AI Magazine Volume 5 Number 2 (1984) (© AAAI)

Research in Progress

AI Research at Vanderbilt University

John R. Bourne

Department of Electrical and Biomedical Engineering
Vanderbilt University

AT VANDERBILT UNIVERSITY we are exploring the use of expert systems in a broad range of application areas. Programming is in Franzlisp on a VAX 11/790, UCI LISP on a DEC-10, and IQLISP on an IBM XT. Currently, personnel from four schools in the University are participating Listed below are brief descriptions of current projects.

Evaluation of GAIT

This project deals with recommending therapies for persons with abnormal walking patterns. Static knowledge about gait and anatomy is represented in frames and dynamic evaluation strategies are represented in frames and meta-rules. Initial results are described by Dzierzanowski *et al.* (Dzierzanowski *et al.*, 1983).

Personnel: J. Bourne, R. Shiavi, J. Dzierzanowski, H. Sandell.

EEG Consultation Systems

We have completed several expert systems for electroencephalogram evaluation (Jagannathan, *et al.*, 1981, 1982) (Bourne et al., 1983) These systems have been primarily rule-based and have performed well in several studies. We have also implemented a rule-based microprocessor EEG evaluation system (Schaffer *et al.*, 1983).

Personnel: J. Bourne, L. Baas.

Initial Prescription Dialysis Consultant

A rule-based consultant system has been implemented for advising physicians about the prescription of initial dialysis therapies (Schaffer *et al*, 1983). This system is now in use at the Dialysis Clinics, Inc., Nashville, Tennessee. This system is now being expanded into a community of simulated consultative experts that provide advice about pharmacology, cardiovascular problems, nutrition and other problems

Personnel: J. D. Schaffer, J. Caviedes, J Bourne

EMG Diagnosis

This project is devoted to building a complete system that assists the electromyogram [EMG] reader. The system under development consists of three stages:

1 EMG acquisition
2. feature extraction
3 an inference system based on features and common-sense knowledge about EMG evaluation

Participants: J Sztipanovits, M. Bradruzamon, R. Shiavi.

Intelligent Instrument Research

Work is underway on producing intelligent interfaces to small instruments, *e.g* , signal averagers, spectral analyzers.

The basic problem is to assist the naive user in setting parameters for proper use of a complex instrument.

Electronic Circuit Board Evaluation

We are undertaking a project for evaluating faults in microprocessor-based circuit boards. Abstract circuit descriptions are frame-based as is interconnection information Rules and meta-rules are used to infer diagnostic procedures. The project is intended to simulate the expertise of an expert electronic repair person.

Personnel: G. Beale, A. Brodersen, M. Hofman, J Caviedes, J. Bourne.

Projects concerned with theoretical issues are also being conducted in areas including knowledge acquisition and representation methods and machine learning.

References

Baas, L., & Bourne, J.R. (1983) A Rule-based microcomputer system for electroencephalogram evaluation Submitted to *IEEE Trans Biomed Engr*

Bourne, J.R., Matousek, M., Friberg, S., & Arvidsson, A (1983) SEER-I: The semantic EEG evaluation regimen *IEEE Trans Biomed Engr* BME-30: No. 4, 239-244 April.

Dzierzanowski, J , Shiavi, R , & Bourne, J R (1983) A syntactic method for evaluation of abnormalities in human gait. *IEEE/Engineering in Medicine and Biology* September pp. 12-14.

Jagannathan, V., Bourne, J R , & Jansen, B.H (1981) A syntactic/semantic system for automated EEG analysis *ACEMB 34*:131.

Jagannathan, V., Bourne, J R , Jansen, B.H , & Ward, J W (1982) Artificial intelligence methods in quantitative electroencephalogram analysis *Comp Progs Biomed* 15:249-258

Schaffer, J.D., Teschan, P.E., Caviedes, J , & Bourne, J.R. (1983) A computer-based dialysis therapy advisor *IEEE Transactions in Biomedical Engineering* In press.