Download Roadmap

1. Prerequisites

- Basic Math & Statistics
  - Topics:
    - Linear Algebra
    - Probability & Statistics
    - Calculus Basics
- Basic Programming (Python preferred)
- Understanding of Algorithms and Data Structures

2. Programming & Tools

- Python for Data Science
- Jupyter Notebooks
- Virtual Environments (venv, conda)
- Version Control (Git + GitHub)

3. Libraries & Frameworks

- pandas
- numpy
- matplotlib
- seaborn
- plotly
- scikit-learn
- xgboost
- tensorflow / keras
- pytorch

Data Wrangling & Analysis

- Working with CSV, JSON, Excel
- APIs and Web Scraping (requests, beau ıp4)
- Data Cleaning and Handling Missing Va
- Exploratory Data Analysis (EDA)

5. Databases & SQL

- SQL Basics (SELECT, WHERE, JOIN, GROUP BY)
- PostgreSQL / MySQL
- sqlite3 / sqlalchemy in Python

6. Machine Learning

- Supervised vs Unsupervised Learning
- Regression and Classification
- Clustering (K-Means, Hierarchical)
- Dimensionality Reduction (PCA, t-SNE)
- Evaluation Metrics: Accuracy, Precision, Recall, F1
- Basic Model Deployment

Deep Learning (Intermediate)

- Neural Networks
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs, LSTMs)
- Transfer Learning
- GPU Acceleration

8. Projects & Portfolio

- End-to-End Projects
- Kaggle Competitions
- Dashboards (Streamlit, Dash)
- Model APIs (Flask, FastAPI)
- Showcase on GitHub

9. Deployment & Scaling

- Docker
- Deployment Platforms (Render, HuggingFace, AWS)
- ML Pipelines (MLflow, DVC)
- Monitoring and Retraining

10. Optional & Advanced Topics

- Natural Language Processing (NLP)
- Time Series Forecasting
- Recommendation Systems

- Big Data Tools (Hadoop, Spark)
- Reinforcement Learning
- Data Engineering Basics (Airflow, ETL)