DEMONSTRATION OF AI/RHEUM, AN EXPERT CLINICAL CONSULTANT SYSTEM IN RHEUMATOLOGY

S.E. Hazelwood**, G.R. Reese*, J.K. Kastner***

*Information Science Group and **Division of Immunology/Rheumatology,
School of Medicine, University of Missouri-Columbia
***Department of Computer Science, Rutgers University

The AI/RHEUM project is a collaborative effort among the Information Science Group and the Division of Immunology/Rheumatology at the University of Missouri School of Medicine, and the Department of Computer Science at Rutgers University.

The objective of the project is to produce a computer-based rheumatology consultant performing at the level of an expert rheumatologist. The system is designed for practicing physicians who do not have specialty training in rheumatology. The AI/RHEUM model utilizes the consulting system framework called EXPERT developed by Kulikowski and Weiss at Rutgers.

Currently the model gives a differential diagnosis for 26 rheumatologic diseases. In testing with well studied selected cases the model scored 94% correct. In prospective testing against unselected cases in a routine hospital service setting, the model scored 91% correct and/or appropriate.

The model informs the user that diagnoses are considered in the categories Definite, Probable and Possible; presents its differential diagnosis; supports each component of the differential with the appropriate patient findings; and prints a ranked list of the findings presently unknown which if known and positive would tend to confirm the diagnosis.

The logic of the program itself is an inference network, controlled by IF... THEN production rules. These elements are integrated and organized by formal diagnostic tables which provide an efficient and concise means for the highest level knowledge representation.

The program is capable of accepting up to 862 clinical findings. Interaction is provided the user to explain the meaning and the clinical observation methods for the most important findings. The model contains 1,014 production rules, 464 intermediate hypotheses, and about 4,800 lines of textual information.

References

Acknowledgments
This research is supported in part by grant DHHS 5 T15 LM07006 from the National Library of Medicine and grant DHHS 5P60 AM20658 from the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases.