



JOHNS HOPKINS

WHITING SCHOOL  
of ENGINEERING

# Algorithms for Data Science

Unsupervised Learning: Introduction

# Module Learning Objectives

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1. Classify the different types of unsupervised learning problems including clustering, anomaly detection, dimensionality reduction, and mathematical transformations.
2. Analyze the computational complexity of unsupervised algorithms.
3. Explain the factors influencing complexity of unsupervised algorithms.
4. Evaluate the correctness of unsupervised algorithms using mathematical proofs.
5. Apply key statistical measures to analyze data variability and relationships in unsupervised tasks.

# Unsupervised Learning: An Overview

Unsupervised learning finds hidden patterns or intrinsic structures in data without labeled outputs.

## Key Features

No supervision or labels required

Focus on exploration and understanding



## Applications

Clustering

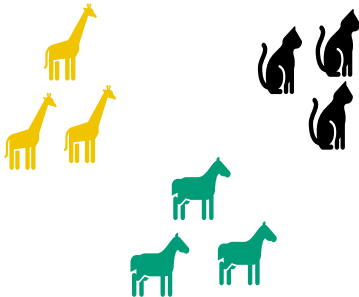
Dimensionality Reduction

Anomaly Detection

# Classes of Unsupervised Problems

## Clustering

Grouping data points based on similarity.



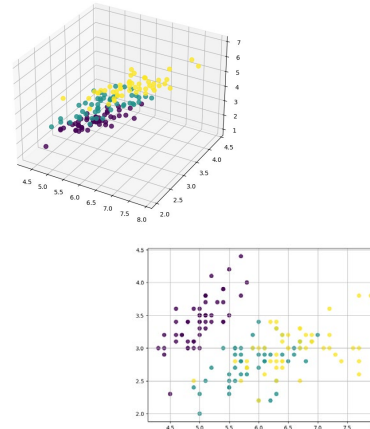
## Anomaly Detection

Identifying outliers or unusual patterns.



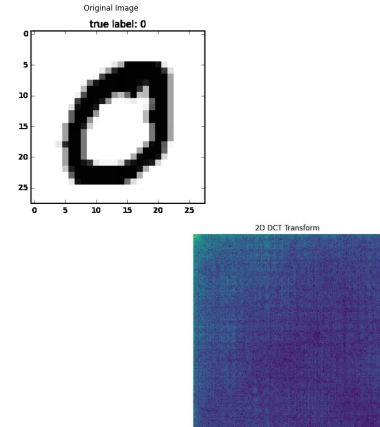
## Dimensionality Reduction

Reducing data complexity while retaining key patterns.



## Mathematical Transformations

Transforming data into new representations to uncover hidden structure.





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