📘 Month 1: Python Programming & Math Foundations

Topics:

- Python Basics: Variables, Data Types, Loops, Functions
- Data Structures: Lists, Tuples, Dictionaries, Sets
- Libraries: NumPy, Pandas, Matplotlib
- Math for ML:
    - Linear Algebra (Vectors, Matrices)
    - Probability & Statistics
    - Calculus Basics (Derivatives, Gradient)

Projects:

- Data analysis with Pandas
- Visualizing datasets with Matplotlib/Seaborn

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📗 Month 2: Core Machine Learning Concepts

Topics:

- ML Workflow: Data Collection, Cleaning, Modeling, Evaluation
- Supervised Learning:
    - Linear Regression, Logistic Regression
    - K-Nearest Neighbors, Decision Trees, Random Forest
- Model Evaluation:
    - Accuracy, Precision, Recall, F1 Score, ROC

Tools:

- Scikit-learn
- Jupyter Notebook

Projects:

- House Price Prediction
- Iris Flower Classification

📙 Month 3: Advanced ML & Unsupervised Learning

Topics:

- Unsupervised Learning:
    - K-Means Clustering, Hierarchical Clustering

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    - PCA (Principal Component Analysis)
- Ensemble Models:
    - Gradient Boosting, XGBoost
- Model Tuning:
    - Grid Search, Cross Validation
- Introduction to Deep Learning:
    - Perceptron, Neural Networks

Projects:

- Customer Segmentation
- Dimensionality Reduction on Image Dataset

📒 Month 4: Introduction to NLP & Text Preprocessing

Topics:

- What is NLP?
- Text Cleaning:
    - Tokenization, Stopwords, Lemmatization, Stemming
- Bag of Words (BoW), TF-IDF
- N-grams
- Feature Extraction with CountVectorizer and TfidfVectorizer

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Tools:

- NLTK, spaCy, Scikit-learn

Projects:

- Spam Detection using BoW/TF-IDF
- News Classification

📕 Month 5: NLP Modeling & Deep Learning in NLP

Topics:

- Text Classification using ML & Deep Learning
- Word Embeddings:
    - Word2Vec, GloVe, FastText
- RNNs, LSTMs, GRUs for NLP
- Introduction to Transformers (BERT basics)

Tools:

- Keras/TensorFlow or PyTorch
- Hugging Face Transformers (Intro)

Projects:

- Sentiment Analysis on Movie Reviews
- Named Entity Recognition (NER)

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📓 Month 6: Capstone Projects & Deployment

Topics:

- Model Saving & Loading
- Introduction to Model Deployment using Flask or Streamlit
- GitHub & Version Control Basics
- Resume & Interview Preparation

Capstone Project Ideas:

- Chatbot using NLP techniques
- Fake News Detection
- Resume Parser
- Email Intent Classification

🛠️ Tools & Libraries Covered

- **Languages**: Python
- **ML Libraries**: scikit-learn, XGBoost
- **NLP Libraries**: NLTK, spaCy, Hugging Face
- **Deep Learning**: TensorFlow/Keras or PyTorch
- **Visualization**: Matplotlib, Seaborn
- **Deployment**: Flask, Streamlit

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