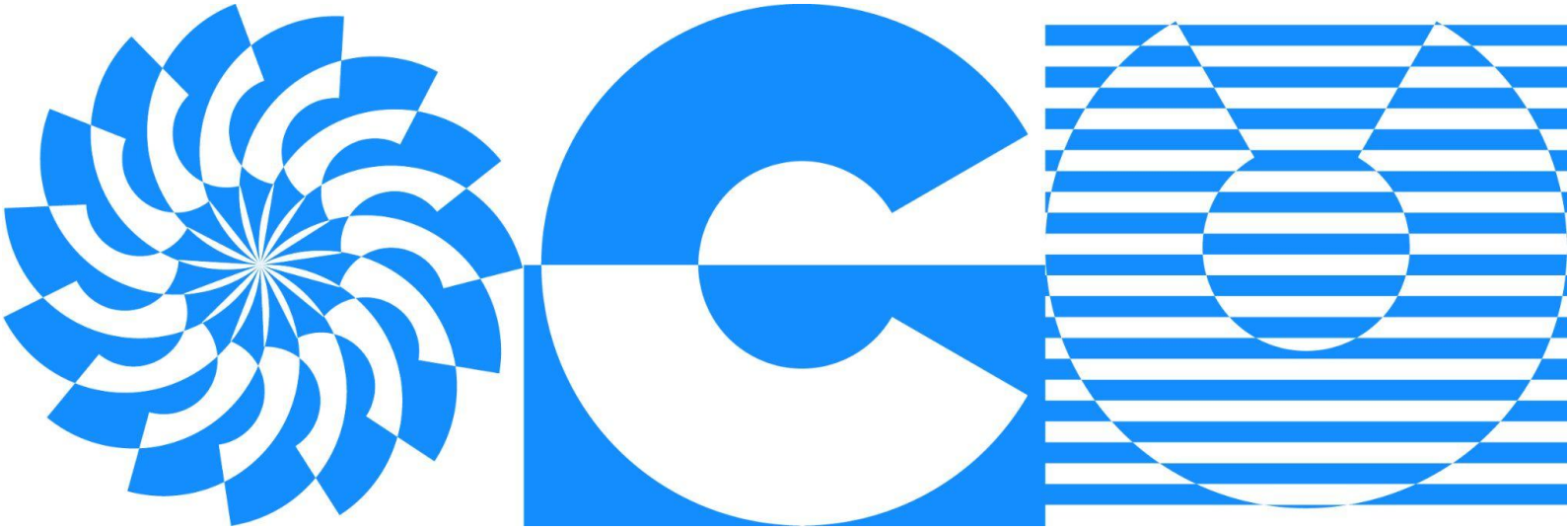
A place where legacy creates future.



DLTK

Deep Learning With TensorFlow & Keras

Detailed Curriculum

OpenCV University

Index

1 Getting Started

1.1 Introduction to Artificial Intelligence
1.2 AI in Computer Vision
1.3 AI terminology
1.4 NumPy refresher
1.5 Introduction to TensorFlow & Keras
1.6 What is inside an ML algorithm?
1.7 Gradient-based Optimization techniques in ML

Assignment 1	**Implement Leaky ReLu, Softmax & Convolution Using TensorFlow**
Assignment 2	**Implement Gradient Descent For Two Variables**

2 Neural Networks

2.1 Feature Vectors & Normalization
2.2 Basics of Neural Networks
2.3 Understanding Backpropagation in a Neural Network
2.4 Loss Functions for Recgression and Classification Tasks.
2.5 Mathematical foundation for Regression & Classification
2.6 Implementing a single neuron to model Linear Regression
2.7 Binary Classification using Perceptrons
2.8 Image Classification using Multilayer Perceptron
2.9 Model Complexit, Generalizaation and handling Overfitting
2.10 Understand and implement the building blocks like the different Activation Functions, Loss Functions, Hidden Layers

Assignment 3	**Implement A Multi-Layer Perceptron For Apparel Classification**

3 Convolutional Neural Networks

3.1 The Convolution operation
3.2 CNN building blocks and Layers
3.3 Evaluation metrics for Classification Performance
3.4 Important CNN architectures like VGGNet and ResNet
3.5 Leverage pre-trained models using Transfer Learning and Fine-tuning
3.6 Building custom models from scratch using your own data
3.7 Handling Overfitting through Data augmentations

Assignment 4	**Conversion from Sequential API to Functional API.**
Assignment 5	**Implement a CNN For Image Classification On CIFAR10/100 Dataset**

Project 1	**Implement An Image Classifier From Scratch**

4 Best Practices In Deep Learning

4.1 Advanced Optimizers in Keras
4.2 Training Deep Neural Networks
4.3 Handling Data in TensorFlow using TF Data, Sequence Class, and TF Records
4.4 Learning Rate Schedulers
4.5 Model Interpretability using GradCAM

Assignment 6	**Implement AdamW Optimizer**

Project 2	**Kaggle Competition For Sports Item Classification**

5 Semantic Segmentation

5.1 Problem formulation, custom layers and Loss Functions associated with Segmentation, like **Dilated & Transposed Convolution, Dice Loss, Pixel Accuracy,** etc.
5.2 Semantic Segmentation Datasets and Architectures
5.3 Evaluation metrics for Semantic Segmentation
5.4 Custom DataLoader for Segementation Datasets
5.5 Fully Convolutional Networks (**FCNs**) and **UNet** training for Binary Segmentation on **Road Data**
5.6 UNet and **DeepLab** v3+ Training on Multi-class segmentation on **CamVid** Data.
5.7 Improving **DeepLab** v3+ on Segmentation of **Underwater Imagery (SUIM)**

Assignment 7	**Implementation of PSPNet**

Project 3	**Kaggle Competition On Semantic Segmentation Of FloodNet Dataset**

6 Object Detection

6.1 Evolution from traditional Object Detection algorithms to state-of-the-art

Deep Learning-based methods

6.2 Exploring Object detection Datasets.

6.3 Revisiting Image Classification, and comparing it with Object Detection.

6.4 Two-Stage & Single Stage Object Detectors

6.5 Problem formulation, custom layers and Loss Functions used in Object Detection like Anchors, NMS, IoU, etc.

6.6 Learn about Object Detection models like RCNN, SSD, RetinaNet, YOLO, EfficientDet

6.7 Evaluation metrics for Object Detection: Precision, Recall, Average Precison(AP) and mean average Precison (mAP)

6.8 Using the TensorFlow Object Detection (TFOD) API

6.9 Fine-tuning of Object Detection Models available on TFOD API on a subset of Pascal VOC data.

6.10 Building a Custom SSD Model with FPN and training it on PenFudanPed Dataset

Assignment 8	**Encoding And Decoding Of Ground Truths For Anchor Box Implementation**

Project 4	**Build A Custom Object Detection Model For Detecting Safety Kits In Construction Sites**

7 Pose Estimation using MediaPipe

7.1 Real-time Posture analysis using MediaPipe Pose

7.2 Drowsy Driver Detection using MediaPipe

8 Generative Adversarial Networks (GANS)

8.1 Introduction to GANs

8.2 Vanilla GAN using Fashion MNIST

8.3 DCGAN using Flickr Faces

8.4 CGAN using Fashion MNIST

Explore Other Courses