Introduction to Machine Learning

Machine learning represents a paradigm shift in how we approach problem-solving with computers. Instead of explicitly programming solutions, we enable systems to learn patterns from data and make predictions or decisions based on that learning.

Mathematical Foundations

The core of many machine learning algorithms relies on mathematical optimization. For example, linear regression seeks to minimize the cost function:

J(?) = (1/2m) ?(h?(xi) - yi)²

where ? represents the parameters, m is the number of training examples, h?(xi) is the hypothesis function, and yi is the actual output.

Types of Machine Learning

1. Supervised Learning: Uses labeled training data
   - Classification: Predicting discrete categories
   - Regression: Predicting continuous v

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