AI Learning Roadmap

1. Foundations (Math + Programming)

- Mathematics: Linear Algebra, Probability & Statistics, Calculus
- Programming: Python (NumPy, Pandas, Matplotlib), Git/GitHub, Jupyter/Colab

2. Core Machine Learning

- Concepts: Supervised vs Unsupervised Learning, Bias-Variance tradeoff, Evaluation metrics
- Algorithms: Regression, Decision Trees, Random Forests, XGBoost, KNN, SVM, Naive Bayes, K-Means
- Libraries: scikit-learn, Statsmodels

3. Deep Learning

- Neural Networks: MLPs, Activation functions, Loss functions, Backpropagation
- Frameworks: TensorFlow, PyTorch
- Architectures: CNNs (Vision), RNNs/LSTMs (Sequences), Transformers (NLP, Vision)

4. Specializations

- NLP: Text preprocessing, embeddings, BERT, GPT, Hugging Face Transformers
- Computer Vision: Image classification, Object detection, Segmentation, OpenCV, YOLO
- Reinforcement Learning: Q-learning, Policy Gradients, PPO
- Generative AI: GANs, Diffusion Models, LLM fine-tuning

5. MLOps & Deployment

- Docker, Kubernetes
- FastAPI / Flask for serving models
- MLflow, Weights & Biases
- Cloud platforms: AWS, GCP, Azure

6. Real-World Projects

- Spam classifier, Image recognition app, Chatbot with LLMs
- Stock price prediction, Recommendation system
- Kaggle competitions

7. Advanced Topics

- AI Ethics & Bias
- Explainable AI (SHAP, LIME)
- Advanced optimization (AdamW, LR schedulers)
- Scaling laws for LLMs

Tips

- Learn by projects, not just theory
- Follow 70:20:10 rule (Practice, Reading, Math)
- Network on GitHub, Kaggle, LinkedIn