Python, Hand-on Supervised Learning Task

Classification Algorithms (Support Vector Machines (SVM))

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Title Machine Learning Boot-Camp

Data science and Artificial Intelligence
3-Months Course
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Support Vector Machines (SVM)

- **Definition:** SVM is a supervised machine learning algorithm that classifies data points by finding the hyperplane that maximizes the margin between different classes.
- **History:** Introduced by Vladimir N. Vapnik and Alexey Ya. Chervonenkis in 1963. Became popular in the 1990s for its effectiveness in high-dimensional spaces.
- **Working Principle:**
  - Find the hyperplane with the maximum margin.
  - Classify data points based on their position relative to the hyperplane.
- **Examples:**
  - Image classification.
  - Spam detection.

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Support Vector Machines (SVM): Mathematical Formulation

- **Mathematical Notation:**

$$y(x) = \text{sign}(\sum_{i=1}^{N} \alpha_i y_i K(x, x_i) + b)$$

Support Vector Machines (SVM) Example

- **Problem:** Binary classification with two features (X_1 and X_2).
- **Data:**

Example	X_1	X_2
1	2	3
2	3	3
3	3	4
4	4	4
5	4	5
6	5	5

- **SVM Model:**

$$y(x) = \text{sign}(\sum_{i=1}^{N} \alpha_i y_i K(x, x_i) + b)$$

- **Calculation:** (Demonstrate step-by-step calculation for a specific example)

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Questions and Answers

Hand-0n "Lab-Logistic Regression" available at GitHub