and multivariate analysis through descriptive statistics, correlation, covariance and regression, before moving into natural language processing tasks such as text classification, document clustering, sentiment analysis and few-shot learning. Computer vision using PyTorch is covered next, spanning object detection, object recognition, image segmentation and OCR modelling, followed by generative AI and large language models, including model architectures, prompt engineering, fine tuning, retrieval-augmented generation, text embedding and vector database setup. The course closes with the machine learning model lifecycle, covering retraining, performance tuning and deployment, and a classification problem project that applies these skills end to end.

## WHO THIS COURSE IS FOR

- **Data Scientists**
- **Machine Learning Engineers**
- **NLP Engineers**
- **Computer Vision Engineers**
- **AI Developers**

## LEARNING OBJECTIVES

- Apply data preparation, validation and feature engineering techniques
- Explain hypothesis testing methods including Z-tests and t-tests
- Interpret confidence intervals and ANOVA results
- Analyse univariate and multivariate data through correlation and regression
- Implement NLP tasks such as text classification and sentiment analysis
- Build computer vision models for object detection and segmentation
- Develop generative AI solutions using RAG and vector databases
- Deploy machine learning models and manage their lifecycle

COURSE SYLLABUS

# 8 Modules, 38 Topics

01

Hands-on Exercise

## Structured Data Analysis and Data Wrangling

**TOPICS**

Data Preparation · Data Validation · Feature Selection · Feature Engineering

02

Hands-on Exercise

## Statistical Analysis

**HYPOTHESIS TESTING**

Z-tests · t-tests · Chi-square tests

Confidence Intervals · ANOVA (Analysis of Variance)

03

Hands-on Exercise

## Univariate and Multivariate Analysis

**TOPICS**

Descriptive Statistics · Correlation and Covariance · Regression Analysis

04

Hands-on Exercise

## Natural Language Processing (NLP)

**TOPICS**

Text Classification · Document Clustering · Sentiment Analysis · One-Shot and Few-Shot Learning

05

Hands-on Exercise

## Computer Vision Using PyTorch

**TOPICS**

Object Detection · Object Recognition · Image Segmentation · Optical Character Recognition (OCR) Modeling

06

Hands-on Exercise

## Generative AI and Large Language Models (LLMs)

**TOPICS**

Model Architectures · Prompt Engineering · Fine Tuning · Retrieval-Augmented Generation (RAG) · Text Embedding · Vector Database Setup · Model Evaluation

07 Hands-on Exercise

### Machine Learning Model Lifecycle

**TOPICS**

Model Retraining · Performance Tuning · Model Deployment

08

### Classification Problem Project

**TOPICS**

Problem Statement · Data Preparation · Data Validation · Feature Selection · Feature Engineering · Model Building · Model Testing · Evaluation Criteria

HANDS-ON ACTIVITIES

## Practise What You Learn

| # | MODULE | ACTIVITY |
|---|---|---|
| 01 | **Structured Data Analysis and Data Wrangling** | Hands-on Exercises |
| 02 | **Statistical Analysis** | Hands-on Exercises |
| 03 | **Univariate and Multivariate Analysis** | Hands-on Exercises |
| 04 | **Natural Language Processing (NLP)** | Hands-on Exercises |
| 05 | **Computer Vision Using PyTorch** | Hands-on Exercises |
| 06 | **Generative AI and Large Language Models (LLMs)** | Hands-on Exercises |
| 07 | **Machine Learning Model Lifecycle** | Hands-on Exercises using Python and PyTorch |

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

## Learn the Way That Suits You

Classroom Training | Live Online Classes (ILO) | Fly-Me-A-Trainer (FMAT) | Flexi (Self-Paced) | 1-on-1 Training

### Ready to Get Started?

Talk to a learning advisor about schedules, group training and customised delivery.

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