

AI for Beginners: ML, CNNs & RNN Transformers

Learn to build and apply machine learning, CNN and RNN transformer models using Python, from data preprocessing to NLP.

15 Days

8 HOURS A DAY

30

MODULES

73

TOPICS

1

HANDS-ON ACTIVITIES

COURSE OVERVIEW

The course aims to provide a comprehensive foundation in Python programming, machine learning, and deep learning. It covers essential concepts, practical skills, and hands-on experience, enabling participants to proficiently analyze, model, and solve real-world data science problems.

WHO THIS COURSE IS FOR

Data Analysts

Python Developers

Machine Learning Engineers

Data Scientists

AI Enthusiasts

PREREQUISITES

- Basic knowledge of any Object-Oriented Programming (Python is recommended but any other language is good)

TOOLS AND REQUIREMENTS

- Courseware: Unofficial pdf/ppt
- Lab: Koenig DC (VM) for lab performance

LEARNING OBJECTIVES

- Explain core AI, machine learning and deep learning concepts
- Apply Python libraries such as NumPy, Pandas and Matplotlib
- Implement data cleaning, encoding and normalization techniques
- Build regression and classification models including SVM and Random Forests
- Apply feature selection and dimensionality reduction methods such as PCA
- Develop neural networks using TensorFlow and Keras
- Build convolutional neural networks for image classification and detection
- Develop recurrent neural networks and transformer models for NLP tasks

30 Modules, 73 Topics

DAY 1 Introduction to AI and Python Refresher

01

Session 1: Introduction to AI

TOPICS

- What is AI?
- History and evolution of AI
- AI applications in various fields
- Introduction to machine learning and deep learning

02

Session 2: Python Basics

TOPICS

Python installation and setup · Basic syntax and data types · **Control structures:** if statements, loops · Functions and modules

DAY 2 Python for Data Analysis & Pre-processing

03

Session 1: Python Libraries for Data Science

TOPICS

- Introduction to NumPy, Pandas, Matplotlib, Seaborn
- Basic operations with NumPy
- Data manipulation with Pandas

04

Session 2: Data Cleaning and EDA

TOPICS

- Data cleaning techniques
- Handling missing and categorical data
- Exploratory Data Analysis (EDA) with visualizations

05

Session 1: Data Preprocessing

TOPICS

Importance of data preprocessing · Handling missing values · Label encoding and one-hot encoding

06

Session 2: Data Transformation

TOPICS

- **Data normalization techniques:** Standard Scaler, MinMax Scaler
- **Splitting data:** Train, test, and validation sets

07

Session 1: Machine Learning Fundamentals

TOPICS

- Types of machine learning
- Lifecycle of a data science project
- Overview of supervised and unsupervised learning

08

Session 2: Supervised Learning - Regression

TOPICS

Simple Linear Regression · Multiple Linear Regression · **Evaluation metrics:** R-squared, RMSE

09

Session 1: Logistic Regression

TOPICS

Concept and intuition · Confusion matrix and performance metrics

10

Session 2: Advanced Classification Techniques

TOPICS

Support Vector Machine (SVM) · Decision Trees · Random Forests

11

Session 1: Feature Selection

TOPICS

Importance of feature selection · Univariate feature selection techniques · Recursive Feature Elimination (RFE)

12

Session 2: Dimensionality Reduction

TOPICS

Principal Component Analysis (PCA)

HANDS-ON

- Hands-on PCA implementation

13

Session 1: Clustering Techniques

TOPICS

Introduction to clustering · K-means clustering · Elbow method

14

Session 2: Natural Language Processing (NLP) Basics

TOPICS

- Introduction to NLP
- Tokenization, stop words, stemming, lemmatization

15

Session 1: Deep Learning Fundamentals

TOPICS

Need and applications of deep learning · Working of Artificial Neural Networks (ANN) · Introduction to TensorFlow and Keras

16

Session 2: Building Neural Networks

TOPICS

- **Keras model building:** Construct, compile, evaluate
- Activation functions
- Loss functions and optimization techniques

DAY 9

Neural Network Basics and Shallow Neural Networks

17

Session 1: Neural Network Basics

TOPICS

Machine learning problem setup · Neural network mindset · Vectorization for efficient computation

18

Session 2: Shallow Neural Networks

TOPICS

- Building a neural network with one hidden layer
- Forward propagation and backpropagation

DAY 10

Deep Neural Networks

19

Session 1: Deep Neural Networks

TOPICS

Building and training deep neural networks · Computation in deep learning

20

Session 2: Practical Aspects of Deep Learning

TOPICS

- Initialization methods
- Regularization techniques to prevent overfitting

21

Session 1: Optimization Algorithms

TOPICS

Advanced optimization techniques · Random minibatching and learning rate decay

22

Session 2: Hyperparameter Tuning

TOPICS

Batch normalization · Grid search and randomized search

23

Session 1: Foundations of CNNs

TOPICS

- Understanding pooling and convolutional layers
- Building deep CNNs for image classification

24

Session 2: Advanced CNN Techniques

TOPICS

Advanced tricks and methods in deep CNNs · Transfer learning with pretrained models

25

Session 1: Object Detection

TOPICS

Using CNNs for object detection tasks

26

Session 2: Face Recognition & Neural Style Transfer

TOPICS

- Applying CNNs for face recognition
- Implementing neural style transfer for art generation

27

Session 1: Recurrent Neural Networks

TOPICS

Introduction to RNNs · Variants of RNNs for sequential data modeling

28

Session 2: NLP with Deep Learning

TOPICS

NLP applications with deep learning models · Word embeddings for text analysis

29

Session 1: Sequence Models & Attention Mechanism

TOPICS

- Enhancing sequence models with attention mechanisms
- Speech recognition and audio data processing

30

Session 2: Transformer Networks

TOPICS

Understanding transformer networks · Applications of transformers in NLP

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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✉ info@koenig-solutions.com