Your 14-Week Journey to Machine Learning Mastery

Master machine learning through a practical, hands-on approach designed for beginners. You'll learn 8 core algorithms that solve real-world problems—from predicting house prices to detecting fraud. Each algorithm follows a proven cycle: understand the concept, build it from scratch, then apply it to real projects. With just 2 hours of daily practice, you'll transform from complete beginner to confident practitioner ready for advanced topics.

FOUNDATION

The Big Picture: What is Machine Learning?

Machine learning teaches computers to recognize patterns in data and make intelligent predictions without explicit programming.

Regression Problems

Predict numbers like house prices, salaries, or temperatures

Classification Problems

Make yes/no decisions: spam detection, disease diagnosis, customer churn

WEEK 0

Setup Week: Building Your Foundation

Invest 3-5 days preparing your development environment and mastering essential Python skills. This preparation ensures you'll move smoothly through the algorithm training.

01

Install Your Toolkit

Set up Python, VS Code or PyCharm, Anaconda, and Jupyter Notebook

02

Master Python Essentials

Learn lists, dictionaries, loops, functions, NumPy, Pandas, and Matplotlib—only what you need

03

Practice Mini-Project

Load a CSV file, calculate statistics, and create visualizations to confirm you're ready

WEEKS 1-2

Linear Regression: Your Gateway Algorithm

Start with the most intuitive algorithm in machine learning. Linear regression predicts continuous numbers by finding the best-fit line through your data points. You'll predict house prices, salaries, sales figures, and more.

The Learning Cycle

- **Days 1-2:** Grasp core concepts without coding—features, targets, models, MSE, and gradient descent
- **Days 3-5:** Build from scratch using only NumPy (no libraries yet!) to develop true understanding
- **Days 6-7:** Evaluate model performance with train/test splits, R^2 scores, and residual plots

Week 2 Milestone Project

House Price Predictor

Apply everything you've learned to predict real estate values. Clean data, scale features, train your model, and visualize predictions. Push your completed notebook to GitHub—your first portfolio piece is live.

WEEKS 3-4

Logistic Regression: Enter Classification

Transition from predicting numbers to predicting categories. Logistic regression introduces probability—instead of "how much?" it answers "how likely?" Perfect for spam detection, disease diagnosis, and purchase prediction.

New Concepts Unlocked

- Sigmoid function transforms predictions into probabilities
- Decision boundaries separate different classes
- Log loss measures classification accuracy

Evaluation Metrics

Master confusion matrices, precision, recall, F1 scores, and ROC curves—critical for any ML role

Week 4 Project

Spam Email Classifier: Convert text to numbers using TF-IDF and build a real spam detector

Weeks 5-8: Tree-Based Algorithms

Weeks 5-6: Decision Trees

Learn algorithms that think like humans using IF-THEN rules. Build intuitive models and visualize decision paths.

Project: Loan Approval Predictor

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Weeks 7-8: Random Forest

Combine multiple weak trees into one powerful model. Discover ensemble learning, bagging, and feature importance.

Project: Fraud Detection System

Decision trees are prone to overfitting, but Random Forests solve this by averaging multiple trees trained on different data subsets—transforming weakness into strength through teamwork.

Weeks 9-12: Advanced Classification Techniques

Weeks 9-10: Support Vector Machine

Draw optimal boundaries between classes using margins and support vectors. Learn kernel tricks for complex patterns.

Project: Sentiment Analyzer for movie reviews

Week 11: K-Nearest Neighbors

Predict by finding similar examples. Simple yet powerful for recommendation systems.

Project: Movie Recommendation Engine

Week 12: Naive Bayes

Fast probability-based classification, perfect for text analysis and real-time predictions.

Project: News Category Classifier

These four weeks introduce specialized algorithms, each with unique strengths. SVMs excel at finding optimal boundaries, KNN thrives on similarity matching, and Naive Bayes shines with text classification.

By week 12, you'll have a toolkit of 7 algorithms and 7 completed projects demonstrating your growing expertise.

WEEKS 13-14

Neural Networks: Your Gateway to Deep Learning

Reach the frontier of modern machine learning. Neural networks unlock image recognition, natural language processing, and beyond. You'll understand the architecture behind today's AI revolution.

Core Concepts

Neurons, activation functions, forward propagation, and backpropagation

Build From Scratch

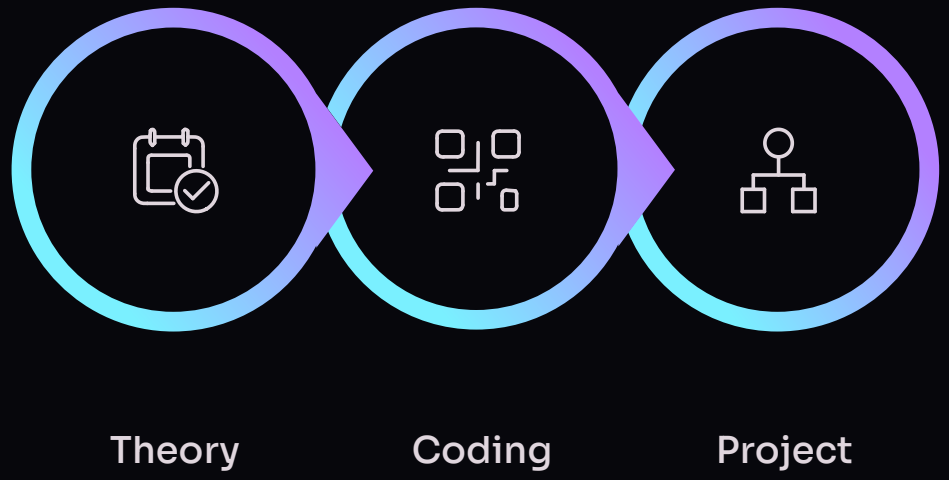
Implement a neural network using only NumPy to truly understand the mathematics

Capstone Project

Fashion Image Classifier—recognize clothing items from images

> After these two weeks, you'll understand the foundation of deep learning and be ready to explore advanced architectures like CNNs and RNNs.

Your Daily Success Routine



Consistency Over Speed

Success in machine learning comes from steady, daily practice—not marathon study sessions.

Every Weekday

- **First Hour:** Watch tutorials, read documentation, take detailed notes
- **Second Hour:** Code, experiment, break things and fix them

Every Weekend

Dedicate time to building your weekly project. These projects become your portfolio.

What Comes Next: Your ML Future

Complete this 14-week roadmap with a capstone project: build a full machine learning application using Streamlit. Compare multiple algorithms, clean real-world data, and deploy a working web app. This becomes your portfolio centerpiece.

Deep Learning

CNNs, RNNs, transformers

NLP

Text analysis, chatbots, language models

Computer Vision

Image recognition, object detection

MLOps

Production deployment, monitoring

After 14 weeks, you'll no longer be a beginner. You'll have 8 algorithms mastered, 8+ projects completed, and the confidence to tackle advanced topics. Your machine learning journey is just beginning.