Fuzzy Sets and Systems 19 (1986) 309–322
North-Holland

BULLETIN

Edited by Janet Efstathiou

1. Editorial

This issue of the Bulletin focuses on research being done in Europe and Africa, from Algeria to Germany and Spain to Poland. Forthcoming issues of the Bulletin will carry special reports on fuzzy research in the USA. We also hope to carry soon a feature on fuzzy sets in AI. Contributions to either of these themes would be most welcome.

As always, we carry reminders of forthcoming conferences. We are happy to publicise meetings, but would like to remind conference organisers to appoint an individual who can compile a report of the meeting for publication in the Bulletin.

Many thanks to all those who have contributed material to this month's issue. We hope that any delay in publication has not rendered your article out of date.

2. Research Report: Rough Sets

The concept of a rough set was introduced by the author in 1981, in order to deal with problems where approximate data are available only. The proposed approach differs essentially from that proposed by L. Zadeh – and it seems to be of practical importance in many areas, for example such that as expert systems, machine learning, induction, pattern recognition and others.

At present there are about 80 articles published concerning rough sets and several expert systems based on this idea have been implemented and successfully applied in medicine, sociology, antropology, psychology and industry.

The departure point of our considerations is the fact that if we do not have exact data on some objects, states, processes, etc., we are unable to discern them exactly. In other words inexactness defines an indiscernibility relations on the set of data. The indiscernibility relation is used for the definition of two basic operations on data, namely the lower and the upper approximation of sets. These operations are in fact interior and closure in a certain topology, generated by the inexact data set. Moreover the accuracy of approximation, which is a number from the interval $(0, 1)$, is defined – which informally speaking expresses how exactly we are able to 'see' the set of objects considered, throughout the inexact data available (i.e. the indiscernibility relation generated by the data). Let us notice that the accuracy is not preassumed, like for example membership function, but is computed from the original data.

Theoretical research is going on to formulate mathematical foundations for the proposed approach and the relationship to other similar theories.

Algebraic properties of rough sets are investigated by M. Novotny (Brno) and J. Grzymała-Busse (Lawrence). E. Orłowska (Warsaw) conducts research on logical problems related to rough sets. H. Rasiowa and A. Skowron (Warsaw) introduced rough concept logic in order to deal by logical means with inexact reasoning.

D. Dubois and H. Prade (Toulouse) are investigating the relationship of rough sets to fuzzy sets. H. Sayeki (Montreal) investigates relations of rough sets with the non-standard analysis and the alternative set theory. Z. Ras and M. Zemankova (Knoxville) are combining the rough set approach with possibility theory. W. Ziarko and M. Wong (Regina) are doing research on rough sets in connection with statistics and information theory. K. Chen (Charlotte) applied the concept of rough sets to decision trees theory. Z. Pawlak (Warsaw) showed that the rough set concept can be used as a unified mathematical basis for decision tables theory, expert systems, learning from examples (induction) and concept analysis developed by R. Wille (Darmstadt). Also a trial has been made by Orłowska and Pawlak to apply the rough set concept to the measurement theory of P. Suppes and D. Scott. C. Woźniak (Warsaw) tries to apply rough sets to problems of theoretical mechanics. The idea of the rough set has also been applied to theory dependencies in relational data bases by W. Buszkowski (Poznań), E. Orłowska and C. Rauszer (Warsaw).

At present the two most interesting applications of rough sets are due to R. Słowiński and K. Słowiński (Poznań) – to medical data analysis, and A. Mrózek (Gliwice) – to cement kiln control.

A book on rough sets is under preparation.

Z. Pawlak
ul. Zuga 29
01 806 Warsaw, Poland

3. Report: Departamento de Estadística e Investigación Operativa, Universidad Complutense de Madrid, Spain

The research group on Fuzzy Sets in a recent group in this Department. Its actual interests cover fuzzy relations, group decision making, fuzzy games, information theory, and some topics related to fuzzy probability and fuzzy statistics. Here we enclose a short comment on our last papers:

1. *Fuzzy relations*: Given a fuzzy preference relation defined over a set of alternatives X, we consider classical max–$*$ transitives in order to assure the existence of a non-empty set of unfuzzy non-dominated alternatives, in the sense of Orlovski, who proved that max–min transitivity is a sufficient condition. In the first place, we study how other max–$*$ transitivities lead us easily to contradictions or trivial situations. In the second place, since such a condition is frequently violated by individuals, we propose two treatments: one possibility is to define a