SharpMiner

SharpMiner is a powerful .NET library for conducting advanced multifactor analysis, offering a suite of algorithms such as Principal Component Analysis (PCA), Correspondence Analysis (CA), Multiple Correspondence Analysis (MCA), and Hierarchical Clustering on Principal Components (HCPC). Designed with data analysts and scientists in mind, SharpMiner enables efficient data exploration, dimension reduction, and clustering, complemented by a range of visualization tools for clear, insightful results interpretation.

Features

- **Principal Component Analysis (PCA):** Break down high-dimensional data into key components to understand variance, reduce dimensions, and reveal hidden structures.
- **Correspondence Analysis (CA):** Ideal for analyzing relationships within categorical data, particularly effective with contingency tables and survey data.
- **Multiple Correspondence Analysis (MCA):** Expand CA capabilities to handle multiple categorical variables, supporting complex categorical datasets with ease.
- **Hierarchical Clustering on Principal Components (HCPC):** Combine clustering and PCA to identify natural data groupings, useful for hierarchical and cluster-based segmentation.
- **Integrated Visualization Tools:** Generate intuitive charts and plots, including correlation circles, biplots, scree plots, dendrograms, and cluster heatmaps, making result interpretation straightforward and visually engaging.

Benefits

- **User-Friendly API:** SharpMiner’s intuitive API and flexible parameters allow seamless integration into .NET applications, with clear workflows and customizable methods.
- **Optimized Performance:** Engineered for high efficiency, SharpMiner handles complex datasets quickly, enabling you to perform sophisticated analyses with minimal processing time.
- **Comprehensive Documentation and Examples:** Step-by-step guidance and examples make it easy to get started with each analysis type, from data preprocessing to visual output interpretation.

Visualization Highlights

- Plot component contributions and interpret variable correlations using correlation circles.
- Explore dataset structures and dimensional variance through biplots and scree plots.
- Understand clustering patterns and relationships through dendrograms and cluster heatmaps.

Use Cases

- Customer segmentation and market research
- Survey and social science data analysis
- Biomedical research, genomics, and bioinformatics
- Text mining, sentiment analysis, and NLP
- General exploratory data analysis for business and academic research

With SharpMiner, your multifactor analysis workflows become both comprehensive and accessible, providing you with a powerful toolkit to explore, analyze, and visualize complex datasets with ease.

Namespace SharpMiner

Classes

Component
: Represent a principal component. A PC is a linear combination of the original variables that maximally explain the variance of all the variables

DataSetLoader
: This class contains helper methods to read a dataset.

FactorResults
: This class represents a summary of the factor analysis.

MatrixHelper
: Helper class that contains various static methods

PrincipalComponentAnalysis
: This class implements the Principal Component Analysis algortithm

Specs
: This class is used to parameterize a Computation

Enums

DecompositionMethod
: Specify which decomposition method to use to compute the principal components

FactorMethod