Applied Multivariate Data Analysis Everitt

Design matrix

Wichern, Dean W (2001). Applied Multivariate Statistical Analysis. Pearson. pp. 111–112. ISBN 0131877151. "Basic Concepts for Multivariate Statistics p.2" (PDF)

In statistics and in particular in regression analysis, a design matrix, also known as model matrix or regressor matrix and often denoted by X, is a matrix of values of explanatory variables of a set of objects. Each row represents an individual object, with the successive columns corresponding to the variables and their specific values for that object. The design matrix is used in certain statistical models, e.g., the general linear model. It can contain indicator variables (ones and zeros) that indicate group membership in an ANOVA, or it can contain values of continuous variables.

The design matrix contains data on the independent variables (also called explanatory variables), in a statistical model that is intended to explain observed data on a response variable (often called a dependent...

Standard score

(Second ed.), openintro.org Everitt, Brian; Hothorn, Torsten J (2011), An Introduction to Applied Multivariate Analysis with R, Springer, ISBN 978-1441996497

In statistics, the standard score or z-score is the number of standard deviations by which the value of a raw score (i.e., an observed value or data point) is above or below the mean value of what is being observed or measured. Raw scores above the mean have positive standard scores, while those below the mean have negative standard scores.

It is calculated by subtracting the population mean from an individual raw score and then dividing the difference by the population standard deviation. This process of converting a raw score into a standard score is called standardizing or normalizing (however, "normalizing" can refer to many types of ratios; see Normalization for more).

Standard scores are most commonly called z-scores; the two terms may be used interchangeably, as they are in this article...

Statistics

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Statistics (from German: Statistik, orig. "description of a state, a country") is the discipline that concerns the collection, organization, analysis, interpretation, and presentation of data. In applying statistics to a scientific, industrial, or social problem, it is conventional to begin with a statistical population or a statistical model to be studied. Populations can be diverse groups of people or objects such as "all people living in a country" or "every atom composing a crystal". Statistics deals with every aspect of data, including the planning of data collection in terms of the design of surveys and experiments.

When census data (comprising every member of the target population) cannot be collected, statisticians collect data by developing specific experiment designs and survey samples...

Latent variable model

Fiona; Moustaki, Irini; Galbraith, Jane I. (2002). The Analysis and Interpretation of Multivariate Data for Social Scientists. Chapman & Hall/CRC. p. 145.

A latent variable model is a statistical model that relates set of observable variables (also called manifest variables or indicators) to a set of latent variables. Latent variable models are applied across a wide range of fields such as biology, computer science, and social science. Common use cases for latent variable models include applications in psychometrics (e.g., summarizing responses to a set of survey questions with a factor analysis model positing a smaller number of psychological attributes, such as the trait extraversion, that are presumed to cause the survey question responses), and natural language processing (e.g., a topic model summarizing a corpus of texts with a number of "topics").

It is assumed that the responses on the indicators or manifest variables are the result of...

Cluster analysis

analysis is widely used in market research when working with multivariate data from surveys and test panels. Market researchers use cluster analysis to

Cluster analysis, or clustering, is a data analysis technique aimed at partitioning a set of objects into groups such that objects within the same group (called a cluster) exhibit greater similarity to one another (in some specific sense defined by the analyst) than to those in other groups (clusters). It is a main task of exploratory data analysis, and a common technique for statistical data analysis, used in many fields, including pattern recognition, image analysis, information retrieval, bioinformatics, data compression, computer graphics and machine learning.

Cluster analysis refers to a family of algorithms and tasks rather than one specific algorithm. It can be achieved by various algorithms that differ significantly in their understanding of what constitutes a cluster and how to efficiently...

Mixture model

would be computationally prohibitive. Here a pattern analysis routine is used to generate multivariate tail-dependencies consistent with a set of univariate

In statistics, a mixture model is a probabilistic model for representing the presence of subpopulations within an overall population, without requiring that an observed data set should identify the sub-population to which an individual observation belongs. Formally a mixture model corresponds to the mixture distribution that represents the probability distribution of observations in the overall population. However, while problems associated with "mixture distributions" relate to deriving the properties of the overall population from those of the sub-populations, "mixture models" are used to make statistical inferences about the properties of the sub-populations given only observations on the pooled population, without sub-population identity information. Mixture models are used for clustering...

SAS (software)

"Statistical Analysis System") is data and artificial intelligence software developed by SAS Institute for data management, advanced analytics, multivariate analysis

SAS (previously "Statistical Analysis System") is data and artificial intelligence software developed by SAS Institute for data management, advanced analytics, multivariate analysis, business intelligence, and predictive analytics.

SAS was developed at North Carolina State University from 1966 until 1976, when SAS Institute was incorporated. SAS was further developed in the 1980s and 1990s with the addition of new statistical procedures, additional components and the

introduction of JMP. A point-and-click interface was added in version 9 in 2004. A social media analytics product was added in 2010. SAS Viya, a suite of analytics and artificial intelligence software, was introduced in 2016.

Fabrizio Ruggeri

A. (2020), On a new class of multivariate prior distributions: theory and application in reliability. Bayesian Analysis, 16, 31-60. Rios Insua, D., Ruggeri

Fabrizio Ruggeri is an Italian statistician. His work focusses on Bayesian methods, specifically robustness and stochastic process inference. He has done innovative work on the sensitivity of Bayesian methods and incompletely specified priors. He has also worked on Bayesian wavelet methods, and on a vast variety of applications to industrial problems. His publications include well over 150 refereed papers and book chapters, as well as six books.

Lambda

definition of the de Bruijn–Newman constant Λ. Everitt, Brian (2011). An introduction to applied multivariate analysis with R. Use R! Ser. Torsten Hothorn. New

Lambda(; uppercase Λ, lowercase λ; Greek: λάμ(β)δα, lám(b)da; Ancient Greek: λά(μ)βδα, lá(m)bda), sometimes rendered lamda, labda or lamma, is the eleventh letter of the Greek alphabet, representing the voiced alveolar lateral approximant IPA: [l]; it derives from the Phoenician letter Lamed, and gave rise to Latin L and Cyrillic El (Л). In the system of Greek numerals, lambda has a value of 30. The ancient grammarians typically called it λάβδα (l□bdă, [lábda]) in Classical Greek times, whereas in Modern Greek it is λάμδα (lámda, ['lamða]), while the spelling λάμβδα (lámbda) was used (to varying degrees) throughout the lengthy transition between the two.

In early Greek alphabets, the shape and orientation of lambda varied. Most variants consisted of two straight strokes, one longer than the...

K-nearest neighbors algorithm

1016/S0003-2670(01)95359-0. Everitt, Brian S.; Landau, Sabine; Leese, Morven; and Stahl, Daniel (2011) "Miscellaneous Clustering Methods", in Cluster Analysis, 5th Edition

In statistics, the k-nearest neighbors algorithm (k-NN) is a non-parametric supervised learning method. It was first developed by Evelyn Fix and Joseph Hodges in 1951, and later expanded by Thomas Cover.

Most often, it is used for classification, as a k-NN classifier, the output of which is a class membership. An object is classified by a plurality vote of its neighbors, with the object being assigned to the class most common among its k nearest neighbors (k is a positive integer, typically small). If k = 1, then the object is simply assigned to the class of that single nearest neighbor.

The k-NN algorithm can also be generalized for regression. In k-NN regression, also known as nearest neighbor smoothing, the output is the property value for the object. This value is the average of the values...

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