



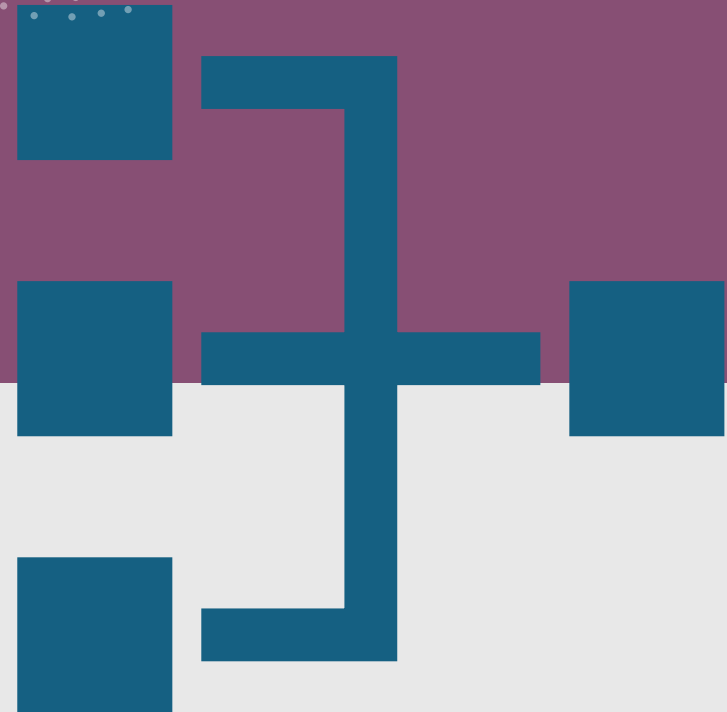
Principal Component Analysis (PCA)

Understanding PCA in Simple Terms

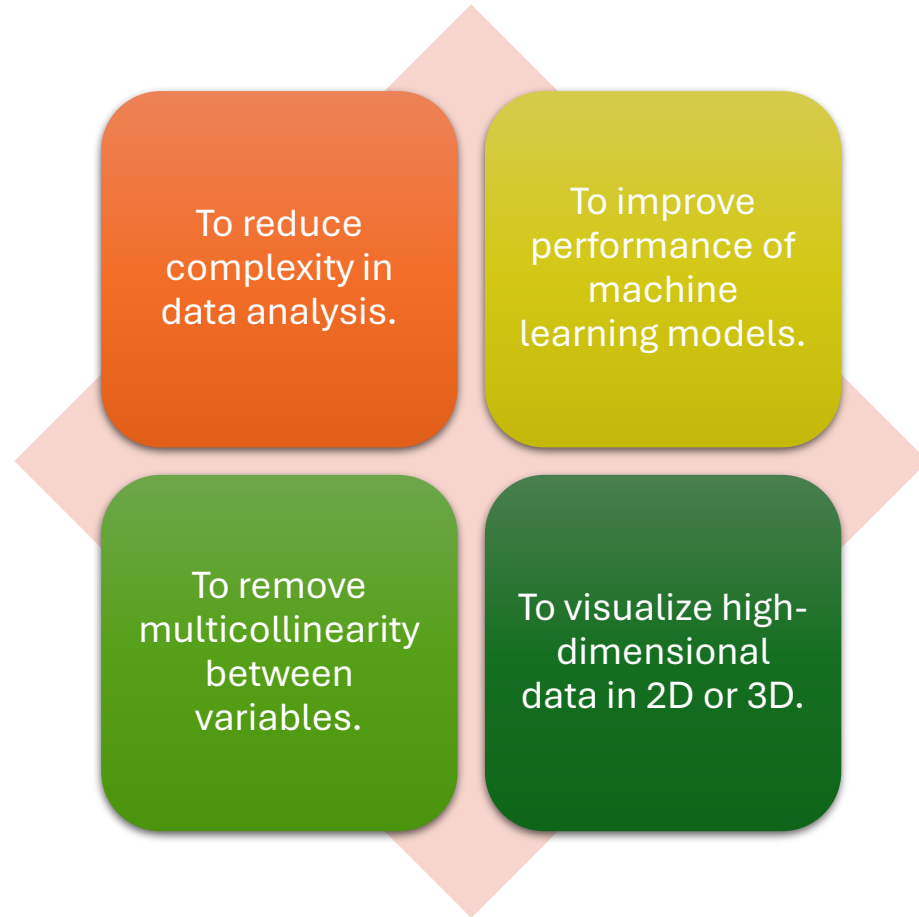


What is PCA?

Principal Component Analysis (PCA) is a dimensionality reduction technique. It converts high-dimensional data into fewer dimensions. PCA retains most of the original information while simplifying the data. Useful for visualization, noise reduction, and feature extraction.



Why Use PCA?



Steps in Performing PCA

Standardize	Standardize the data.
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Calculate	Calculate the covariance matrix.
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Compute	Compute eigenvalues and eigenvectors.
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Select	Select principal components based on eigenvalues.
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Project	Project data onto principal components.
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Key Terminologies

- Covariance Matrix: Shows the relationship between variables.
- Eigenvectors: Directions of the new feature space.
- Eigenvalues: Magnitude of variance captured by each principal component.
- Principal Components: Linear combinations of original features.

Applications of PCA



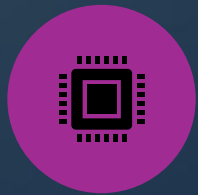
Image compression and recognition.



Financial data analysis.



Bioinformatics and genetics.



Pattern recognition and signal processing.



Preprocessing step in ML pipelines.

Visualizing PCA

PCA HELPS REDUCE
DATA TO 2 OR 3
DIMENSIONS FOR
PLOTting.

COMMONLY USED
FOR CLUSTERING
OR CLASSIFICATION
VISUALIZATION.

EACH POINT IS A
PROJECTION ON
THE PRINCIPAL
COMPONENTS.