

A Dictionary of
Computing

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tions of n variables, i.e. they do not involve derivatives or integrals. This in both theory and practice is a very difficult problem. Such systems of equations arise in many areas, e.g. in numerical methods for nonlinear *ordinary and *partial differential equations. When $n = 1$ the single equation can be solved by a variety of effective techniques (all involving *iteration); the case of *polynomial equations can give rise to complex solutions. For systems of equations, *Newton's method and principally its many variants are widely used. For cases of extreme difficulty where, for example, only poor starting approximations are available, methods based on the idea of *continuation can be of value.

nonlinear regression model See REGRESSION ANALYSIS.

nonlocal entity See LOCAL.

nonmemory reference instruction An instruction that can be carried out without having to obtain an operand from, or return a result to, memory. Immediate instructions and some branch instructions are examples. See also ZERO-ADDRESS INSTRUCTION.

nonmonotonic reasoning A form of reasoning in which the acquisition of new knowledge can cause earlier conclusions to be withdrawn, so that the body of inferred knowledge does not grow monotonically (i.e. does not increase consistently) with the body of received knowledge. Various systems of nonmonotonic reasoning have been developed, among which are nonmonotonic logic, circumscription, default reasoning, autoepistemic logic, and negation as failure.

nonparametric techniques *Statistical methods that make no assumptions about the precise form of the *frequency distribution from which the data are sampled. They are mainly of use for hypothesis testing using the information in the rank order within each sample. For example, the Mann Whitney U-test may be used to test whether two samples are drawn from the same distribution, and the rank correlation coefficient may be used to test whether two variables are independent.

These methods can be contrasted with parametric techniques, which require specific models with *parameters to be estimated.

nonpreemptive allocation An alloca-

tion that does not preempt a resource from a process to which it is already allocated. Compare PREEMPTIVE ALLOCATION.

nonprocedural language Another name for declarative language.

nonreturn to zero See NRZ.

nonsingular matrix A square matrix, A , of numbers whose *determinant is nonzero. A is nonsingular if and only if it is invertible (see INVERSE MATRIX).

nonstop processing The use of multiple computers in a redundant configuration to provide high *availability of computing service and tolerance to failures of service in a single computer.

nonterminal (nonterminal symbol) See GRAMMAR.

nonterminal node (interior node) of a tree. Any node that is not a terminal node (i.e. a leaf node) and hence has one or more children.

nonvolatile memory A type of memory whose contents are not lost when power to the memory is removed. *ROM and *PROM are examples. Compare VOLATILE MEMORY.

non von Neumann architecture Any computer architecture in which the underlying model of computation is different from what has come to be called the standard von Neumann model (see VON NEUMANN MACHINE). A non von Neumann machine may thus be without the concept of sequential flow of control (i.e. without any register corresponding to a "program counter" that indicates the current point that has been reached in execution of a program) and/or without the concept of a variable (i.e. without "named" storage locations in which a value may be stored and subsequently referenced or changed).

Examples of non von Neumann machines are the *dataflow machines and the *reduction machines. In both of these cases there is a high degree of parallelism, and instead of variables there are immutable bindings between names and constant values.

Note that the term non von Neumann is usually reserved for machines that represent a radical departure from the von Neumann model, and is therefore not normally applied to multiprocessor or multicomputer archi-