

# Full Stack Data Science Nov'21 Tech Neuron

## Instructors:

### **Sudhanshu Kumar:**

Having 8+ years of experience in Big data, Data Science and Analytics with product architecture design and delivery. Worked in various product and service based Company. Having an experience of 5+ years in educating people and helping them to make a career transition.

### **krish naik:**

Having 10+ years of experience in Data Science and Analytics with product architecture design and delivery. Worked in various product and service based Company. Having an experience of 5+ years in educating people and helping them to make a career transition.

### **Sunny Savita:**

I'm an AI enthusiast, graduate in Computer science and engineering. Currently working with iNeuron.ai as a Data Scientist and having 2+ years of experience. I have skills in big data, machine learning, computer vision, Natural language processing. My expertise also includes project design development and implementation with AIOps tools.

## Curriculum:

### **Welcome to the Course**

- Course Overview
- Dashboard Introduction

### **Python Fundamentals**

- Python Basic

- String, List, Indexing
- Tuple, Set & Dict
- If, Else & For Loop
- For Loops & While loops
- Python Program Discussion in loops
- Function Part - 1
- Function Part - 2

### **Advanced Python**

- Iterator Generator & File System
- Exception handling Class 1 part 1
- Exception handling Class 1 part 2
- Exception handling Class 2
- Module & Packages
- OOPS Part 1
- OOPS Part 2
- OOPs Concepts - Polymorphism

### **Working with Databases & Python**

- SQL Part 1
- SQL Part 2
- OOPS Discussion
- Introduction to MongoDB
- Working with Python & MongoDB Part1
- Working with Python & MongoDB Part2

- SQL lite, map, reduce, filter,zip

## **Working with Pandas & Numpy**

- Introduction to Pandas
- Working with Pandas
- Pandas Data Analysis Part 1
- Pandas Data Analysis Part 2
- Pandas and Numpy
- Numpy methods

## **GUI Programming**

- GUI Programming with Tkinter

## **Working with Graphs & Charts**

- Introduction to Graphs & Charts
- Working with Graphs in Python

## **API**

- API Testing

## **Python Projects**

- Flask End-to-End Project
- Review Scraper
- Image Scraper and deployment on Heroku, AWS and Azure

## **Statistics**

- Introduction to Stats - Day 1
- Stats - Day 2
- Extra doubt session
- Stats - Day 3
- Stats - Day 4
- Stats - Day 5

### **EDA & Feature Engineering**

- Introduction to EDA
- Doubt Clearing session
- EDA and Feature Engineering

### **Machine Learning**

- Linear Regression
- Ridge Lasso Regression, Elastic & Logistic Regression
- Naive Bayes Algorithm and practical implementation of Ridge Lasso and Logistic Regression
- Logistic Practical, SSVM, SVR
- Decision Tree Classification
- Random Forest & SVM
- Adaboost
- Gradient Boosting
- Clustering
- Introduction to Machine learning
- Linear Regression

- Linear Regression live coding demonstration part-1
- Linear Regression live coding demonstration part-2
- Project Admission Prediction, Lasso, Ridge & Elastic Net
- Project deployment in Heroku, Azure & AWS
- Logistic Regression
- Logistic Regression implementation
- Decision Tree
- Decision Tree Part 2 , Ensemble Tech, Random Forest & Boosting
- KNN and SVM
- Decision Tree Practical Implementation
- Decision Tree Live Coding & Grid Search
- Grid Search, Bagging Classifier & Random Forest
- KNN, SVC, SVR & Stacking
- Clustering
- Clustering and PCA
- PCA practical, DBSCAN and Naive Bayes
- XG Boost, NLTK & TF-IDF

### **Machine Learning End to End Project**

- Machine learning project
- Machine learning project
- ML End to End project Pipeline Explanation
- ML Project Explanation along with GitHub and Docker
- Machine Learning Pipelines Live Coding Part-1
- Machine Learning Pipelines Live Coding Part-2

- 2nd July Live Class
- Machine Learning Pipelines Live Coding Part-2
- Revision Class
- Model training, evaluation, and push
- Model training, evaluation, and push
- Revision

### **PCA in ML**

- PCA
- PCA Implementation

### **NLP for Machine Learning**

- NLP in ML
- Spam Classification

### **Time Series Analysis**

- Introduction to Time Series
- Time Series Implementation

### **Stats**

- Introduction
- Different types of Statistics
- Population vs Sample
- Mean, Median and Mode
- Variance, Standard Deviation

- Sample Variance why  $n-1$
- Standard Deviation
- Variables
- Random Variables
- Percentiles & quartiles
- 5 number summary
- Histograms
- Gaussian - Normal distribution
- Standard Normal distribution
- Application Of Zscore
- Basics Of Probability
- Addition Rule In Probability
- Multiplication rule in probability
- Permutation
- Combination
- Log Normal Distribution
- Central Limit theorem
- Statistics - Left Skewed And Right Skewed Distribution And Relation With Mean, Median And Mode
- Covariance
- Pearson And Spearman Rank Correlation
- What is P Value
- What is Confidence Intervals
- How To Perform Hypothesis Testing - Confidence Interval Z Test Statistics Derive Conclusion

- Hypothesis testing part 2
- Hypothesis testing part 3
- Finalizing statistics

## **ML Projects**

- Detailed Project Report explanation
- Project :- Wafer Fault Detection Part 1
- Project :- Wafer Fault Detection Part 2
- Deployment in Heroku using docker and circleci

### **ML Project 1 :- Fault detection in wafers based on sensor data**

- Introduction
- The problem statement and Data Description
- The Application Flow
- Ingestion and Validation Part1
- Validation Part2
- DB Operations
- Data Preprocessing
- Clustering
- Model Selection and Tuning
- Prediction
- Deployment

### **ML Project 2 :- Cement Strength Prediction**

- Introduction



- The Problem Statement and Data Description
- The Application Flow
- Code Intro and Logging
- Validation and Transformation
- DB Operations
- Data Preprocessing
- Clustering
- Model Selection and Tuning
- Prediction
- Deployment

### **ML Project 3 :- Credit Card Defaulters**

- Introduction
- The Problem Statement and Data Description
- The Application Flow
- Code intro and Logging
- Validation and Transformation
- DB Operations
- Data Preprocessing
- Deployment

### **Time Series**

- Arima, Sarima, Auto Arima
- Time series using RNN LSTM, Prediction of NIFTY stock price
- Time series using RNN LSTM, Prediction of NIFTY stock price

## **DL ANN - Introduction**

- Introduction to Deep Learning
- Importance of Deep learning
- Why you should study Deep Learning? (Motivation)
- ANN vs BNN
- The first Artificial Neuron

## **DL ANN - Perceptron**

- Overview of Perceptron
- More about Perceptron
- Perceptron implementation using python - 1
- Perceptron implementation using python - 2
- Perceptron implementation using python - 3
- Perceptron implementation using python - 4
- Perceptron implementation using python - 5
- Perceptron implementation using python - 6
- Perceptron implementation using python - 7
- Python scripting & modular coding for Perceptron
- Python logging basics and docstrings
- Python packaging, Github actions, and PyPI

## **DL ANN -1**

- Multilayer Perceptron
- Forward propagation

- Why we need Activation function?
- ANN implementation using tf.keras - 1
- ANN implementation using tf.keras - 2
- ANN implementation using tf.keras - 3
- ANN implementation using tf.keras - 4
- ANN with Callbacks | Tensorboard | Early Stopping | Model Checkpointing

## **DL ANN - 2**

- Vector
- Differentiation
- Partial differentiation
- Maxima and minima concept
- Gradient descent basics
- In-depth understanding of Gradient descent with mathematical proof

## **DL ANN - 3**

- Chain rule
- Backpropagation

## **DL ANN - 4**

- General problems in training Neural Networks
- Vanishing and Exploding gradients
- Activation Function Basics
- Weight initialization
- Activation Functions - 1

- Activation functions - 2
- Activation functions - 3
- Transfer learning
- Batch normalization -1
- Batch normalization -2
- Batch normalization -3

## **DL ANN - 5**

- Introduction to fast optimizers
- Momentum optimization
- NAG
- Elongated bowl problem | AdaGrad
- RMSProp
- Adam
- Loss functions
- Regularization
- Dropout

## **Computer Vision - Introduction**

- Introduction to Course
- Course Overview
- Installing Anaconda, Pycharm & Postman
- Working with Conda Envs
- Pycharm Introduction
- Pycharm with Conda

- Pycharm with venv
- Pycharm with Pipenv

## **Computer Vision - CNN Foundations**

- Why CNN? Building an Intuition for CNN
- CNN, Kernels, Channels, Feature Maps, Stride, Padding
- Receptive Fields, Image Output Dimensionality Calculations, MNIST Dataset Explorations with CNN
- MNIST CNN Intuition, Tensorspace.js, CNN Explained, CIFAR 10 Dataset Explorations with CNN
- Dropout & Custom Image Classification Dog Cat Dataset
- Deployment in Heroku, AWS, Azure
- Deployment in GCP, AWS EBS

## **Computer Vision - CNN Architectures**

- LeNet-5
- LeNet-5 Practical
- AlexNet
- AlexNet Practical
- VGGNet
- VGG16 Practical
- Inception
- Inception Practical
- ResNet
- Resnet Practical

## **Computer Vision - Image Classification Hyper Parameter Tuning**

- Keras Tuner
- Building a simple model
- Tuning with Keras Tuner

## **Computer Vision - Data Augmentation**

- What is Data Augmentation?
- Benefits of Data Augmentation
- Exploring Papers like RICAP, Random Erasing, Cutout
- Exploring Augmentor
- Exploring Roboflow

## **Computer Vision - Object Detection Basics**

- What is Object Detection?
- Competitions for Object Detection
- Bounding Boxes
- Bounding Box Regression
- Intersection over Union (IoU)
- Precision & Recall
- What is Average Precision?

## **Computer Vision - Object Detection Architectures**

- Object Detection Family
- RCNN
- RCNN Network Architecture

- Cons of RCNN
- FAST RCNN
- FAST RCNN Network Architecture
- Cons of FAST RCNN
- FASTER RCNN
- FASTER RCNN Network Architecture
- YOLO
- YOLO Architecture
- YOLO Limitations
- SSD
- SSD Network

### **Computer Vision - Practicals Object Detection using Tensorflow 1x**

- Introduction to TFOD1.x
- Using Google Colab with Google Drive
- Installation of Libraries in Colab
- TFOD1.x Setup in Colab
- Visiting the Model Zoo
- Inferencing in Colab
- Inferencing in Local
- Important Configurations Files
- Webcam Testing

### **Computer Vision - Practicals Training a Custom Cards Detector using Tensorflow1x**

- Custom Model Training in TFOD1.x

- Our Custom Dataset
- Doing Annotations or labeling data
- Selection of Pretrained Model from Model Zoo
- Files Setup for Training
- Let's start Training in Colab
- Export Frozen Inference Graph
- Inferencing with our trained model in Colab
- Training in Local
- Inferencing with our trained model in Local

### **Computer Vision - Practicals Creating an Cards Detector Web App with TFOD1**

- Code Understanding
- WebApp Workflow
- Code Understanding
- Prediction with Postman
- Debugging our Application

### **Computer Vision - Practicals Object Detection using Tensorflow 2x**

- Introduction to TFOD2.x
- Using the Default Colab Notebook
- Google Colab & Drive Setup
- Visting TFOD2.x Model Garden
- Inference using Pretrained Model
- Inferencing in Local with a pretrained model



## **Computer Vision - Practicals Training a Custom Chess Piece Detector using Tensorflow2**

- Custom Model training in TFOD2.x
- Our Custom Dataset TF2
- File Setup for Training
- Let's start Training
- Let's start Training
- Stop Training or resume Training
- Evaluating the trained model
- Convert CKPT to Saved Model
- Inferencing using the Custom Trained Model in Colab
- Inferencing using the Custom Trained Model in Local PC

## **Computer Vision - Practicals Creating an Chess Piece Detector Web App with TFOD2**

- Creating a Pycharm project & Environment Setup TF2
- Application Workflow
- Code understanding
- Testing our App with Postman
- Debugging our Application

## **Computer Vision - Practicals Object Detection using Detectron2**

- Introduction to Detectron2
- Detectron2 Colab Setup
- Visiting Detectron2 Model Zoo
- Detectron2 Pretrained Model Inferencing

## **Computer Vision - Practicals Training a Custom Detector using Detectron2**

- Detectron2 Custom Training
- Exploring the Dataset
- Registering Dataset for Training
- Let's start Training
- Inferencing using the Custom Trained Model in Colab
- Evaluating the Model

## **Computer Vision - Practicals Creating an Custom Detector Web App with Detectron2**

- Creating a Pycharm project & Environment Setup Detectron2
- Application Workflow
- Code understanding
- Testing our App with Postman
- Debugging our Application

## **Computer Vision - Practicals Object Detection using YoloV5**

- Introduction to YoloV5
- YoloV5 Colab Setup
- Inferencing using Pre Trained Model

## **Computer Vision - Practicals Training a Custom Warehouse Apparel Detector using YoloV5**

- Custom Training with YoloV5
- Exploring the Dataset
- Doing Annotations or labeling data

- Setting up Google Colab & Drive
- Let's start Training
- Inferencing using the Custom Trained Model in Colab

## **Computer Vision - Practicals Creating an Warehouse Apparel Detector Web App with YOLOV5**

- Creating a Pycharm project & Environment Setup Yolo
- Application Workflow
- Code understanding
- Testing our App with Postman
- Debugging our Application

## **Computer Vision - Image Segmentation**

- Segmentation Introduction
- From Bounding Box to Polygon Masks
- What is Image Segmentation?
- Types of Segmentation
- MASKRCNN
- MASK RCNN Architecture

## **Computer Vision - MASK RCNN Practicals with TFOD**

- Segmentation with TFOD1.x
- Local Setup MASKRCNN
- Exploring the Dataset
- Data Annotation
- Model Selection

- Files Setup for Training
- Model Training
- Export Frozen Inference Graph
- Model Prediction

### **Computer Vision - MASKRCNN practical with Detectron2**

- Introduction to Detectron2
- Detectron2 Colab Notebook
- Exploring the Model Zoo
- Detectron2 Colab Setup
- Custom Training with Detectron2
- Exploring our Dataset
- Data Annotation
- Data Preparation
- Setup for Training
- Let's start Training
- Inferencing using the Custom Trained Model in Colab
- Evaluating the Model

### **Computer Vision - Face Recognition Project**

- Introduction to Project
- Requirement Gathering
- Techstack Selection
- Project Installation
- Project Demo

- Project Workflow
- Core Components of the Application
- Data Collection Module
- Generate Face Embeddings
- Training Face Recognition Module
- Prediction Pipeline
- Entry point of the Application
- Application Workflow
- Debugging our Application

### **Computer Vision - Object Tracking Project**

- Object Tracking project
- Project Installation Tracking
- Project Demo
- Code Understanding

### **Computer Vision - GANS**

- Introduction to GANS
- GAN Architecture
- GAN PRACTICALS Implementation

### **Computer Vision Project - Traffic Vehicle Detection**

- Introduction to Vehicle Detection project
- Requirement Gathering
- Framework Selection

- Detailed Project Workflow
- Data Collection Scrap
- Data Preparation
- Data augmentation augementer
- Data Annotations
- Model Training
- Creating a Pycharm project & Environment Setup TVD
- WebApp Workflow
- Code Understanding
- Prediction with Postman
- Debugging our Application

### **Computer Vision Project - Helmet Detection**

- Introduction to Helmet Detection project
- Requirement Gathering
- Techstack Selection
- Detailed Project Workflow
- Data Collection
- Data Preparation
- Data Augmentation
- Data Annotations
- Model Training
- Creating a Pycharm project & Environment Setup HD
- WebApp Workflow
- Code Understanding

- Prediction with Postman
- Debugging our Application

### **Computer Vision Project - Fashion Apparel Detection**

- Introduction to Fashion Apparel Detection project
- Requirement Gathering
- Techstack Selection
- Detailed Project Workflow
- Data Collection
- Data Preparation
- Data Augmentation
- Data Annotations
- Model Training
- Creating a Pycharm project & Environment Setup FAD
- Project Demo
- WebApp Workflow
- Code Understanding
- Prediction with Postman
- Debugging our Application

### **Computer Vision Project - Image TO Text OCR**

- Introduction to Project
- Project Installation OCR
- Project Demo
- Application Workflow

- Code Understanding
- Debugging our App
- Different OCR's available

### **Computer Vision Project - Shredder System**

- Introduction to Shredder Systems
- Requirement Gathering
- Techstack Selection
- Data Collection
- Data Augmentation
- Data Preparation
- Data Annotation
- Model Selection from Zoo
- Model Training
- Creating a Pycharm project & Environment Setup SS
- Application Workflow
- Project Demo
- Code Understanding
- Debugging our Application
- Project Workflow
- Project Workflow

### **Computer Vision Project - Automatic Number plate Recognition with TFOD1x**

- Introduction to ANPR Project
- Requirement Gathering



- Tech Stack Selection
- Data Collection
- Data Augmentation
- Data Preparation
- Data Annotation
- Model Selection From Zoo
- Model Training
- Creating a Pycharm project & Environment Setup ANPR
- Application Workflow
- Create Google OCR API Key
- Project Demo
- Code Understanding
- Debugging our Application

## **NLP Overview**

- NLP Overview
- NLP very basic

## **NLP Word Embeddings**

- TFIDF
- Word Embeddings Part-1
- Word Embeddings Part-2

## **NLP RNN**

- RNN basic

- RNN Implementation

## **NLP LSTM & GRU**

- LSTM Introduction
- GRU

## **NLP Attention Based Model**

- Encoder Decoder and Attention Mechanism
- Attention All You Need Paper Understanding

## **NLP Transfer Learning in NLP**

- GPT and BERT Model
- SOTA Model with Paper Discussions
- Albert & DistillBert Project Discussion

## **NLP Project :- Megatron**

- Megatron Project

## **NLP Project:- Brand Measures**

- Brand Measures Project

## **NLP Project:- Text to Speech**

- Introduction
- Project Setup Text to Speech
- Project Demo
- Code Explanation

- Project Workflow
- Prediction with Postman
- Debugging Application

### **NLP Project:- Speech To Text**

- Introduction
- Project Setup Speech To Text
- Project Demo
- Code Explanation
- Project Workflow
- Prediction with Postman
- Debugging Application

### **NLP Project:- Spell Corrector**

- Introduction
- Project Setup Spell Corrector
- Project Demo
- Code Explanation
- Project Workflow
- Prediction with Postman
- Debugging Application

### **NLP Project:- Named Entity Recognition**

- NER using BERT

### **NLP Project:- Machine Translation & Keyword Spotting**

- Machine Translation
- Keyword Spotting

### **NLP Project:- Keyword Extractor & Summarization**

- Keyword Extraction
- Extractive Text Summarization

### **NLP project:- Paraphrasing**

- Rephrase Project

### **BigData - Introduction to Big Data and Data Engineering**

- Big Data Engineering

### **BigData - Introduction to Distributed Systems - Hadoop and MapReduce**

- Big Data Engineering Introduction

### **BigData - Map Reduce & YARN**

- Big Data Hadoop Map Reduce YARN
- Hadoop Map Reduce Hands On

### **BigData - Hive**

- Apache hive

### **BigData - Hive Hands On**

- Apache hive Hands On

## **BigData - NoSQL and Hbase**

- Big Data HBase
- Hbase hands On

## **BigData - Sqoop**

- Big Data Sqoop
- Big Data Sqoop Hands On

## **BigData - Spark**

- Spark - Introduction
- Big Data Engineering using PySpark- RDDs
- Spark hands on - RDD
- Big Data Engineering using PySpark- Core, Internals, Architecture
- Apache Spark Actions\_ Transformations
- Apache Spark Caching
- Big Data Engineering using PySpark- Shared Vars , Coalesce Repartition
- Big Data Engineering using PySpark- Dataframes
- Spark hands on - Dataframe
- Spark hands on - Databricks
- Big Data Engineering using PySpark- Catalyst& Tungsten

## **BigData - Spark ML**

- Big Data Engineering using PySpark- MLlib
- Spark hands On - Spark ML Lib

## **BigData - Spark Streaming**

- Big Data Engineering using PySpark- Streaming Part 1
- Big Data Engineering using PySpark- Streaming Part 2
- Spark hands On - Spark Streaming

## **BigData - Kafka**

- Big Data Kafka
- Big Data Kafka Hands on

## **BigData - Apache Airflow - Workflow Management Platform**

- Big Data - Airflow
- Big Data Airflow Hands On

## **Big Data Projects**

- IoT Sensor data pipeline using Kafka-Spark Streaming
- Product Recommendation Engine using Kafka-Spark Streaming
- Short Video App Analytics

## **Basic Charts in Power BI**

- 2.0 Basic Charts in Power BI Desktop
- 2.1 Column Chart in Power BI
- 2.2 Stacked Column Chart in Power BI
- 2.3 Pie Chart in Power BI
- 2.4 Donut Chart in Power BI
- 2.5 Funnel Chart in Power BI

- 2.6 Ribbon Chart
- 2.7 Include and Exclude
- 2.8 Export data from Visual

## **Working with Maps**

- 3.1 Creating a Map in Power BI
- 3.2 Filled Map
- 3.3 Map with Pie Chart
- 3.4 Formatting in Map
- 3.5 Change Background in Map
- 3.6 Map of India in Power BI
- 3.7 Map of Australia in Power BI

## **Tables and Matrix in Power BI**

- 4.0 Table and Matrix in Power BI
- 4.1 Creating a Table in Power BI
- 4.2 Formatting a Table
- 4.3 Conditional Formatting in Table
- 4.4 Aggregation in Table
- 4.5 Matrix in Power BI
- 4.6 Conditional Formatting in Matrix
- 4.7 Hierarchy in Matrix
- 4.8 Sub-Total and Total in Matrix
- 4.9 Number Formatting in Table

## **Other Charts in Power BI**

- 5.0 Other Charts in Power BI
- 5.1 Line Chart in Power BI
- 5.2 Drill Down in Line Chart
- 5.3 Area Chart in Power BI
- 5.4 Line vs Column Chart in Power BI
- 5.5 Scatter Plot in Power BI
- 5.6 Waterfall Chart in Power BI
- 6.7 TreeMap in Power BI
- 5.8 Guage Chart in Power BI

## **Cards and Filters**

- 6.0 Cards and Filters in Power BI
- 6.1 Number Card
- 6.2 Text Card
  - 6.2.1 Formatting of Text Card
- 6.3 Date Card
  - 6.3.1 Date Card (Relative Filtering)
- 6.4 Multi-Row Card
- 6.5 Filter on Visual
- 6.6 Filter on This PAge
- 6.7 Filter on All Pages
- 6.8 Drillthrough in Power BI

## **Slicers in Power BI**



- 7.0 Slicers in Power BI
- 7.1 Text Slicers in Power BI
- 7.2 Formatting a Text Slicer
- 7.3 Date Slicers in Power BI
- 7.4 Formatting a Date Slicer
- 7.5 Number Slicers in Power BI

## **Introduction to tableau**

- Tableau Introduction
- Download and Install Tableau
- Tableau Vs Excel

## **Charts - 1**

- Column Chart
- Horizontal Bar Chart
- Stacked Column Chart
- Stacked Bar Chart
- Keep Only, Exclude
- Keep Only, Exclude2\_Normal
- Publish to Tableau Public

## **Charts - 2**

- Pie Chart
- Multiple Pie Chart
- TreeMap\_Editing

- Packed Bubble Chart
- Word Cloud OR Word Map
- Formatting payal

### **Charts - 3**

- Data Types in Tableau
- Filled Map
- Symbol Maps
- India Map
- Histogram

### **SQL**

- Database Architecture
- Introduction to SQL
- Constraints
- Data Definition Language (DDL)
- Data Query Language (DQL)
- Data Manipulation Language (DML)
- Joins
- Import Export
- Aggregate Functions
- Order by, Having & Limit Clause
- String Functions
- Datetime functions
- Understanding Regular Expressions

- Nested Queries
- Views
- Stored Procedures
- WindowsFn
- Python-SQL Connectivity

## **Excel**

- Introduction to Excel
- Pre-defined functions
- Datetime Functions
- String functions
- Mathematical functions
- Lookup
- Logical & Error Functions
- Statistical Functions
- Images in Excel
- Excel Formatting
- Custom Formatting
- Conditional Formatting
- Charts in Excel
- Data Analysis using Excel
- Pivot Tables
- Dashboarding in Excel
- Others
- What-If Tools - Scenario Manager, Goal Seek

