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Featured Keynote Lectures #1
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A Restriction-Centered Theory of Reasoning and Computation

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Abstract. The theory which is outlined in this lecture, call it RCC for short, is a system of reasoning and computation which is not in the traditional spirit. In large measure, RCC is oriented toward reasoning and computation in an environment of uncertainty, imprecision and partiality of truth. The centerpiece of RCC is the concept of a restriction—a basic concept which is deceptively simple. Informally, a restriction is an answer to a question of the form: What is the value of a variable, X? More concretely, a restriction, R(X), is a limitation on the values which X can take. A restriction is precisiated if R(X) is mathematically well defined; otherwise it is unprecisiated. Generally, restrictions which are described in a natural language are unprecisiated. A restriction is precisiable if it lends itself to precisiation. A restriction is singular if R(X) is a singleton; otherwise it is nonsingular. Nonsingularity implies uncertainty. Examples. Robert is staying at a hotel in Berkeley. He asks the concierge, "How long will it take me to drive to SF Airport?" Possible answers: one hour; one hour plus minus fifteen minutes; about one hour; usually about one hour, etc. Each of these answers is a restriction on the variable, Driving time. The first two answers are precisiated restrictions. The last two answers are unprecisiated. Another example.

The concept of a restriction is considerably more general than the concept of an interval, set, fuzzy set and probability distribution. In one form or another, much of human cognition involves restrictions, particularly in the realms of everyday reasoning and decision-making. Humans have a remarkable capability to reason and, to some degree, compute with restrictions. What is needed is a theory which formalizes this capability. RCC may be viewed as a step in this direction. What should be noted is that existing approaches to reasoning and computation, other than RCC, do not have the capability of reasoning and computation with restrictions which are described in a natural language.

About Prof Lotfi A. Zadeh:

LOTFI A. ZADEH is Professor Emeritus, Computer Science Division, Department of EECS, University of California, Berkeley. In addition, he is serving as the Director of BISC (Berkeley Initiative in Soft Computing). Since the publication of his first paper on fuzzy sets in 1965, his research has been focused on fuzzy logic and its applications.

Lotfi Zadeh has received many awards, among them the IEEE Medal of Honor, IEEE Education Medal, IEEE Richard W.

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Hamming Medal, the ACM Allen Newell Award, the Honda Prize, the Okawa Prize, the Kaufmann Prize and Gold Medal, Grigore Moisil Prize, the Kampe de Feriet Award, Bolzano Medal, the Nicolaus Copernicus Medal, Norbert Wiener Award, the Benjamin Franklin Medal and the Friendship Order from the President of the Republic of Azerbaijan. He was inducted into the Silicon Valley Engineering Hall of Fame, the AI Hall of Fame and the Nixdorf Museum Wall of Fame. He is a recipient of twenty-five honorary doctorates, and is a member of the National Academy of Engineering. In addition, he is a foreign member of the Finnish Academy of Sciences, the Polish Academy of Sciences, the Korean Academy of Science & Technology, the Bulgarian Academy of Sciences, the Azerbaijan Academy of Sciences, Hungarian Academy of Engineering and Romanian Academy of Technical Sciences and a member of the International Academy of System Studies. His work is associated with 100,584 Google Scholar citations.

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