IDM TECHPARK

GUIDE`S FOR PERFECT CAREER PATHWAY

Deep Learning Course Syllabus

Deep Learni.ng™

N·S·D·C National Skill Development Corporation

CERTIFIED ISO 9001:2015 COMPANY

IDMTECHPARK
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About Us

IDMTECHPARK global retail & corporate training solutions provider in Coimbatore, Erode, Trichy & Salem that offers a comprehensive range of training and placement services for both fresher's and professionals seeking new opportunities. The company commenced its IT training business in 2016. A pioneer in IT education, over the years, we have trained over 50k students. Idmtechpark has a wide range of courses, maintains education standards & provides placement assistance.

About IDMTechpark Education Quality

IDMTECHPARK is managed and developed by industry specialists with more than 8 years of expertise in the field. IDMTECHPARK offers a staff of highly skilled professional trainers who deliver effective IT training in a friendly setting, concentrating on the needs of each individual to help them succeed in a demanding work world. In the book of career and success, our staff never leaves a page unturned.

IDMTECHPARK's versatile instructor-led training class rooms and lower-class sizes enable people to engage more easily and absorb knowledge, resulting in remarkable results for both themselves and the organizations for which they work. Our training programmes are adaptable and customizable to ensure that each participant gets the most out of their time with us. IDMTECHPARK focuses in providing hands-on IT training in over 30 different courses.

- We teach in-demand courses
- We provide impactful learning material
- Our teachers are well-selected & trained
- We follow world-class teaching methods
- Our courses include E-Projects
- We conduct technical workshops
- Exams are held and based on Exams providing Certification
- Certificates are recognized the world over
- Our course timings are flexible

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Our Recent Placement

Idmtechpark assists students in getting job placements on successful completion of their courses. Idmtechpark also provides recruitment assistance to organizations. Idmtechpark students are shortlisted based on the organization's requirement. To make students job-ready, Idmtechpark conducts workshops e.g. How to do Group Discussions, how to behave in a Personal Interview. From time to time, job fairs & campus recruitments are conducted. Workplace skills such as time management, making effective presentations and communication skills are also provided. All this helps students find appropriate jobs in the IT industry while also helping save companies recruitment costs.

Krishnaveni M

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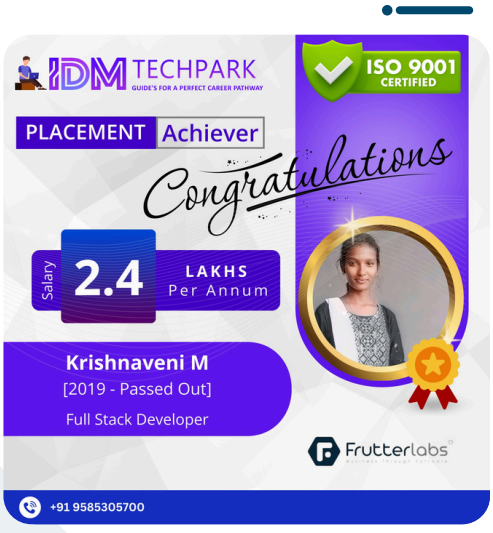

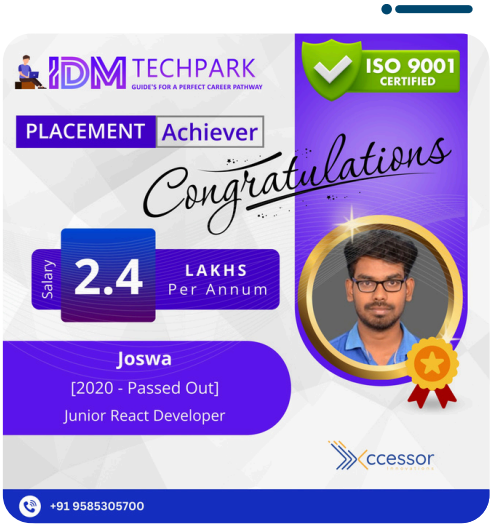

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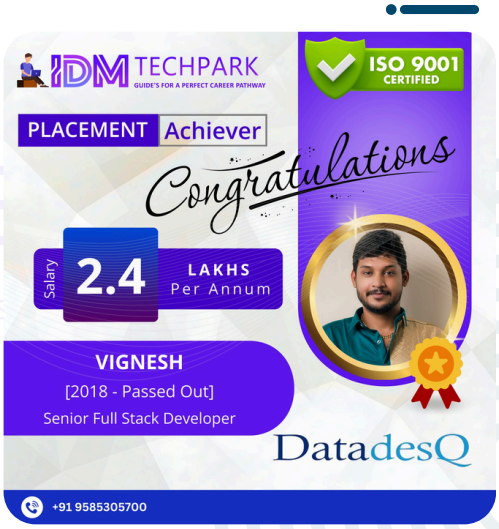

Vignesh

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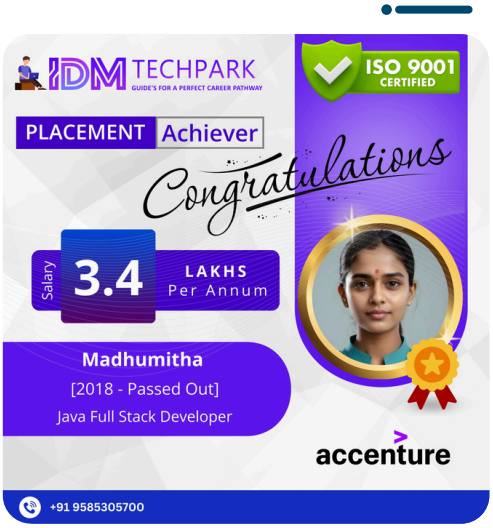

Madhumitha

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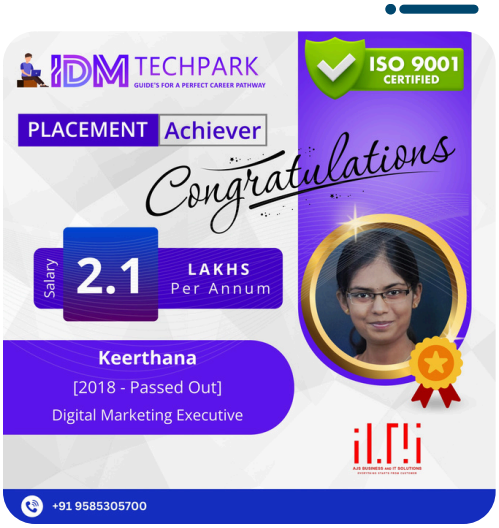

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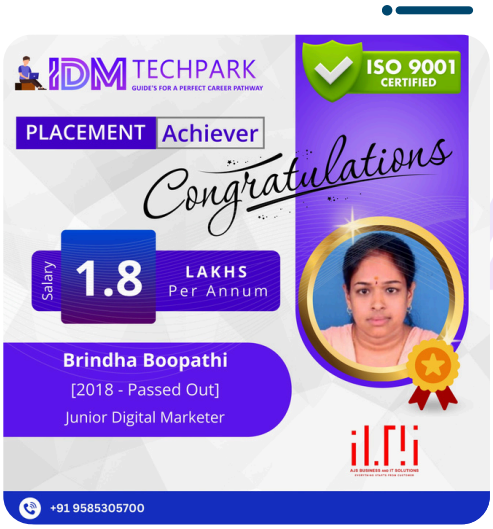

Kavin Kumar

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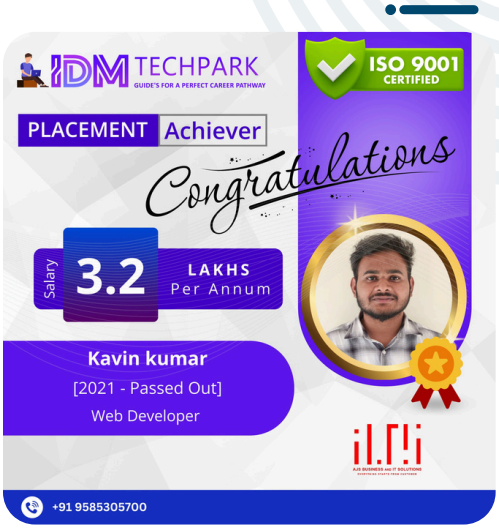

Ajithkumar

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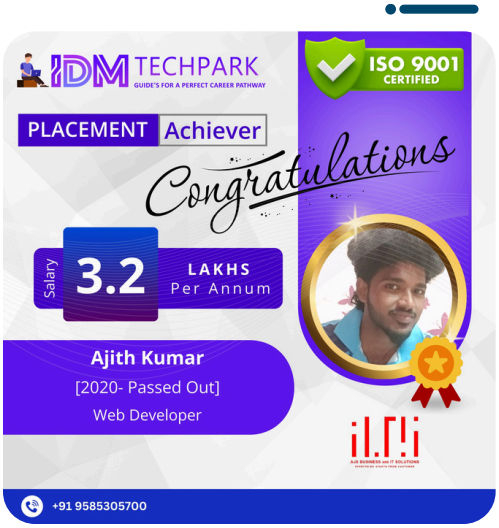

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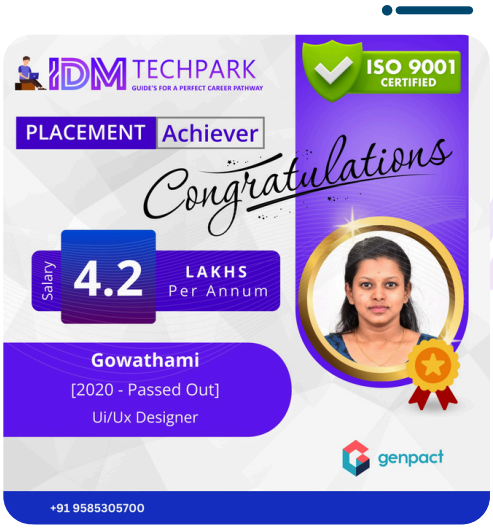

Surya

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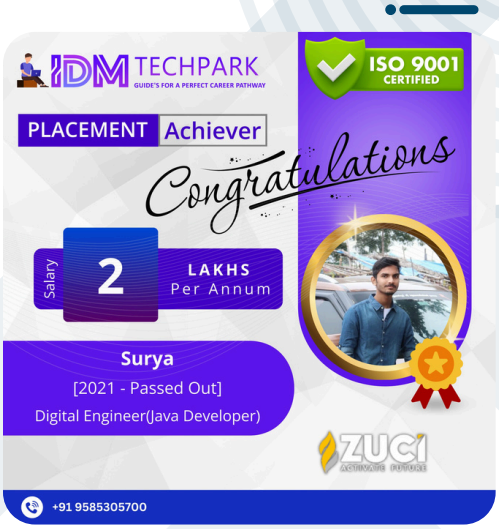

Pavithra

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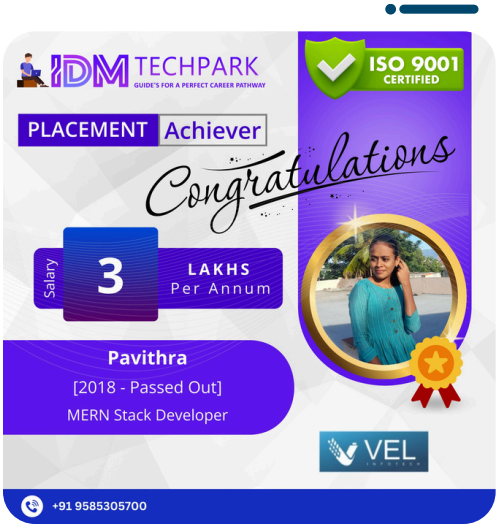
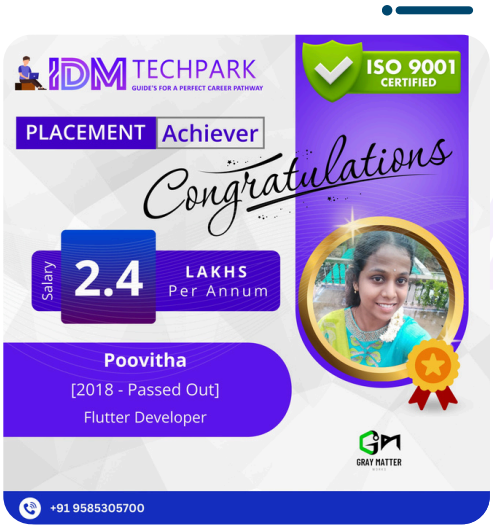


Poovitha

Gray Matter



Ramesh

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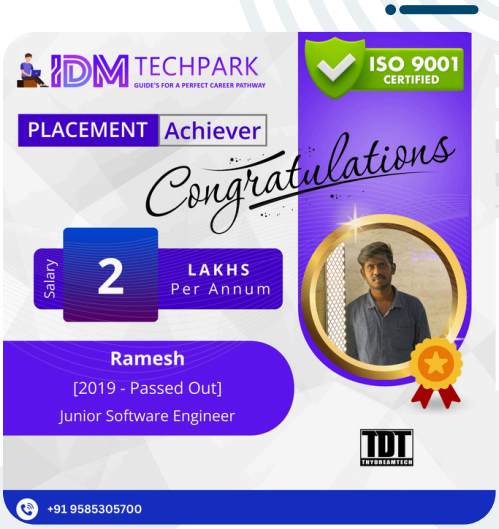

Siva Sankar

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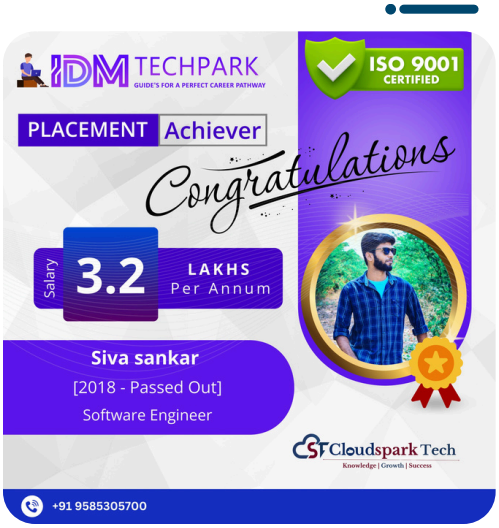

Nabeel Hisham

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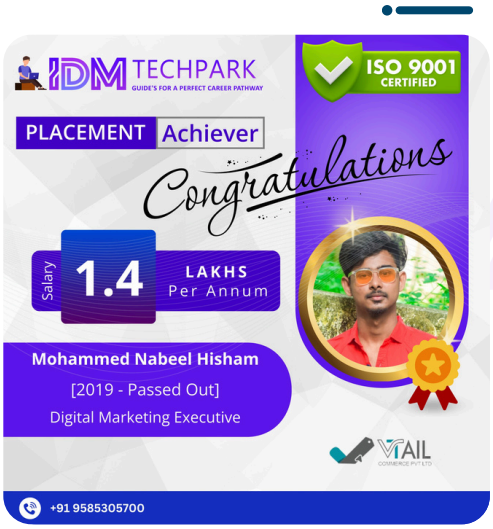

Kalayarasan

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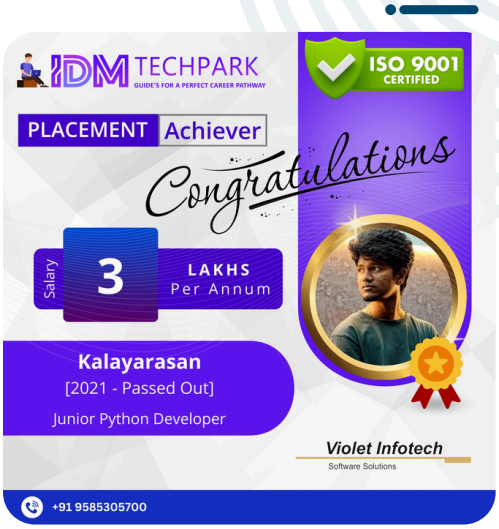

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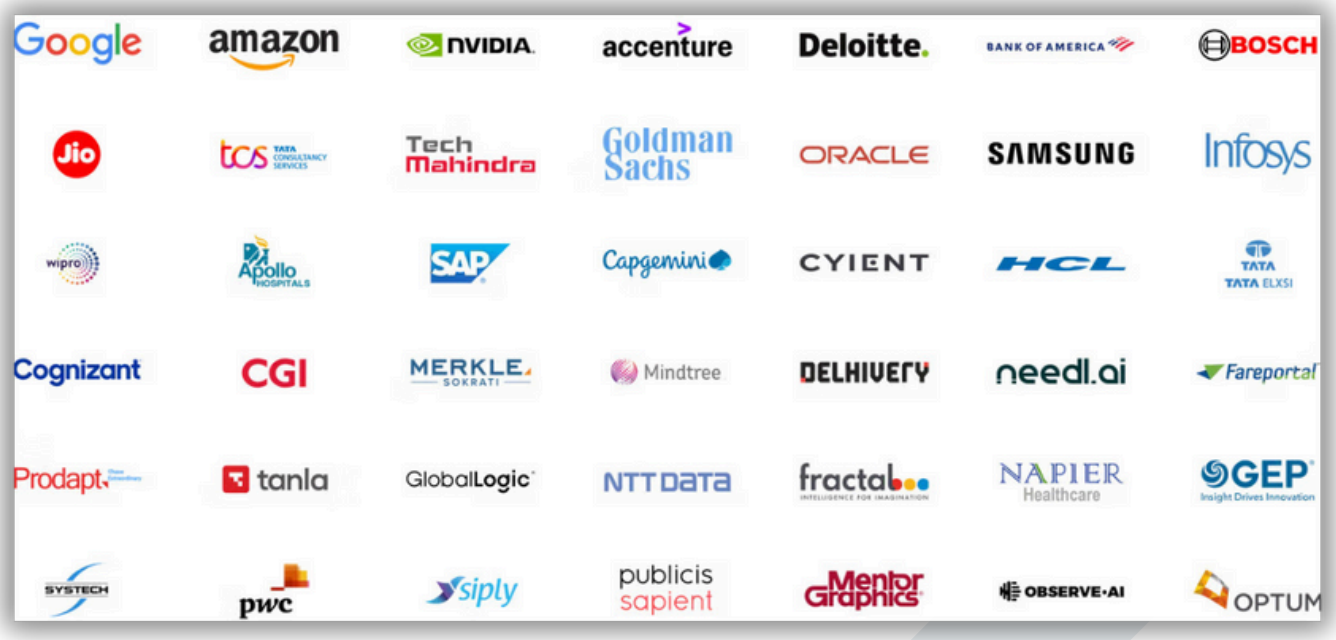

MODULE 1

Introduction to Deep Learning

- Overview of Artificial Intelligence, Machine Learning, and Deep Learning
- Key differences between traditional ML and deep learning
- History and evolution of deep learning
- Applications of deep learning (e.g., computer vision, NLP, autonomous systems)
- Setting up the environment: TensorFlow, Keras, PyTorch

MODULE 2

Neural Networks Basics

- Introduction to Artificial Neural Networks (ANNs)
- Anatomy of a neural network: Neurons, layers, weights, and biases
- Activation functions: Sigmoid, ReLU, Tanh, Softmax
- Forward propagation and backpropagation algorithms
- Gradient descent optimization and the learning process
- Training a simple neural network

MODULE 3

Deep Learning Frameworks

- Overview of popular deep learning libraries: TensorFlow, Keras, and PyTorch
- Installing and setting up TensorFlow/Keras and PyTorch
- Basic operations and tensor manipulation
- Building a simple neural network using TensorFlow/Keras and PyTorch
- Introduction to model training and evaluation

MODULE 4

Gradient Descent and Optimization Techniques

- Understanding gradient descent and its variants
- Stochastic Gradient Descent (SGD), Mini-batch Gradient Descent
- Learning rate and its impact on convergence
- Momentum, Nesterov Accelerated Gradient (NAG)
- Adam, RMSprop, and other advanced optimization algorithms
- Weight initialization techniques (Xavier, He initialization)

MODULE 5

Overfitting and Regularization

- The issue of overfitting in deep learning models
- Techniques to prevent overfitting: Cross-validation, train-test split
- Regularization methods: L1, L2, and Elastic Net
- Dropout technique for regularization
- Batch normalization and its impact on training
- Early stopping and model selection

MODULE 6

Convolutional Neural Networks (CNNs) - Introduction

- Introduction to CNNs and their importance in computer vision
- Understanding convolutions and kernels
- Pooling layers: Max pooling and average pooling
- CNN architecture: Input layer, convolutional layers, pooling layers, fully connected layers
- Basic CNN models for image classification

MODULE 7

Advanced CNN Architectures

- Understanding deep CNN architectures: LeNet, AlexNet, VGG, and ResNet
- Key concepts: Residual connections, skip connections
- Transfer learning with pre-trained models (e.g., VGG16, ResNet)
- Fine-tuning CNN models for custom tasks
- Data augmentation techniques for improving generalization

MODULE 8

Object Detection with CNNs

- Introduction to object detection and key challenges
- YOLO (You Only Look Once) and SSD (Single Shot Detector)
- Training object detection models using pre-trained CNNs
- Intersection over Union (IoU) and evaluation metrics
- Hands-on with object detection using CNNs

MODULE 9

Recurrent Neural Networks (RNNs)

- Introduction to RNNs and their application in sequential data
- Understanding sequence modeling: Time series, text, speech
- Training RNNs with backpropagation through time (BPTT)
- Limitations of vanilla RNNs and the vanishing gradient problem
- Hands-on with simple RNNs using Keras and PyTorch

MODULE 10

Long Short-Term Memory (LSTM) Networks

- Introduction to LSTMs and the problems they solve
- Anatomy of an LSTM unit: Forget, input, and output gates
- Training LSTMs for sequence data
- Applications of LSTMs: Text generation, time series forecasting
- Hands-on with LSTM-based models

MODULE 11

Gated Recurrent Units (GRU)

- Introduction to GRUs and their differences from LSTMs
- Architecture and working of GRUs
- When to choose GRU over LSTM
- Practical use cases of GRUs
- Hands-on with GRU-based models

MODULE 12

Generative Models - Autoencoders

- Introduction to Autoencoders and their applications
- Encoder-decoder architecture
- Variational Autoencoders (VAEs)
- Applications of autoencoders: Data compression, anomaly detection
- Hands-on with Autoencoders using Keras and PyTorch

MODULE 13

Generative Adversarial Networks (GANs)

- Introduction to GANs and the concept of adversarial training
- Architecture of GANs: Generator and discriminator
- Training and convergence issues in GANs
- Types of GANs: DCGAN, WGAN, CycleGAN
- Applications of GANs: Image generation, style transfer
- Hands-on with GANs using TensorFlow/PyTorch

MODULE 14

Transfer Learning

- What is transfer learning and its importance in deep learning
- Fine-tuning pre-trained models for new tasks
- Using models like VGG, ResNet, Inception for transfer learning
- Applications of transfer learning in limited data scenarios
- Hands-on with transfer learning using pre-trained models

MODULE 15

Natural Language Processing (NLP) with Deep Learning

- Overview of NLP and its challenges
- Text preprocessing: Tokenization, stop-word removal, stemming, lemmatization
- Word embeddings: Word2Vec, GloVe, FastText
- Text classification with CNNs and RNNs
- Hands-on with text classification and sentiment analysis

MODULE 16

Sequence-to-Sequence Models and Attention Mechanisms

- Introduction to sequence-to-sequence models
- Encoder-decoder architecture for translation tasks
- Attention mechanisms and their benefits in NLP
- Transformer architecture and self-attention
- Applications of sequence-to-sequence models: Machine translation, chatbot development
- Hands-on with seq2seq models using Keras/PyTorch

MODULE 17

Transformer Networks and BERT

- Introduction to the Transformer architecture
- Self-attention and multi-head attention in Transformers
- BERT (Bidirectional Encoder Representations from Transformers)
- Fine-tuning BERT for NLP tasks
- Applications of BERT: Text classification, named entity recognition, question answering
- Hands-on with BERT for NLP tasks

MODULE 18

Time Series Forecasting with Deep Learning

- Introduction to time series forecasting and challenges
- Using RNNs, LSTMs for time series prediction
- Sequence-to-sequence models for time series forecasting
- Evaluation metrics for time series models
- Practical applications in finance, weather forecasting, and sales prediction

MODULE 19

Reinforcement Learning (RL) Basics

- Introduction to Reinforcement Learning (RL)
- Key components: Agent, environment, action, reward
- Markov Decision Processes (MDP) and Bellman Equation
- Exploration vs exploitation in RL
- Overview of Q-Learning and Deep Q Networks (DQNs)
- Hands-on with RL in OpenAI Gym

MODULE 20

Deep Reinforcement Learning

- Advanced concepts in RL: Policy Gradient, Actor-Critic, Proximal Policy Optimization (PPO)
- Q-Learning vs Policy Gradient methods
- Applications of deep RL in gaming and robotics
- Training RL models using neural networks
- Hands-on projects in reinforcement learning

MODULE 21

Self-Supervised Learning

- Overview of self-supervised learning
- Contrastive learning and its applications
- Using self-supervised models for image and text understanding
- Contrastive loss and its role in learning representations
- Hands-on with self-supervised learning models

MODULE 22

Model Interpretability and Explainability

- The need for interpretability in deep learning models
- Techniques for model interpretability: LIME, SHAP
- Visualizing CNN activations and feature maps
- Interpreting RNNs and LSTMs
- Ethical considerations and the impact of explainable AI

MODULE 23

Hyperparameter Tuning and Model Optimization

- The importance of hyperparameter tuning in deep learning
- Grid search and random search for hyperparameter optimization
- Bayesian optimization and genetic algorithms
- Using tools like Keras Tuner and Hyperopt
- Practical techniques for improving model performance

MODULE 24

Deep Learning for Computer Vision

- Overview of computer vision tasks and challenges
- Image classification, object detection, semantic segmentation
- Transfer learning and fine-tuning for image recognition tasks
- Using CNNs for image generation, segmentation, and style transfer
- Applications of deep learning in autonomous vehicles, medical imaging

MODULE 25

Deploying Deep Learning Models

- Introduction to deploying deep learning models
- Saving and loading models using H5, SavedModel, ONNX formats
- Deploying models with TensorFlow Serving and Flask API
- Model deployment on cloud platforms: AWS, Google Cloud, Microsoft Azure
- Monitoring and maintaining models in production environments

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Thank You

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