CODING NINJAS

DATA SCIENCE AND MACHINE LEARNING

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OVERVIEW

This course will help you to learn Data Science by building expertise in Data Cleaning, Data Visualisation and Data Analysis to obtain actionable insights out of gigabytes of data using various statistical techniques. Also, it will help you to build and refine your ML skills with the help of topics like Statistics, Trees, Neural Network etc and equip yourself to understand the predictive models of tomorrow with a blink of an eye.

FEATURES

LIVE MENTOR SUPPORT & STUDENT EXPERIENCE TEAM

WANT A BREAK? PAUSE YOUR COURSE

GET AN INDUSTRY RECOGNISED CERTIFICATE

BE A PART OF THE INDUSTRY COMMUNITY

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PRODUCTS THAT USE DATA SCIENCE AND MACHINE LEARNING

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COMPANIES HIRING

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COURSE OFFERINGS

BASIC

- Data Science and Machine Learning

STANDARD

- Introduction to Programming
- Data structures and algorithms
- Data Science and Machine Learning

PRO

- Data Science and Machine Learning
  - 10 industry mentor sessions
  - Resume Building Workshops
  - Help in profile building
  - 100+ curated interview problems
  - DSA mock test series to crack product companies

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- **Introduction to Programming**
- **Data structures and Algorithms**
- **Data Science and Machine Learning**
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INTRODUCTION TO PROGRAMMING

Learn the basics of the most popular programming languages (C++ /Java / Python) and become an expert in the core fundamentals of programming.

DATA STRUCTURES AND ALGORITHMS

Data structures and algorithms is all about organizing the information and finding the most efficient approach to solve a problem. Learning these concepts will in turn help you to improve your problem-solving skills and solve any real-world problems using technology.

DATA SCIENCE

Learn techniques to extract the data from different sources like files, web pages, databases etc, and work with the python libraries such as Numpy, pandas, Matplotlib, seaborn to analyze, manipulate and visualize the results.

MACHINE LEARNING

Learn to build Classification and Regression models to analyse the patterns in a given dataset which will help to make predictions based on the data. This course will make you eligible for the job roles like Machine Learning Engineer, Data scientist, NLP Scientist, Software developer/engineer(AI/ML).

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INTRODUCTION TO PROGRAMMING

TOPIC	SUB-TOPICS	DETAILS
BASICS OF PROGRAMMING	Flowcharts	Introduction to flow-charts, Decision making using flowcharts, Loops, Example problems
	Variables and Data types	First program, Variables and data types, Taking input, How data is stored in memory, Arith-metic Operators
	Conditional statements	Introduction to If else, Relational and logical operators, Nested conditionals
LOOPS AND FUNCTIONS	While loops	While loops, Flow of execution of statements in while loop, Example problems using while loop
	Patterns	Introduction to patterns, Basic Patterns, Square Patterns, Triangular Patterns, Character Patterns, Reverse Triangle, Inverted patterns, Isosceles triangles

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TOPIC	SUB-TOPICS	DETAILS
LOOPS AND FUNCTIONS	For loops	For loops, Break and Continue, increment - decrement operators
	Functions	Introduction to functions, Working of function calling, Variables and its scope, Pass by value
ARRAYS	Introduction to arrays	Introduction to arrays, How arrays are stored in memory, Passing arrays to functions
	Searching and Sorting	Understanding Binary Search, Selection sort, Bubble sort, Insertion sort, Merging two sorted arrays
STRINGS AND 2D ARRAYS	Strings	Introduction to strings, storage of strings and their inbuilt functions
	2D Arrays	2D arrays, Storage of 2D arrays, Example problems using 2D Arrays

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DATA STRUCTURES AND ALGORITHMS

TOPIC	SUB-TOPICS	DETAILS
PROBLEM SOLVING TECHNIQUES	Recursion	Introduction to recursion, Principle of mathematical induction, Fibonacci numbers, Recursion using arrays, Recursion using strings, Recursion using 2D arrays
	Time and space complexity	Order complexity analysis, Theoretical complexity analysis, Time complexity analysis of searching and recursive algrithms, Theoretical space complexity, Space complexity analysis of merge sort
OBJECT-ORIENTED PROGRAMMING	Basics of OOP	Introduction to oops, Creating objects, Getters, and setters, Constructors and related concepts, Inbuilt constructor and destructor, Example classes
	Advance concepts of OOP	Static members, Function overloading and related concepts, Abstraction, Encapsulation, Inheritance, Polymorphism, Virtual functions, Abstract classes, Exception handling

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TOPIC	SUB-TOPICS	DETAILS
LINEAR DATA STRUCTURES	Linked lists	Introduction to linked list, Inserting node in linked list, Deleting node from linked list, Midpoint of linked list, Merge two sorted linked lists, merge sort of a linked list, Reversing a linked list
	Stacks and Queues	Introduction to stacks, Stack using arrays, Dynamic Stack class, Stack using linked list, Inbuilt stack, Queue using arrays, Dynamic queue class, Queue using linked list, Inbuilt queue
TREES	Generic Trees	Introduction to Trees, Making a tree node class, Taking a tree as input and printing, Tree traversals, Destructor for tree node class
	Binary Trees	Introduction to Binary Trees, Taking a binary tree as input and printing, Binary Tree traversals, Diameter of binary tree

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TOPIC	SUB-TOPICS	DETAILS
TREES	Binary Search Trees	Introduction to Binary Search Trees, Searching a node in BST, BST class, Inserting and Deleting nodes in BST, Types of balanced BSTs
ADVANCED DATA STRUCTURES	Priority Queues	Introduction to Priority Queues, Ways to implement priority queues, Introduction to heaps, Introduction to Complete Binary Trees and its implementation, Insert and Delete operations in heaps, Implementing priority queues, Heap sort, Inbuilt Priority Queue
	Hashmaps	Introduction to Hash-maps, Inbuilt Hashmap, Hash functions, Collision handling, Insert and Delete operation implementation in hashmap, Load factor, Rehashing
	Tries	Introduction to Tries, Making a Trie Node class, Insert, Search and Remove operation implementation in Tries, Types of Tries, Huffman Coding

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TOPIC	SUB-TOPICS	DETAILS
ADVANCED DATA STRUCTURES	Graphs	Introduction to Graphs, Graph Terminology, Graph implementation, Graph Traversals (DFS and BFS), Weighted and Directed Graphs,Minimum Spanning Trees, Cycle Detection in Graphs, Kruskal's algorithm, Prim's Algorithm, Dijkstra's algorithm
DYNAMIC PROGRAMMING	Introduction to Dynamic Programming	Introduction to Memoization, Introduction to Dynamic Programming, Fibonacci numbers using recursion, memoization and dynamic programming
	Applications of Dynamic Programming	Longest Common Subsequence (LCS) using recursion, memoization and dynamic programming, Edit distance using recursion, memoization and dynamic programming, Knapsack problem using recursion, memoization and dynamic programming

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DATA SCIENCE:

TOPIC	SUB-TOPICS	DETAILS
INTRODUCTION	Introduction To Data Science	What is Data Science? Work of Data Scientist, Data Science and ML, Why Python
	Introduction To Python	First Program in Python, Anaconda and Jupyter Notebook, Variables in Python, Data Types, Python Numbers, Limit of Integers, Arithmetic Operators, Taking Inputs
CONDITIONAL STATEMENTS AND LOOPS	Conditionals and Loops	Boolean Datatype, Introduction to If-Else, Using Relational and Logical Operators, Using Else If, Nested Conditionals, While Loop, Primality Checking, Nested Loops
	Patterns	Introduction to Patterns, First Patterns, Square Patterns, Triangular Patterns, Character Patterns, Inverted Pattern, Reversed Pattern, Isosceles Pattern

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TOPIC	SUB-TOPICS	DETAILS
CONDITIONAL STATEMENTS AND LOOPS	More on Loops	For loop & Range Method, Print Multiples of 3, Check if a Number is Prime, Pattern, Break Keyword, Else keyword with loops, Continue keyword, Pass statements
PROGRAMMING BASICS	Functions	Functions and how to use them, Why do we need functions, How does function calling works, Functions using strings & lists, Swap Alternate, Scope of Variables, Default parameters in functions
	Object-Oriented Programming Systems (OOPs)	Introduction, Create class & object, Instance Attributes, Class Attributes, Methods, Instance Methods, Constructors, Access modifiers, Class Methods & Static Methods

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TOPIC	SUB-TOPICS	DETAILS
DATA TYPES	Strings, List & 2D List	Strings Introduction, Strings inbuilt functions, Strings slicing, Lists Introduction, List inbuilt functions, Taking Input, Difference of Even-Odd, List Slicing, Multi-dimen-sional Lists
	Tuples, Dictionary, and Sets	Tuples, Tuples Functions, Variable-length input and output, Dictionary Intro, Access/looping elements in dictionary, Adding Or Removing Data In Dictionary, Print All Words With Frequency K, Sets Intro, Functions in sets, Sum Of All Unique Numbers In List
DATA MANIPULATION	Working With Files	Introduction, Open and read Text files, Read file line by line, CSV Files, Work with CSV Files, DictReader, Countrywise Killed
	NumPy	Introduction, Why NumPy is fast, Create NumPy arrays, Slicing & Indexing, Mathematical Operations - 1D, Boolean Indexing - 1D, Boolean Indexing - 2D, NumPy Broadcastin

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TOPIC	SUB-TOPICS	DETAILS
DATA MANIPULATION	Pandas	Introduction to Pandas, Accessing Data in Pandas, Manipulating Data in Data Frame, Handling NAN, Handling Strings in Data
	Matplotlib	Plotting Graphs, Customizing Graph, Bubble Chart, Pie Chart, Histogram, Bar Graph, How to decide Graph Type
STRUCTURED QUERY LANGUAGE [SQL]	Introduction to SQL queries	Create and Insert, Update Table, Retrieve Data, Filter Result, Aggregate Functions, Update and Delete, Introduction to Databases, Relational Database, What is SQL
	Advanced SQL queries	Group By, Having, Order By, IN, BETWEEN, LIKE, Joins Introduction, Inner Join, Left & Right Join

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TOPIC	SUB-TOPICS	DETAILS
STRUCTURED QUERY LANGUAGE [SQL]	Indexing And SQLite	What is Indexing, Default Indexing, Use Default Indexing, Add & Remove Indexes, SQLite Introduction, Connect with a database, Passing parameters in a query, Fetch data, SQLite with pandas
APPLICATION PROGRAMMING INTERFACE[API]	Introduction to API	Introduction to APIs, Examples of APIs, HTTP Basics, HTTP Libraries, J SON file format, JSON to Python, Explore JSON data, Passing Parameters - 1, POST request
	Working with API	Basic Authentication, Reddit Introduction, oAuth Introduction, oAuth Roles & Process, Reddit API - Get Access Token, Reddit API - Fetch Data, Reddit API - Few more operations

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TOPIC	SUB-TOPICS	DETAILS
WEB SCRAPING	BeautifulSoup	Scraping Introduction, HTML tour, BeautifulSoup Introduction, Navigating Parse Tree, First Web Page, Books to scrape, Link of all the pages, Store data in CSV
	Selenium	Selenium Introduction, Let's start with Selenium, Browser Interaction, Locate element - 1, Web element Methods & Properties, Find all jobs, Type into fields
	Advanced Selenium	Implicit Wait, Explicit Wait, Radio buttons and checkbox, Handle drop-down,Infinitely Scroll Webpage, Infinite Scrolling, Switch tab focus, Handle popups
DATA VISUALIZATION	Introduction to Data Visualization	Different ways for Data Visualization, Types Of Data Visualization, What is Data Visualization?, Importance Of Data Visualization

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TOPIC	SUB-TOPICS	DETAILS
DATA VISUALIZATION	Introduction to Data Visualization	Different ways for Data Visualization, Types Of Data Visualization, What is Data Visualization?, Importance Of Data Visualization
	Introduction to Tableau	Automatically Generated Fields, Dimension & measure, Tableau Navigation, Data Joins and Union, Connect with Data, Tableau Installation, What is Tableau, Data Types
	Tableau Visualizations	Histogram, Bar Chart, Area Chart, Adding customization, Let's create the First plot, Understanding the Basics of Plotting, Types of charts, Line Chart
	Seaborn	Seaborn vs Matplotlib, Introduction to Seaborn, Starting with Seaborn, Visualizing Statistical Relationships - LinePlot

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TOPIC	SUB-TOPICS	DETAILS
STATISTICS	Statistics	Introduction of Statistics, Data Types in Statistics, Sample & Population, Simple Random Sampling, Stratified sampling, Cluster sampling, Systematic Sampling, Categories of Statistics
	Descriptive Statistics	Measures in Descriptive Statistics, Measures of central tendency, Measures of Spread, Range & IQR, Variance & Standard Deviation, Measure of Position
	Introduction to Inferential Statistics	Introduction to Inferential Statistics, Why Inferential Statistics?, Probability Distribution, Normal Distribution, Standard Normal Distribution, Sampling Distribution, Central Limit Theorem
	Hypothesis Testing	What is Hypothesis Testing, Null & Alternative Hypothesis, Significance Level, Test statistic, Test Statistic: Critical value & Rejection Region, Test Statistic: Type of Test, Errors in Hypothesis Testing

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TOPIC	SUB-TOPICS	DETAILS
DECISION TREES AND RANDOM FORESTS	Decision Trees - 1	Decision Trees, Decision Trees for Interview call, Building Decision Trees, Getting to Best Decision Tree, Deciding Feature to Split on, Continuous Valued Features
	Decision Trees - 2	Code using Sklearn decision tree, information gain, Gain Ratio, Gini Index, Decision Trees & Overfitting, Pruning
	Project: Decision Tree Implementation	Implement the standard Decision Tree Class used for classifying data into various classes using a tree-like model of decisions and their possible consequences.
	Random Forests	Introduction to Random Forests, Data Bagging and Feature Selection, Extra Trees, Regression using decision Trees and Random Forest, Random Forest in Sklearn

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TOPIC	SUB-TOPICS	DETAILS
NAIVE BAYES	Naive Bayes	Bayes Theorem, Independence Assumption in Naive Bayes, Probability estimation for Discrete Values Features, How to handle zero probabilities, Implementation of Naive Bayes, Finding the probability for continuous valued features, Text Classification using Naive Bayes
	Project: Text Classification	Build a classifier model using Naive Bayes algorithm to predict the topic of an article present in a newspaper
KNN AND SVM	K-nearest neighbours	Introduction to KNN, Feature scaling before KNN, KNN in Sklearn, Cross Validation, Finding Optimal K, Implement KNN, Curse of Dimensionality, Handling Categorical Data, Pros & Cons of KNN

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TOPIC	SUB-TOPICS	DETAILS
KNN AND SVM	Support Vector Machine	Intuition behind SVM, SVM Cost Function, Decision Boundary & the C parameter, using SVM from Sklearn, Finding Non Linear Decision Boundary, Choosing Landmark Points, Similarity Functions, How to move to new dimensions, Multi-class Classification, Using Sklearn SVM on Iris, Choosing Parameters using Grid Search, Using Support Vectors to Regression
PRINCIPAL COMPONENT ANALYSIS	PCA - 1	Intuition behind PCA, Applying PCA to 2D data, Applying PCA on 3D data, Math behind PCA, Finding Optimal Number of Features, Magic behind PCA
	PCA - 2	PCA on Images, PCA on Olevitti Images,Reproducing Images, Eigenfaces, Classification of LFW Images

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TOPIC	SUB-TOPICS	DETAILS
PRINCIPAL COMPONENT ANALYSIS	Project: Cifar10	Build a classifier for classifying 10,000 images into 10 classes dog, horse, cat etc) using the CIFAR-10 Dataset.
NATURAL LANGUAGE PROCESSING	NLP - 1	Using Words as Features, Basics of word process-ing, Stemming, Part of Speech, Lemmatization, Building Feature set, Classification using NLTK Naive Bayes
	NLP - 2	Using Sklearn classifiers within NLTK, Countvectorizer, Sklearn Classifiers, N-gram, TF-IDF
	Project: Twitter Sentiment Analysis	Analyse the tweets posted on twitter to predict the sentiment of the tweet i.e. positive, negative or neutral

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TOPIC	SUB-TOPICS	DETAILS
NEURAL NETWORKS	Neural Networks - 1	Why do we need Neural Networks, Example with Linear Decision Boundary, Finding Non-Linear Decision Boundary, Neural Network Terminology, No of Parameters in Neural Network, Forward and Backward Propagation, Cost Function, How to handle Multiclass classification, MLP classifier in sklearn
	Neural Networks - 2	Forward Propagation, Error Function in Gradient descent, Derivative of Sigmoid Function, Math behind Backpropagation, Implementing a simple Neural Network, Optimising the code using Vector Operations, Implementing a general Neural Network.
TENSORFLOW AND KERAS	TensorFlow	Introduction to Tensor-Flow, Constants, Session, Variables, Placeholder, MNIST Data, Initialising Weights and Biases, For-ward Propagation, Cost Function, Running the Optimiser, How does the Optimiser work?, Running Multiple Iterations, Batch Gradient Descent

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TOPIC	SUB-TOPICS	DETAILS
TENSORFLOW AND KERAS	Keras	Introduction to Keras, Flow of code in Keras, Kera Models, Layers, Compiling the model, Fitting Training Data in Keras, Evaluations & Predictions
CONVOLUTIONAL NEURAL NETWORK	CNN - 1	Problem in Handling images, Convolution Neural Neworks, Stride and Padding, Channels, Pooling Layer, Data Flow in CNN
	CNN - 2	Architecture of CNN, Initializing weights, Forward Propagation in TensorFlow, Convolution and Maxpool Functions, Regularization using Dropout layer, Adding Dropout Layer to the network, Building CNN Keras
RNN AND LSTM	Recurrent Neural Network	Building ML Models for sequential Data, Recurrent Neural Networks, How does RNN work, Typical RNN Structures, Airline Data Analysis, Preparing Data for RNN, Setting up the RNN model, Analysing the Output

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TOPIC	SUB-TOPICS	DETAILS
RNN AND LSTM	Long Short Term Memory	Vanishing or Exploiting Gradients, Gated Recurrent Units, Variations of the GRU, LSTM
UNSUPERVISED LEARNING	Unsupervised Learning - 1	Introduction to Unsupervised Learning, Introduction to Clustering, Using K-means for Flat Clustering, KMeans Algorithm, Using KMeans from Sklearn, Implementing Fit & Predict Functions, Implementing K-Means Class
	Unsupervised Learning - 2	How to choose Optimal K, Silhouette algorithm to choose K, Introduction to K Medoids, K Medoids Algorithm, Introduction to Hierarchical Clustering, Top down/Divisive Aproach, Bottom up/Divisive Approach

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TOPIC	SUB-TOPICS	DETAILS
GIT	Git	Learn about version control systems
PROJECTS	Facial Emotion Recognition	Build an advanced model with the ability to predict the facial emotion of a person in an image.
	Text Generation	Build a Neural Network based model to predict what the next word will be in a sequence of words/sentences.
	Distracted Driver Detection	Build a classification model to predict using a database of images whether a given driver is distracted, ie, texting, on a call, driving safely etc.
	Neural Machine Translation	Build an advanced model for the purpose of translation of phrases and symbols from one language to the other using Artificial Neural Network.

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PROJECTS

Case Study on Indian Startups

Detailed analysis of the Indian Startups for interpretation of trends and pat terns to facilitate selection of proper city, useful investors, funding type etc for different startups.

TMDB API

Finding out the latest information about TV Shows, Movies and the biggest names in the entertainment sector for a marvelous and fun TV/Movie watching experience.

Instagram Bot

Automation of your Instagram features such as like-unlike, follow-unfollow, and much more with a simple click of a button achieved using libraries such as BeautifulSoup and Selenium.

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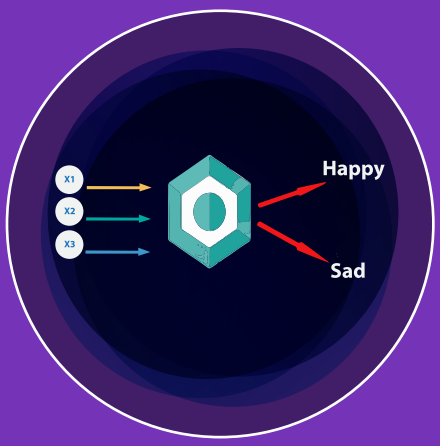
Gradient Descent Implementation

Implement the standard Gradient Descent algorithm for optimisation of a model (Regression or Neural).



Logistic Regression Implementation

Implement the standard Logistic Regression model generally used for classifying data into binary classes such as pass/fail, win/lose, alive/dead or healthy/sick.

Decision Tree Implementation

Implement the standard Decision Tree Class used for classifying data into various classes using a tree-like model of decisions and their possible consequences.

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Text Classification

Build a classifier model using Naive Bayes algorithm to predict the topic of an article present in a newspaper

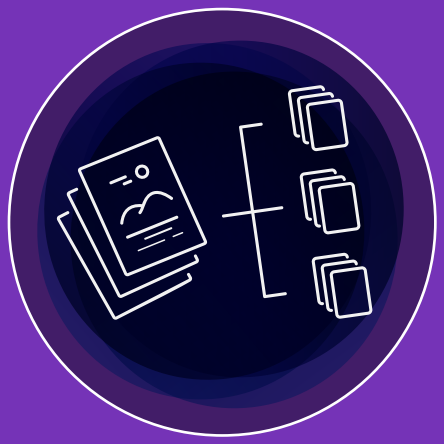

Image Classification (CIFAR-10 Dataset)

Build a classifier for classifying 10,000 images into 10 classes (dog, horse, cat etc) using the CIFAR-10 Dataset.

Twitter Sentiment Analysis

Analyse the tweets posted on twitter to predict the sentiment of the tweet i.e. positive, negative or neutral

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Facial Emotion Recognition

Build an advanced model with the ability to predict the facial emotion of a person in an image.

Distracted Driver Detection

Build a classification model to predict using a database of images whether a given driver is distracted, ie, texting, on a call, driving safely etc.

Text Generation

Build a Neural Network based model to predict what the next word will be in a sequence of words/sentences.

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Neural Machine Translation

Build an advanced model for the purpose of translation of phrases and symbols from one language to the other using Artificial Neural Network.

Urban Sound Classification

Build a Neural network based model to classify various sounds using their unique spectrogram into classes such as Dog Barking, Sirens, Street Music etc.

Image Caption Generation

Build a CNN/LSTM based model to provide a caption to the given image.

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TOOLS AND TECHNIQUES

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TESTIMONIALS

“The course structure was designed very effectively for both beginners and experienced coders. Support of Mentors and Teaching Assistants helped a lot to improve my coding fundamentals and helping other students enhanced my coding skills.”

KARTIKEY KUMAR

“It's a great place to learn how to code. The way of teaching and dedication offered towards your development makes it easier to grasp the concepts even for beginners. The best part of Coding Ninjas is the faculty, I am grateful for all the guidance.”

LUV MISRA

“It was a great learning experience. The kind of content it provides really helps in building your logic and how to approach a problem in real life too. Ankush sir has done a wonderful job in explaining the core concept of hard topics”.

DHARNEESH GUPTA