DOWNLOAD PDF FUZZY MATHEMATICS AND STATISTICS BOOK

Chapter 1 : Mathematics Letters :: Science Publishing Group

This monograph belongs to the broader area of Fuzzy Mathematics and it is the first one in Fuzzy Approximation Theory. The chapters are self-contained with lots of applications to teach several advanced courses and the topics covered are very diverse. An extensive background of Fuzziness and Fuzzy.

Origins[edit] Problems of vagueness and fuzziness have probably always existed in human experience. Across time, however, philosophers and scientists began to reflect about those kinds of problems, in much more systematic ways. Sorites paradox[edit] The ancient Sorites paradox first raised the logical problem of how we could exactly define the threshold at which a change in quantitative gradation turns into a qualitative or categorical difference. With many other processes and gradations, however, the point of change is much more difficult to locate, and remains somewhat vague. Thus, the boundaries between qualitatively different things may be unsharp: According to the modern idea of the continuum fallacy , the fact that a statement is to an extent vague, does not automatically mean that it is invalid. The problem then becomes one of how we could ascertain the kind of validity that the statement does have. This idea sounds simple enough, but it had large implications. The intellectual origins of the species of fuzzy concepts as a logical category have been traced back to a diversity of famous and less well-known thinkers, [11] including among many others Eubulides , Plato , Cicero , Georg Wilhelm Friedrich Hegel , [12] Karl Marx and Friedrich Engels , [13] Friedrich Nietzsche , Hugh MacColl , [14] Charles S. This suggests at least that the awareness of the existence of concepts with "fuzzy" characteristics, in one form or another, has a very long history in human thought. Quite a few logicians and philosophers have also tried to analyze the characteristics of fuzzy concepts as a recognized species, sometimes with the aid of some kind of many-valued logic or substructural logic. An early attempt in the post-WW2 era to create a theory of sets where set membership is a matter of degree was made by Abraham Kaplan and Hermann Schott in They intended to apply the idea to empirical research. Kaplan and Schott measured the degree of membership of empirical classes using real numbers between 0 and 1, and they defined corresponding notions of intersection, union, complementation and subset. Ackermann and Nicholas Rescher respectively. Zadeh is credited with inventing the specific idea of a "fuzzy concept" in his seminal paper on fuzzy sets, because he gave a formal mathematical presentation of the phenomenon that was widely accepted by scholars. This finding is intuitively quite appealing, because people say "this product is more or less good" or "to a certain degree, he is a good athlete", implying the graded structure of concepts. In his classic paper, Zadeh called the concepts with a graded structure fuzzy concepts and argued that these concepts are a rule rather than an exception when it comes to how people communicate knowledge. Moreover, he argued that to model such concepts mathematically is important for the tasks of control, decision making, pattern recognition, and the like. Zadeh proposed the notion of a fuzzy set that gave birth to the field of fuzzy logic The fact that a concept is fuzzy does not prevent its use in logical reasoning; it merely affects the type of reasoning which can be applied see fuzzy logic. If the concept has gradations of meaningful significance, it is necessary to specify and formalize what those gradations are, if they can make an important difference. Not all fuzzy concepts have the same logical structure, but they can often be formally described or reconstructed using fuzzy logic or other substructural logics. Truth of a fuzzy proposition is a matter of degree. I recommend to everybody interested in fuzzy logic that they sharply distinguish fuzziness from uncertainty as a degree of belief e. Compare the last proposition with the proposition "The patient will survive next week". This may well be considered as a crisp proposition which is either absolutely true or absolutely false; but we do not know which is the case. We may have some probability chance, degree of belief that the sentence is true; but probability is not a degree of truth. In , Lotfi A. Zadeh introduced a distinction between "Type 1 fuzzy sets" without uncertainty and " Type 2 fuzzy sets " with uncertainty, which has been widely accepted. Philosophy[edit] In philosophical logic and linguistics, fuzzy concepts are often regarded as vague concepts which in their application, or formally speaking, are neither completely true nor completely false, or which are partly true and partly false; they are ideas which require further elaboration, specification or qualification to understand their applicability the conditions under which they truly make sense. Sciences[edit] In mathematics and

statistics , a fuzzy variable such as "the temperature", "hot" or "cold" is a value which could lie in a probable range defined by some quantitative limits or parameters , and which can be usefully described with imprecise categories such as "high", "medium" or "low" using some kind of scale or conceptual hierarchy. Fuzzy logic In mathematics and computer science , the gradations of applicable meaning of a fuzzy concept are described in terms of quantitative relationships defined by logical operators. Such an approach is sometimes called "degree-theoretic semantics" by logicians and philosophers, [46] but the more usual term is fuzzy logic or many-valued logic. This makes it possible to analyze a distribution of statements for their truth-content, identify data patterns, make inferences and predictions, and model how processes operate. In principle, this allows us to give a definite, precise answer to the question, "To what extent is something the case? Via a series of switches, this kind of reasoning can be built into electronic devices. That was already happening before fuzzy logic was invented, but using fuzzy logic in modelling has become an important aid in design, which creates many new technical possibilities. The programming of vehicle and transport electronics, household appliances, video games, language filters, robotics, and driverless vehicles. Fuzzy logic washing machines are gaining popularity. Electronic equipment used for pattern recognition, surveying and monitoring including radars , satellites , alarm systems and surveillance systems. Community[edit] Originally lot of research on fuzzy logic was done by Japanese pioneers inventing new machinery, electronic equipment and appliances see also Fuzzy control system. Since that time, the movement has spread worldwide; nearly every country nowadays has its own fuzzy systems association, although some are larger and more developed than others. In some cases, the local body is a branch of an international one. In other cases, the fuzzy systems program falls under artificial intelligence or soft computing. IEEE has an international membership and deals with fuzzy logic , neural networks and evolutionary computing. Zadeh estimated around that there were more than 50, fuzzy logicâ€”related, patented inventions. He listed 28 journals at that time dealing with fuzzy reasoning, and 21 journal titles on soft computing. His searches found close to , publications with the word "fuzzy" in their titles, but perhaps there are even , When he died on 11 September at age 96, Professor Zadeh had received more than 50 engineering and academic awards, in recognition of his work. Concept formalization[edit] According to the computer scientist Andrei Popescu at Middlesex University London , [79] a concept can be operationally defined to consist of: Once the context is defined, we can specify relationships of sets of objects with sets of attributes which they do, or do not share. Fuzzy concept lattice[edit] Whether an object belongs to a concept, and whether an object does, or does not have an attribute, can often be a matter of degree. Thus, for example, "many attributes are fuzzy rather than crisp". This is the basic idea of a "fuzzy concept lattice", which can also be graphed; different fuzzy concept lattices can be connected to each other as well for example, in " fuzzy conceptual clustering " techniques used to group data, originally invented by Enrique H. Fuzzy concept lattices are a useful programming tool for the exploratory analysis of big data , for example in cases where sets of linked behavioural responses are broadly similar, but can nevertheless vary in important ways, within certain limits. It can help to find out what the structure and dimensions are, of a behaviour that occurs with an important but limited amount of variation in a large population.

Chapter 2 : Fuzzy concept - Wikipedia

With this definition, the fuzzy union of A and B is the smallest fuzzy set con- taining both A and B, and the intersection is the largest fuzzy set contained by both A and B.

Chapter 3 : Fuzzy mathematics - Wikipedia

Topological and Algebraic Structures in Fuzzy Sets: A Handbook of Recent Developments in the Mathematics of Fuzzy Sets (Trends in Logic) Sep 30, by S.E. Rodabaugh and Erich Peter Klement.

Chapter 4 : Science Library

DOWNLOAD PDF FUZZY MATHEMATICS AND STATISTICS BOOK

This monograph belongs to the broader area of Fuzzy Mathematics and it is the first one in Fuzzy Approximation Theory. The chapters are self-contained with lots of applications to teach several advanced courses and the topics covered are very diverse.

Chapter 5 : International Journal of Management and Fuzzy Systems :: Science Publishing Group

Fuzzy Mathematics Fuzzy -Sets, -Relations, -Logic, -Graphs,-Mappings and The Extension Principle OlafWolkenhauer ControlSystemsCentre UMIST blog.quintoapp.comhauer@blog.quintoapp.com

Chapter 6 : Fuzzy-Set Social Science, Ragin

This led to my paper "Fuzzy groups", which became the starting point of an entire literature on fuzzy algebraic structures. In King-Sun Fu invited me to speak at a U. S. -Japan seminar on Fuzzy Sets and their Applications, which was to be held that summer in Berkeley.