Decomposing

<https://scikit-learn.org/stable/modules/decomposition.html#principal-component-analysis-pca>

LDA: **Linear discriminant analysis** (**LDA**), **normal discriminant analysis** (**NDA**), or **discriminant function analysis** is a generalization of **Fisher's linear discriminant**, a method used in [statistics](https://en.wikipedia.org/wiki/Statistics), [pattern recognition](https://en.wikipedia.org/wiki/Pattern_recognition), and [machine learning](https://en.wikipedia.org/wiki/Machine_learning) to find a [linear combination](https://en.wikipedia.org/wiki/Linear_combination) of [features](https://en.wikipedia.org/wiki/Features_(pattern_recognition)) that characterizes or separates two or more classes of objects or events. The resulting combination may be used as a [linear classifier](https://en.wikipedia.org/wiki/Linear_classifier), or, more commonly, for [dimensionality reduction](https://en.wikipedia.org/wiki/Dimensionality_reduction) before later [classification](https://en.wikipedia.org/wiki/Statistical_classification).

* <https://www.youtube.com/watch?v=azXCzI57Yfc>
* linear discriminant analysis example <https://en.wikipedia.org/wiki/Linear_discriminant_analysis>

LDA is also closely related to [principal component analysis](https://en.wikipedia.org/wiki/Principal_component_analysis) (PCA) and [factor analysis](https://en.wikipedia.org/wiki/Factor_analysis) in that they both look for linear combinations of variables which best explain the data.[[4]](https://en.wikipedia.org/wiki/Linear_discriminant_analysis#cite_note-Martinez:2001-4) LDA explicitly attempts to model the difference between the classes of data. PCA, in contrast, does not take into account any difference in class, and factor analysis builds the feature combinations based on differences rather than similarities. Discriminant analysis is also different from factor analysis in that it is not an interdependence technique: a distinction between independent variables and dependent variables (also called criterion variables) must be made.