

Action plan to learn AIML

Week 1: Introduction to Machine Learning

Understand supervised and unsupervised learning.
Linear regression, logistic regression.
Key concepts: overfitting, underfitting, model evaluation.
Clustering (K-means).
Dimensionality reduction (PCA).
Watch lectures from "Machine Learning" by Andrew Ng on Coursera.
Implement linear regression and K-means clustering on sample datasets.

Week 2: Supervised Learning Algorithms

Classification Algorithms:

Decision Trees, Random Forests.
Support Vector Machines (SVM).

Regression Algorithms:

Polynomial Regression.
Regularization techniques (Ridge, Lasso).

Use Scikit-Learn to implement and compare classification and regression algorithms on datasets like the Iris dataset.

Week 3: Unsupervised Learning Algorithms

Hierarchical Clustering.

DBSCAN.

t-SNE

Implement hierarchical clustering and t-SNE on different datasets.

Compare the results of different clustering techniques.

Week 4: Neural Networks and Deep Learning

Neurons, activation functions.
Forward and backward propagation.

Deep Learning Frameworks:

- Introduction to TensorFlow and Keras.

- Building a simple neural network.

- Implement a basic neural network for digit recognition (MNIST dataset).

Week 5: Model Evaluation and Hyperparameter Tuning

Model Evaluation:

- Metrics: accuracy, precision, recall, F1 score.

- Confusion Matrix, ROC Curve.

Hyperparameter Tuning:

- Grid Search, Random Search.

- Perform hyperparameter tuning using GridSearchCV on a chosen model.

Week 6-7: Project Development

- Apply the learned concepts to a real-world project.

Project Example: Predicting House Price

Activities:

- Days 1-2: Define project scope, gather data from Kaggle (e.g., House Prices dataset).

- Days 3-4: Preprocess the data (cleaning, feature engineering).

- Days 5-6: Implement and train multiple models (regression, decision trees, etc.).

- Day 7: Evaluate models, tune hyperparameters, select the best model.

- Day 8: Documentation

Week 8: Deployment and Final Project

- Learn how to deploy AI/ML models and finalize a comprehensive project

Model Deployment:

- Creating APIs with Flask or FastAPI.

- Deploying models on cloud platforms (AWS, Google Cloud, Azure).

Final Project:

- Integrate all learned concepts into a complex project.

- Focus on deployment and real-world application.

Example Final Project

Final Project: Sentiment Analysis on Movie Review.

Activities:

Days 1-2: Define project scope and gather data (e.g., IMDB movie reviews dataset).

Days 3-4: Preprocess text data (cleaning, tokenization, lemmatization).

Days 5-6: Train multiple models (e.g., Naive Bayes, LSTM) for sentiment classification.

Days 7: Evaluate models, fine-tune parameters, and finalize the best model.

Days 8: Create an API with Flask or FastAPI to serve the model and deploy it on a cloud platform.

References

Learn Python, focusing on libraries like NumPy, Pandas, and Matplotlib.

Python for Data Science Handbook

Study linear algebra, calculus, probability, and statistics. These are crucial for understanding ML algorithms.

Khan Academy Math Courses

Supervised Learning

Concepts: Regression, Classification

Algorithms: Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM), Naive Bayes, k-Nearest Neighbors (KNN)

Andrew Ng's Machine Learning course on Coursera

Scikit-Learn documentation

Unsupervised Learning

Concepts: Clustering, Dimensionality Reduction

Algorithms: K-means, Hierarchical Clustering, DBSCAN, Principal Component Analysis (PCA), t-Distributed Stochastic Neighbor Embedding (t-SNE)

DeepwizAI Roadmap

KDnuggets articles

Random Forests, Gradient Boosting

Deep Learning

Concepts: Neural Networks, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs)

Frameworks: TensorFlow, PyTorch

TensorFlow and PyTorch tutorials
DeepLearning.AI courses

Machine Learning Projects

Projects: Predictive modeling with Titanic dataset (Kaggle), Image classification with MNIST dataset, Sentiment analysis on movie reviews

Kaggle Datasets

The Complete Machine Learning Study Roadmap by KDnuggets

Learn to deploy ML models using Flask, Django, and cloud services (AWS, Azure, GCP).

Flask Documentation

AWS Machine Learning services

Courses:

Machine Learning by Andrew Ng (Coursera)

Deep Learning Specialization (Coursera)

Books:

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow by Aurelien Geron

Pattern Recognition and Machine Learning by Christopher M. Bishop