

DICTIONARY
OF
COMPUTER
SCIENCE,
ENGINEERING,
AND TECHNOLOGY

EDITOR-IN-CHIEF
Phillip A. Laplante



CRC Press
Boca Raton London New York Washington, D.C.

Library of Congress Cataloging-in-Publication Data

Dictionary of computer science, engineering, and technology / edited by Phillip Laplante.

p. cm.

Includes bibliographical references and index.

ISBN 0-8493-2691-5 (alk. paper)

1. Computer science—Dictionaries. 2. Engineering—Dictionaries. 3.

Technology—Dictionaries. I. Laplante, Phillip A.

QA76.15.D5258 2000

004'.03—dc21

00-052882

This book contains information obtained from authentic and highly regarded sources. Reprinted material is quoted with permission, and sources are indicated. A wide variety of references are listed. Reasonable efforts have been made to publish reliable data and information, but the authors and the publisher cannot assume responsibility for the validity of all materials or for the consequences of their use.

Neither this book nor any part may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, microfilming, and recording, or by any information storage or retrieval system, without prior permission in writing from the publisher.

All rights reserved. Authorization to photocopy items for internal or personal use, or the personal or internal use of specific clients, may be granted by CRC Press LLC, provided that \$.50 per page photocopied is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923 USA. The fee code for users of the Transactional Reporting Service is ISBN 0-8493-2691-5/01/\$0.00+\$.50. The fee is subject to change without notice. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

The consent of CRC Press LLC does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific permission must be obtained in writing from CRC Press LLC for such copying.

Direct all inquiries to CRC Press LLC, 2000 N.W. Corporate Blvd., Boca Raton, Florida 33431.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation, without intent to infringe.

Visit the CRC Press Web site at www.crcpress.com

© 2001 by CRC Press LLC

No claim to original U.S. Government works
International Standard Book Number 0-8493-2591-5
Library of Congress Card Number 00-052882

2 3 4 5 6 7 8 9 0

of all valid encoded symbol sequences, and the basis for the Viterbi decoding algorithm.

trellis search an algorithm for searching through a trellis-structured problem based on a certain cost function, or metric, increment associated with each branch of the trellis.

trellis vector quantization (trellis VQ) a method for structured vector quantization, where the input signal is classified and coded in a manner described by a mathematical structure known as a "trellis".

trellis VQ See trellis vector quantization.

trial phase in which a software product is tested in real-conditions by the end-user. It can be performed in-house or directly in the plant of the end-user.

triangle inequality a complete weighted graph satisfies the triangle inequality if $\text{weight}(u, v) \leq \text{weight}(u, w) + \text{weight}(w, v)$ for all vertices u, v, w . This will hold for any graph representing points in a metric space. Many problems involving edge-weighted graphs have better approximation algorithms if the problem is restricted to weights satisfying the triangle inequality.

triangular co-norm denoted $\dot{+}$, is a two place function from $[0, 1] \times [0, 1]$ to $[0, 1]$. The most used triangular co-norm is the union $\vee$ defined as

$$\mu_{A \vee B} = \max \{ \mu_A(x), \mu_B(x) \},$$

where A and B are two fuzzy sets in the universe of discourse X .

The *triangular co-norm* is used as disjunction in the approximate reasoning, and reduces to the classical OR, when applied to two crisp (nonfuzzy) sets.

See also approximate reasoning, fuzzy set.

triangular loop a nested loop where the inner loop limits depend on the outer loop index.

triangular norm (1) in fuzzy systems, denoted $\star$, a two place function from $[0, 1] \times [0, 1]$ to $[0, 1]$. The most used *triangular norms* are

the intersection $\wedge$ and the algebraic product $\cdot$ defined as

$$\mu_{A \wedge B} = \min \{ \mu_A(x), \mu_B(x) \}, \text{ and}$$

$$\mu_{A \cdot B} = \mu_A(x) \mu_B(x),$$

where A and B are two fuzzy sets in the universe of discourse X .

The triangular norm is used as conjunction in the approximate reasoning, and reduces to the classical AND, when applied to two crisp (nonfuzzy) sets.

See also approximate reasoning, fuzzy set.

(2) in control, a function T from the closed unit square into the closed unit interval endowed with the following properties:

$$T(a, b) = T(b, a); T(a, b) \leq T(c, d)$$

$$\Leftarrow a \leq c, b \leq d;$$

$$T(a, 1) = a; T(T(a, b), c)$$

$$= T(a, T(b, c));$$

for all $a, b, c, d \in [0, 1]$. The most important triangular norms (t -norms) are defined by product of two numbers, operation of taking the smaller one of two numbers and a family of T_s given by

$$T_s(a, b) = \log_s \left(1 + \frac{(s^a - 1)(s^b - 1)}{s - 1} \right)$$

t -norms are used to define a triangle inequality in the family of probabilistic metric spaces called statistical metric spaces, which may be considered as uncertain counterparts of metric spaces. Different triangular norms are used as composition operators in fuzzy systems, although the standard operation is defined by minimum.

triangulation (1) the transformation of a model into a mesh of triangles to facilitate speedy rendering or other computational geometry algorithms. The initial model might be a planar graph, free-form surface, polygonal model, point cloud data, or volumetric data.

(2) an example of faceting. See faceting, facet.

trie digital tree, tree in which edges are labeled by symbols or strings.

trigger (1) the combination of circumstances which activates a latent fault. The circumstances

include selection of particular inputs together with a certain internal state of the system.

(2) specifies a condition and an associated action. If the condition is satisfied, the rule is *triggered*.

trilinear filtering a level of detail blending technique used in MIP texture mapping. Pixels are taken from multiple MIP maps and blended to produce the final color. The purpose is to remove the bands between adjacent pixels taken from different MIP maps.

trinary function a function with three arguments. *See also* constant function, unary function, binary function, N-ary function.

tri-state circuit a circuit element or branch that is in a high impedance state and effectively isolated from the rest of the circuit from a current flow standpoint.

tristimulus coordinates *See* chromaticity coordinates.

tristimulus value one value in tristimulus color theory. Tristimulus color theory stems from the hypothesis that the human eye has three types of color receptors (cones) that have peak sensitivity in the red, green, and blue visible light wavelengths, respectively. The tristimulus color values are a set of three values X, Y, and Z which replace the red, green, and blue intensities with a weighted integral which calculates a spectral energy over the range of visible wavelengths of light for each value; the integrals allow for colors to be represented purely additively, while representing colors via red, green, and blue intensities often requires a subtractive interaction between the "primaries".

Trojan horse a method for penetrating a system's security measures by launching a program that masquerades as a common command program, such as the login program, in order to collect information to invade a user's account or the system.

tropism an external directional influence on the branching patterns of trees.

true a value that represents the "true" value in two-valued logic. Programming languages are, in the abstract, not constrained to a particular representation of the notion of "true" and traditional choices have been "the constant 1", "any nonzero value", "any odd value", "the constant -1", or "any positive value". *Compare with* false.

true complement in a system that uses binary (base 2) data, a representation of negative numbers as 1's complement of the positive number. This is also called a radix complement.

true concurrency *See* concurrency. *Contrast with* apparent concurrency.

true data dependency the situation between two sequential instructions in a program when the first instruction produces a result that is used as an input operand by the second instruction. To obtain the desired result, the second instruction must not read the location that will hold the result until the first has written its results to the location. Also called a read-after-write dependency and a flow dependency.

truncation (1) loss of information as a consequence of the representation used by the compiler, language, or underlying computer. In the case of floating point numbers, this usually happens on the least significant bit of the representation.

(2) loss of information caused by a need to store a value in a location that does not have the capacity to store the entire value. Unlike mathematical truncation, this usually involves the loss of high-order information, storing a modulus result and potentially losing sign information. *See* chopping, rounding.

truncation to minus infinity loss of low-order information of a value such that the result is always less than or equal to the untruncated value. Example: -2.7 becomes -3; -3.1 becomes -4. *Compare with* truncation to zero. *See also* rounding.

truncation to zero loss of low-order information of a value such that the absolute value of the result is less than or equal to the absolute