(3) Visit of Yamaguchi University Department of Computer Science and Systems Engineering

Y.Y. Yao, Ph.D.

Associate Professor of Computer Science Department of Computer Science, University of Regina

Regina, Saskatchewan, Canada S4S OA2 E-mail : yyao@cs.uregina.ca

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Introduction

My first meeting with Dr. Zhong was at the Eighth International Symposium on Methodologies for Intelligent Systems in 1994. I was very impressed by his devotion to and eagerness for scientific research, in addition to his kindness and friendliness. I particularly enjoyed his talk on knowledge discovery. Having found out a large overlap of research interests, we began to establish a connection for exchanging ideas and share new research results. In 1997, I invited Dr. Zhong for a short visit to Lakehead University, Canada. He gave a well received seminar on hybrid approach to rule discovery in databases. The visit proved to be very successful. Our collaboration has led to some joint projects on granular com -puting and its application in data mining.

In 1998, Dr. Zhong invited me to visit his re -search group. With the support from Japanese Ministry of Education and Venture Business Laboratory of Yanraguchi University, I made a one month visit. This was a very fruitful international scientific cooperation. I gave a seminar on granular computing and its applications at Yamaguchi University. I also visited Waseda University, where I gave a similar seminar. During my visit, we finished one joint paper [1]. We have also planned for further research collaborations. In fact, we are now in the process of preparing for another paper [2]. On top of the academic achievement, I also benefited in other aspects from this trip. I have gained better understanding of Japanese people and Japanese culture, which is something that I cannot obtain in any other way.

Main Research Results

Our research collaboration focuses on granular computing and its application in data min-ing. The theory is inspired by the ways in which humans granulate information and reason with coarse-grained information. There are theoretical and practical reasons for the study of granular computing. Granulation may be considered to be one of the basic concepts that underlie human cognition. More practically, when a problem involves incomplete, uncertain, or vague information, it may be difficult to differentiate distinct elements and one is forced to consider granules. In some situations, although detailed information may be available, it may be sufficient to use granules in order to have an efficient and practical solution. Very precise solutions may in fact not be required for many practical problems. It may also happen that the acquisition of precise information is too costly, and coarse-grained information reduces cost. In order to design and build intelligent systems, one must deal with the issue of information granulation. Granular computing is likely to, play an important role in the evolution of fuzzy logic and its applications. Our investigations result in two main results.

1. A more concrete granular computing model is developed using information tables. In this model, each object in a finite nonempty universe is described by a finite set of attributes. That is, each object is only perceived, ob -served, or measured by using a finite number of properties. The universe is decomposed into granules by grouping objects with the same or similar properties. The representation of objects by their attribute values provide the semantics for interpreting the induced granules. Several types of relation-ships between attribute values are considered. Each of them induces a different granulation structure on the universe.
2. Elements of a granule of the universe can be considered as instances of a certain concept.

From this point of view, we can study the quantitative measures associated with if-then type rules. A simple set-theoretic framework is proposed. Basic quantities are identified and many existing measures are examined using the basic quantities. The results may lay down the groundwork for further systematic studies.

The preliminary results are very encouraging. We are planning for further studies on granular com puting.

Acknowledgments

I would like to thank Dr. Zhong for the arrangement of my visit. I am grateful to Dr. Zhong's family for so many wonderful meals. Their hospitality and friendship made my visit a very enjoyable and memorable one. I appreciate the help and kindness of students in Dr. Zhong's laboratory. I would like to thank The Department of Com-puter Science and Systems Engineering, the Faculty of Engineering, and the Venture Business Laboratory of Yamaguchi University, and the Japanese Ministry of Education for their kind support.

References

1) Yao, Y.Y. and Zhong, N. "An Analysis of Quantitative Measures Associated with Rules", Zhong, N. and Zhou, L. (eds.) Methodologies for Knowledge Discovery and Data Mining, Lecture Notes in AI 1574, Springer-Verlag, 1999.

2) Yao, Y.Y. and Zhong, N. "Granular Computing using Information Tables", manuscript, 1999.

(4) Dr. E. O. Kamenetskii 講演会

工学部・電気電子工学科教授　粟井郁雄

日　時：平成10年11月18日(水)
16：00～18：00

場　所：工学部電気電子工学棟セミナー室

題　目：On macroscopic electrodynamics of chiral and bianisotropic media and artificial microwave bianisotropic material.
(キラル及び双異方性材料の巨視的電磁力学とそれらを用いたマイクロ波人工媒質)

講演者：Eugine O. Kamenetskii 博士
(イスラエル、テルアビブ大学)

講演内容

キラル媒質又は双異方性媒質 (bianisotropic medium の直訳) に代表される複雑媒質は、電磁波動論の分野で現在非常に多くの研究者の興味を引きつけている。しかしカメネツキー氏は前者のキラル媒質の有用性に対しては否定的で、国際学会においてしばしば論争の一方の旗頭となっている。

逆に彼が擁護する双異方性媒質についても現在の所理論的な可能性が示されているのみで、何故かそれを実験的に製作し、回路素子への応用を試みた例が皆無である。そこで氏はその人工媒質製作法の原理及び指針を示し実験的検証の計画をこのセミナーで解説した。

このセミナーは相当程度の物理学の知識を前提としており難解であったが、参加者 (約20名の大学院生と3名の教官) は学問上の論争の存在と物理学の最前線に触れる事ができて感じる所があったと思われる。

後日談

この提案は当研究室において実行され、現実性が高い事が確認できたのでヨーロッパマイクロ波会議へ投稿し、又今後の国際研究協力へと発展される事になった。