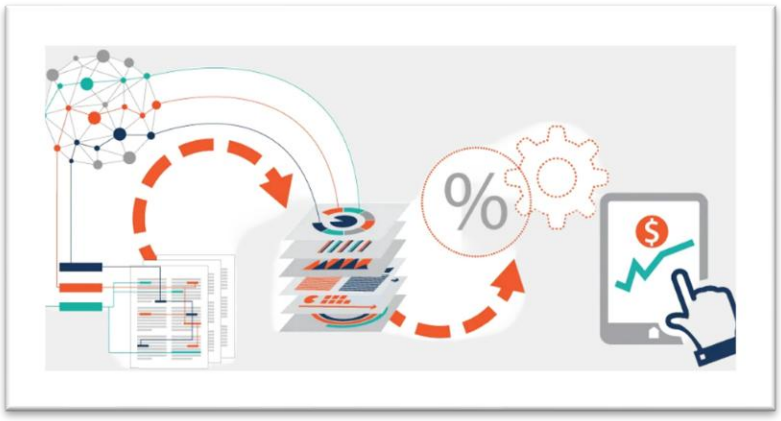

SALIENT TECH SOLUTIONS'

AI & MACHINE LEARNING ENGINEER

Week 1: Introduction to AI & ML, Python Basics

Day 1: Introduction to AI/ML & Project Kickoff

- What is AI, Machine Learning & Deep Learning?
- Types of Machine Learning (Supervised, Unsupervised, Reinforcement)
- Overview of the capstone project and use case discussion (e.g., churn prediction, fraud detection)

Project Task:

- Define project objective and success criteria
- Identify target variable and expected outcome
- Prepare a high-level project plan

Day 2: Python Setup & Programming Essentials for ML

- Setting up Python (Anaconda, Jupyter Notebook)
- Python syntax, variables, control flow
- Functions, loops, and basic I/O

Project Task:

- Create a new project folder and notebook
- Write Python scripts for basic input/output and logic
- Add basic documentation to notebook

Day 3: Data Analysis with Pandas & NumPy

- Working with NumPy arrays
- Loading datasets using Pandas
- Data inspection, filtering, slicing

Project Task:

- Load sample training dataset (e.g., customers.csv)
- Perform data inspection (shape, head, describe)
- Identify missing values and basic patterns

Day 4: Data Cleaning & Preprocessing

- Handling missing data, duplicates
- Feature engineering basics
- Data type conversions and normalization

Project Task:

- Clean the dataset and generate a profiling report
- Convert relevant columns (e.g., dates to datetime)
- Save cleaned dataset for modeling

Day 5: Exploratory Data Analysis (EDA)

- Visualizing data with matplotlib/seaborn
- Histograms, boxplots, and correlation heatmaps
- Initial feature-target relationship analysis

Project Task:

- Generate and interpret visualizations
- Identify top features correlated with target variable
- Present insights in 3-slide summary (EDA deck)

Week 2: Supervised Learning – Regression & Classification

Day 6: Supervised Learning Fundamentals

- Supervised vs Unsupervised learning
- Regression vs Classification problems

Project Task:

- Finalize ML task type (classification or regression)
- Set up training and test datasets

Day 7: Linear Regression

- Concept of linear regression
- Model fitting, interpretation, and evaluation

Project Task:

- Train a linear regression model
- Evaluate with MSE, R^2

Day 8: Logistic Regression

- Classification basics
- Logistic regression implementation

Project Task:

- Train a logistic regression model
- Evaluate with confusion matrix, accuracy, precision, recall

Day 9: Decision Trees & Random Forests

- Tree-based models
- Overfitting and regularization

Project Task:

- Train and compare Decision Tree vs Random Forest
- Analyze feature importance

Day 10: Model Evaluation & Tuning

- Metrics: ROC-AUC, Precision, Recall, F1-score
- Hyperparameter tuning basics

Project Task:

- Evaluate all models on validation set
- Select the best model based on performance metrics

Week 3: Unsupervised Learning & Clustering

Day 11: Clustering Fundamentals

- What is clustering?
- Use cases in marketing, fraud, etc.

Project Task:

- Prepare a new dataset for clustering
- Identify clustering features

Day 12: K-Means Clustering

- K-means concept, elbow method
- Implementation in Python

Project Task:

- Apply K-means and visualize clusters
- Interpret segment profiles

Day 13: Hierarchical Clustering

- Agglomerative vs Divisive
- Dendrograms

Project Task:

- Apply hierarchical clustering
- Compare results with K-means

Day 14: Dimensionality Reduction (PCA)

- PCA for feature reduction
- Scree plot, explained variance

Project Task:

- Apply PCA and reduce dimensionality
- Visualize in 2D/3D plots

Day 15: Anomaly Detection

- Outlier detection using clustering
- Use cases: fraud, error detection

Project Task:

- Detect anomalies in dataset
- Tag and visualize outlier patterns

Week 4: Deep Learning Basics

Day 16: Introduction to Neural Networks

- Neurons, weights, and layers
- Forward/backpropagation basics

Project Task:

- Sketch basic ANN architecture for your project

Day 17: Activation & Loss Functions

- Sigmoid, ReLU, Softmax
- Loss: MSE, cross-entropy

Project Task:

- Test different activations on sample data

Day 18: Building a Neural Network (Keras/TensorFlow)

- Keras model definition
- Compilation and training

Project Task:

- Build a simple ANN using Keras
- Train it on your dataset

Day 19: Convolutional Neural Networks (CNNs)

- CNN layers, filters, pooling
- Use cases: image classification

Project Task:

- Load an image dataset
- Train a CNN for basic image classification

Day 20: Recurrent Neural Networks (RNNs)

- Time series and text data
- RNN, LSTM basics

Project Task:

- Prepare sequential data
- Build a simple RNN or LSTM model

Week 5: Natural Language Processing (NLP)

Day 21: NLP Fundamentals

- Text preprocessing: tokenization, stopwords
- Lemmatization vs stemming

Project Task:

- Clean a text dataset
- Generate word frequencies

Day 22: Sentiment Analysis

- Vectorization (TF-IDF, Bag of Words)
- Classification models for sentiment

Project Task:

- Build a sentiment classifier
- Evaluate performance on reviews dataset

Day 23: Word Embeddings & Transformers

- Word2Vec, GloVe basics
- Introduction to BERT & transformers

Project Task:

- Generate embeddings using pre-trained models
- Visualize semantic similarity

Day 24: Chatbot Basics

- Rule-based vs ML-based bots
- DialogFlow, Rasa intro

Project Task:

- Build a basic rule-based chatbot
- Connect it to a front-end (optional)

Day 25: NLP Project Day

- Real-world NLP project case studies
- Review and reinforcement

Project Task:

- Finalize NLP mini project
  Document pipeline and results

Week 6: Advanced ML & AI Concepts

Day 26: Ensemble Learning

- Random Forest, XGBoost, Gradient Boosting
- Stacking and Voting

Project Task:

- Apply XGBoost on your main dataset
- Compare results with previous models

Day 27: Generative Adversarial Networks (GANs)

- GAN architecture: generator + discriminator
- Applications in image & text

Project Task:

- Build a simple GAN on a toy dataset

Day 28: Reinforcement Learning Basics

- Agent, environment, rewards
- Q-learning intro

Project Task:

- Simulate a simple environment using OpenAI Gym

Day 29: Final Touches & Demo Prep

- Detecting and mitigating bias
- Fair AI practices

Project Task:

- Analyze bias in a public dataset
- Apply fairness-aware techniques

Day 30: Review & Mini Assessment

- Recap of supervised, unsupervised, and deep learning
- Q&A and peer review

Project Task:

- Submit assignment notebook
- Self-evaluate model choices

Week 7: Model Deployment

Day 31: Model Deployment with Flask

- Creating REST APIs with Flask
- Saving and loading ML models

Project Task:

- Deploy your trained model using Flask locally

Day 32: Model Deployment with FastAPI

- Intro to FastAPI
- Endpoint creation & testing

Project Task:

- Convert your Flask app to FastAPI
- Test using Swagger UI

Day 33: Streamlit Dashboards

- Streamlit for interactive dashboards
- Widgets and layouting

Project Task:

- Build a Streamlit app for your project
- Add inputs and predictions

Day 34: Cloud Deployment (AWS/GCP)

- Hosting models on cloud
- Free-tier services overview

Project Task:

- Host model or app on AWS/GCP (optional: use ngrok for demo)

Day 35: Final Deployment Review

- Deployment checklist
- Review of full model lifecycle

Project Task:

- Submit deployed app link
- Record demo walkthrough

Week 8: Capstone Project & Career Preparation

Day 36: Capstone Planning & Data Prep

- Finalize business use case
- Gather & clean dataset

Day 37: Modeling & Evaluation

- Train and tune models
- Evaluate and refine

Day 38: Deployment & Demo Build

- Package model
- Build dashboard or API

Day 39: Resume, GitHub & LinkedIn Optimization

- GitHub project structure
- Resume bullet points for ML projects

Day 40: Final Presentation & Certification

- Present capstone solution
- Take final quiz
- Get feedback and complete certification