UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

Trends in Computer Science

4COSC008C

Machine Learning

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Overview of Machine learning

- Machine learning is a subcategory of artificial intelligence that focuses on building systems from data.
- Focuses on developing systems through data.
- Applications include identifying malware risks in autonomous vehicles.
- Forecasts consumer purchasing patterns. Optimization

(Colins, 2017)

What is Machine learning

- Machine learning is the branch of computer science that enables computers to learn without direct programming.
- It involves the research and deployment of algorithms and techniques that enable machines to answer crucial business questions.
- The evolution of machine learning has led to the question of whether machines will become better learners than humans.
- Machine learning methods include Supervised Machine Learning, which maps inputs to substances using examples of input-substance pairs, and Unsupervised Machine Learning, which uses previously learned features to identify new data classes.
- Both methods aim to improve the learning capabilities of machines and are gaining popularity in various fields.

(Colins, 2017)

What is Conventional Computing

- Computers follow preprogrammed, fixed instructions to perform tasks.
- Set algorithms ensure consistent results.
- Machine language: Only includes 1 and 0, a collection of instructions.
- Central processor unit: The "brain" of a computer. Circuits carry out calculations.
- CMOS transistors: Common type made using metal oxide semiconductors. Computer memory unit stores data and instructions.
- Only specific tasks can be completed in traditional computers.

(Seife, 2005)

Comparison between Machine Learning and Conventional Computing

Machine Learning

- Learns from data and improves over time
- Trains models with data
- Image recognition, recommendation systems, self-driving cars
- Based on AI

VS

Conventional Computing

- Does not learn ; follows fixed instructions
- Based on explicit programming and predefined logic
- Word processors, spreadsheets, operating systems
- Based on Digital Circuits

(Seife, 2005)
(El Naqa and Murphy, 2015)

Critical Evaluation

- ✓ Used in various fields, requiring critical evaluation.
- ✓ Strengths: Detection and prediction on large data sets, useful in medical research and financial analysis.
- ✓ Learning from new data, but prediction accuracy depends on data quality.
- ✓ Limitations: Data should not be skewed.
- ✓ Overall, machine learning is a powerful tool, but usage should be understood.

(Sarker, 2021)

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