ROADMAP TO GET YOU STARTED IN AI/ML
By AICVS

Semester 1: Basics of Programming and Mathematics

Objective: Build a strong foundation in programming and essential mathematical concepts for AI/ML.

1. **Learn Python:**
    - Focus on Python basics, syntax, and libraries like NumPy and Pandas.
    - Practice problem-solving on platforms like LeetCode or HackerRank.
2. **Mathematics:**
    - **Linear Algebra:** Vectors, matrices, and operations (Khan Academy or 3Blue1Brown on YouTube).
    - **Probability & Statistics:** Basics of probability distributions, mean, variance, and standard deviation.
3. **Resources:**
    - *The Joy of Programming using Python - NPTEL Course*
    - Apna College Python series on Youtube (throughout your prep)
4. **Mini-Project:**
    - Easy:- https://www.geeksforgeeks.org/number-guessing-game-in-python/
    - Medium:- https://www.geeksforgeeks.org/21-number-game-in-python/

Semester 2: Intermediate Python and Introduction to Data Science

Objective: Deepen programming skills and introduce data science concepts.

1. **Advanced Python:**
    - Learn OOP concepts, file handling, and exception handling.

- Explore libraries like Matplotlib and Seaborn for data visualization.

2. **Mathematics:**
   - Calculus: Differentiation and integration basics.
   - Statistics: Hypothesis testing, p-values, confidence intervals**.**
3. **Introduction to Data Science:**
   - Data cleaning, exploratory data analysis (EDA), data visualization techniques.
   - Learn about datasets (Kaggle) and how to use them.
4. **Mini-Project:**
   - Easy:- Basic Data Analysis with Pandas

     Perform simple data analysis on a dataset (e.g., analyze the Titanic dataset: count survivors, plot age distribution, etc.).
     Requirements:- Pandas for data manipulation, Matplotlib for visualization, basic data cleaning.

   - Medium:- Data Visualization with Matplotlib/Seaborn
     E.g Use a dataset (e.g., student performance, COVID-19 cases) to create visualizations such as bar charts, histograms, and scatter plots.

Semester 3: Introduction to Machine Learning

Objective: Familiarize with core ML algorithms and techniques.

1. **Math for ML:**
   - Matrix operations, vector calculus, and optimization basics.
   - **Probability:** Bayes' Theorem and conditional probability.
2. **ML Basics:**
   - Algorithms: Linear Regression, Logistic Regression, Decision Trees, k-NN, Clustering (k-Means), PCA, and dimensionality reduction techniques.
   - Hands-on with Scikit-learn for implementing these algorithms.
3. **Mini-Project:**
   - Build a simple supervised learning model (e.g., predict house prices or classify flowers).
   - Check Lab Syllabus of Sem 4.

Semester 4: Advanced Machine Learning and AI Concepts

Objective: Dive deeper into advanced ML and AI topics, including neural networks and real-world applications.

1. **Deep Learning Basics:**
   - Introduction to Neural Networks, activation functions, and backpropagation.

    - Learn about TensorFlow and Keras for building neural networks.
2. **Start Exploring AI:**
    - Explore basics of NLP and Computer Vision (optional for students who are more interested).
3. **Resources:**
    - 3 Courses on Coursera by Andrew NG **:-**

      https://www.coursera.org/learn/machine-learning?language=French

      https://www.coursera.org/specializations/deep-learning

      https://www.coursera.org/learn/introduction-tensorflow?language=French

      A fun youtube channel to learn Stats and Machine Learning: StatQuest with Josh Starmer - YouTube

      Pro Tip:- Join AICVS and Learn Together!!:)