ICA (Independent Component Analysis): a linear dimensionality reduction method; unlike PCA, which seeks uncorrelated components, ICA seeks statistically independent components.

- https://towardsdatascience.com/independent-component-analysis-ica-a3eba0ccec35
- https://medium.com/data-science/introduction-to-ica-independent-component-analysis-b2c3c4720cd9
- https://www.emerald.com/insight/content/doi/10.1016/j.aci.2018.08.006/full/pdf?title=independent-component-analysis-an-introduction
- 2002 - Independent component analysis an introduction

Factor Analysis (FA): an approach to find latent variables which are not directly measured in a single variable but rather inferred from other variables in the dataset.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.5)
- https://online.stat.psu.edu/stat505/lesson/12

Singular Value Decomposition (SVD): a matrix factorization technique used for dimensionality reduction, similar to PCA but more general. It decomposes a matrix into three components: U (left singular vectors), Σ (singular values), and V (right singular vectors).

- Chapter6Alpaydin – DimensionalityReduction (Section 6.6)
- 2022 - Feature dimensionality reduction a review

Non-negative matrix factorization (NMF): a matrix factorization method where we constrain the matrices to be nonnegative.

https://blog.acolyer.org/2019/02/18/the-why-and-how-of-nonnegative-matrix-factorization/

2022 - Feature dimensionality reduction a review (FA, ICA, MDS, SVD, NMF, PP, Isomap, LLE, LPP)

Multidimensional Scaling (MDS): linear dimensionality reduction technique that tries to preserve the distances between data.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.7)
- https://towardsdatascience.com/mds-multidimensional-scaling-smart-way-to-reduce-dimensionality-in-python-7c126984e60b

PP (Projection pursuit): non-linear dimensionality reduction technique which involves finding the most "interesting" possible projections in multidimensional data.

https://www.geeksforgeeks.org/projection-pursuit-using-python/

2022 - Feature dimensionality reduction a review

Canonical Correlation Analysis (CCA): used to identify and measure the linear relationships between two sets of variables (X and Y) measured on the same subjects. By creating linear combinations of each dataset (canonical variates), it maximizes the correlation between these sets, helping to understand how different groups of variables relate to one another.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.9)
- https://www.cs.cmu.edu/~tom/10701_sp11/slides/CCA_tutorial.pdf

Isomap (Isometric Mapping): a non-linear dimensionality reduction method based on the spectral theory which tries to preserve geodesic distances (the true distance along a curved manifold) in the lower dimensions. It MDS by replacing Euclidean distances with graph-based shortest paths to better uncover the underlying structure of complex, non-linear data.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.10)
- https://towardsdatascience.com/isomap-embedding-an-awesome-approach-to-non-linear-dimensionality-reduction-fc7efbca47a0

LLE (Locally Linear Embedding): a non-linear dimensionality reduction technique that can discover non-linear structures in the data set and, also preserve the distances within local neighborhoods. It operates by representing each data point as a linear combination of its nearest neighbors, ensuring that local geometry is maintained.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.11)
- https://towardsdatascience.com/lle-locally-linear-embedding-a-nifty-way-to-reduce-dimensionality-in-python-ab5c38336107

Laplacian Eigenmaps: a non-linear dimensionality reduction technique that computes low-dimensional embeddings by preserving local neighborhood information from high-dimensional data. It models data as a graph and uses the eigenvectors of the Laplacian matrix to find a, embedding that keeps nearby points close together, making it effective for uncovering hidden manifold structures.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.12)
- 2025 - Exploring unsupervised feature extraction algorithms tackling high dimensionality in small datasets

t-SNE: t-Distributed Stochastic Neighbor Embedding: mainly used for visualizing high-dimensional data in lower dimensions. It works by preserving local structures, keeping similar points together while mapping them to a lower-dimensional space, making it highly effective for identifying clusters and complex patterns.

- Chapter6Alpaydin – DimensionalityReduction (Section 6.13)
- https://towardsdatascience.com/t-sne-machine-learning-algorithm-a-great-tool-for-dimensionality-reduction-in-python-ec01552f1a1e
- https://towardsdatascience.com/t-sne-clearly-explained-d84c537f53a
- https://medium.com/data-science/t-sne-clearly-explained-d84c537f53a

UMAP (Uniform Manifold Approximation and Projection): a non-linear dimensionality reduction technique based on manifold learning, mainly used for high-dimensional data visualization. It focuses on preserving both local and global structures in the data, similar to t-SNE but faster and better suited for large datasets.

- https://towardsdatascience.com/umap-dimensionality-reduction-an-incredibly-robust-machine-learning-algorithm-b5acb01de568
- 2025 - A Survey Potential Dimensionality Reduction Methods For Data Reduction