

Matrices Problems And Solutions

Bohemian matrices

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A Bohemian matrix family is a set of matrices whose entries are members of a fixed, finite, and discrete set, referred to as the "population". The term "Bohemian" was first used to refer to matrices with entries consisting of integers of bounded height, hence the name, derived from the acronym Bounded Height Matrix of Integers (BOHEMI). The majority of published research on these matrix families studies populations of integers, although this is not strictly true of all possible Bohemian matrices. There is no single family of Bohemian matrices. Instead, a matrix can be said to be Bohemian with respect to a set from which its entries are drawn. Bohemian matrices may possess additional structure. For example, they may be Toeplitz matrices or upper Hessenberg matrices.

Raven's Progressive Matrices

Progressive Matrices (often referred to simply as Raven's Matrices) or RPM is a non-verbal test typically used to measure general human intelligence and abstract

Raven's Progressive Matrices (often referred to simply as Raven's Matrices) or RPM is a non-verbal test typically used to measure general human intelligence and abstract reasoning and is regarded as a non-verbal estimate of fluid intelligence. It is one of the most common tests administered to both groups and individuals ranging from 5-year-olds to the elderly. It comprises 60 multiple choice questions, listed in order of increasing difficulty. This format is designed to measure the test taker's reasoning ability, the eductive ("meaning-making") component of Spearman's g (g is often referred to as general intelligence).

The tests were originally developed by John C. Raven in 1936. In each test item, the subject is asked to identify the missing element that completes a pattern. Many patterns...

Riemann–Hilbert problem

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In mathematics, Riemann–Hilbert problems, named after Bernhard Riemann and David Hilbert, are a class of problems that arise in the study of differential equations in the complex plane. Several existence theorems for Riemann–Hilbert problems have been produced by Mark Krein, Israel Gohberg and others.

Hand–eye calibration problem

randomly perturbed matrices A and B. The problem is an important part of robot calibration, with efficiency and accuracy of the solutions determining the

In robotics and mathematics, the hand–eye calibration problem (also called the robot–sensor or robot–world calibration problem) is the problem of determining the transformation between a robot end-effector and a sensor or sensors (camera or laser scanner) or between a robot base and the world coordinate system. It is conceptually analogous to biological hand–eye coordination (hence the name). It takes the form of $AX=ZB$, where A and B are two systems, usually a robot base and a camera, and X and Z are unknown transformation matrices. A highly studied special case of the problem occurs where $X=Z$, taking the form of the problem $AX=XB$. Solutions to the problem take the forms of several types of methods, including separable closed-form solutions, simultaneous closed-form solutions, and iterative...

List of undecidable problems

finitely generated subsemigroups of integer matrices have a common element. Given a finite set of $n\times n$ matrices $A_1, \dots, A_m$

In computability theory, an undecidable problem is a decision problem for which an effective method (algorithm) to derive the correct answer does not exist. More formally, an undecidable problem is a problem whose language is not a recursive set; see the article Decidable language. There are uncountably many undecidable problems, so the list below is necessarily incomplete. Though undecidable languages are not recursive languages, they may be subsets of Turing recognizable languages: i.e., such undecidable languages may be recursively enumerable.

Many, if not most, undecidable problems in mathematics can be posed as word problems: determining when two distinct strings of symbols (encoding some mathematical concept or object) represent the same object or not.

For undecidability in axiomatic...

Numerical linear algebra

and Heinz Rutishauser, in order to apply the earliest computers to problems in continuous mathematics, such as ballistics problems and the solutions to

Numerical linear algebra, sometimes called applied linear algebra, is the study of how matrix operations can be used to create computer algorithms which efficiently and accurately provide approximate answers to questions in continuous mathematics. It is a subfield of numerical analysis, and a type of linear algebra. Computers use floating-point arithmetic and cannot exactly represent irrational data, so when a computer algorithm is applied to a matrix of data, it can sometimes increase the difference between a number stored in the computer and the true number that it is an approximation of. Numerical linear algebra uses properties of vectors and matrices to develop computer algorithms that minimize the error introduced by the computer, and is also concerned with ensuring that the algorithm...

M-matrix

Z-matrix) and whose eigenvalues have nonnegative real parts. The set of non-singular M-matrices are a subset of the class of P-matrices, and also of the

In mathematics, especially linear algebra, an M-matrix is a matrix whose off-diagonal entries are less than or equal to zero (i.e., it is a Z-matrix) and whose eigenvalues have nonnegative real parts. The set of non-singular M-matrices are a subset of the class of P-matrices, and also of the class of inverse-positive matrices (i.e. matrices with inverses belonging to the class of positive matrices). The name M-matrix was seemingly originally chosen by Alexander Ostrowski in reference to Hermann Minkowski, who proved that if a Z-matrix has all of its row sums positive, then the determinant of that matrix is positive.

List of named matrices

article lists some important classes of matrices used in mathematics, science and engineering. A matrix (plural matrices, or less commonly matrixes) is a rectangular

This article lists some important classes of matrices used in mathematics, science and engineering. A matrix (plural matrices, or less commonly matrixes) is a rectangular array of numbers called entries. Matrices have a long history of both study and application, leading to diverse ways of classifying matrices. A first group is matrices satisfying concrete conditions of the entries, including constant matrices. Important examples include the identity matrix given by

$$\begin{matrix} I \\ n \\ = \\ \begin{bmatrix} 1 & & \\ & \ddots & \\ & & 1 \end{bmatrix} \end{matrix}$$

Hadamard matrix

among matrices with entries of absolute value less than or equal to 1 and so is an extremal solution of Hadamard's maximal determinant problem. Certain

In mathematics, an Hadamard matrix, named after the French mathematician Jacques Hadamard, is a square matrix whose entries are either +1 or -1 and whose rows are mutually orthogonal. In geometric terms, this means that each pair of rows in a Hadamard matrix represents two perpendicular vectors, while in combinatorial terms, it means that each pair of rows has matching entries in exactly half of their columns and mismatched entries in the remaining columns. It is a consequence of this definition that the corresponding properties hold for columns as well as rows.

The n-dimensional parallelotope spanned by the rows of an n × n Hadamard matrix has the maximum possible n-dimensional volume among parallelotopes spanned by vectors whose entries are bounded in absolute value by 1. Equivalently, a...

Overdetermined system

inconsistent (it has no solution) when constructed with random coefficients. However, an overdetermined system will have solutions in some cases, for example

In mathematics, a system of equations is considered overdetermined if there are more equations than

unknowns. An overdetermined system is almost always inconsistent (it has no solution) when constructed with random coefficients. However, an overdetermined system will have solutions in some cases, for example if some equation occurs several times in the system, or if some equations are linear combinations of the others.

The terminology can be described in terms of the concept of constraint counting. Each unknown can be seen as an available degree of freedom. Each equation introduced into the system can be viewed as a constraint that restricts one degree of freedom.

Therefore, the critical case occurs when the number of equations and the number of free variables are equal. For every variable...

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