A FIRST COURSE IN FUZZY LOGIC

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1. INTRODUCTION

Fuzzy logic was created in 1965 by Lotfi Zadeh, Professor of Electrical Engineering at the University of California at Berkley. Since then there has been much controversy as to the worth and meaning of that topic. Allowing statements to have values other than true or false at first appears to negate the very foundations of classical logic. Recent books and papers have proven that, on the contrary, fuzzy logic can be thought of as an extension of classical logic with one or two properties not holding in the extension [cf 1.]

This paper describes the author's experiences designing and teaching an introductory course in fuzzy logic to computer science juniors/seniors at Western Kentucky University.

2. INITIAL PREPARATION

The author had previously taught fuzzy logic as part of several other courses, but never as a complete course topic [cf 2.]. Teaching fuzzy logic as part of an introduction to artificial intelligence course, or a course in automated reasoning is relatively easy since many artificial intelligence texts have a chapter on the topic which can easily be expanded or supplemented if desired. The author's initial problem was to find an introductory text that gave a good, self contained, introduction to the field. Many potential texts appeared to be too advanced mathematically, or too slanted towards electrical engineering applications or expert systems. The latter two areas are where many applications of fuzzy logic have already been developed.

After much searching and many telephone calls to schools which the author believed offered a course in fuzzy logic, a text "Fuzzy Sets, Uncertainty, and Information" by Klir and Folger[3] was chosen. This text had already been in a classroom setting and had exercises at the end of each chapter for reenforcement of the topics involved.

It was also decided that students at the end of the semester would present a paper that was given at a recent conference on fuzzy systems. It was hoped that this would expose the students to some recent applications in the field.

3. CLASS PROJECTS

Fuzzy logic can leave students "in the dark" if too much hand waving is done. The author wanted the students to have a more concrete experience with the topic. To that end, he had suggested that they implement one of the following:

1. a fuzzy logic advisement system for which restaurant to dine at in town.
2. a motor vehicle diagnostic system.
3. an advisement system for entering freshmen to help them select their major.
4. a controller for an air conditioning/heater system.
5. the timing controller for a red/green light at the intersection of two one-way streets.

What made their projects different from any similar programs they might have done in a previous class was the use of fuzzy terms and fuzzy rules. Vague terms such as expensive, cheap, noisy, and quiet are allowed to be used and they are manipulated accordingly.

In addition "hedges" such as some what, very, not very, slightly, are allowed and manipulated appropriately.

4. CONCLUSIONS

With the growth of fuzzy logic applications, as well as the more respectable view of fuzzy logic in the United States, the author believes more and more courses at colleges and universities will be offered in that area. In a one semester junior/senior level course, students can learn the fundamentals of fuzzy set theory as well as get an insight into the diverse areas in which fuzzy logic applications are being found. Class projects for the students, either individually or in teams, can easily be found and implemented in a variety of different languages.

BIBLIOGRAPHY

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