

Expert Systems in Exploration, Geophysical Development Series, Volume 3

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Review by Christopher G. Kendall

This timely little book is an important contribution to the developing field of the use of expert systems in hydrocarbon exploration. This book is a positive expression of the potential of expert systems to hydrocarbon exploration and may help revive an interest in this field for energy companies with their abundant data and reduced manpower. There is no doubt that hydrocarbon exploration is a complex task that requires the combined expertise of field geologists, geophysicists and geochemists so lending itself to the use of expert systems. In recent years expert systems have received a great deal of attention as potential diagnostic and decision support systems in hydrocarbon exploration, and have been designed and used by several industry and university groups. However despite extensive financial support and development, these systems within the oil industry have had a checkered history. Hopefully as more books and papers like this are published this trend will become more positive.

The text is in ten chapters which present ten papers on a variety of topics. Aminzadeh begins with a review of expert systems related to the oil industry. He lists these in a useful table and then goes on to explain how uncertainty and inexactness and rules are, and can be, handled. He then describes how different expert systems could work, using fuzzy logic, evidential reasoning, and neural networks.

Coppens next describes how a rule based system can be used to determine seismic velocities. He explains how productivity in seismic data processing and velocity analysis normally performed by an professional expert would be enhanced by automating velocity analysis and driving this automation with an expert system. This paper is followed by one by Lu and Cheng which describes how to choose a structural model from seismic data. Then Duluc has a paper on the an intelligent front end for interactive seismic processing. He explains how the system he is developing uses an objected-oriented environment to handle the rules and the relationship between the different programs of the system. Next is a paper by Lafe, Pajot, and Winchester which describes an object oriented program which integrates the different steps of reservoir analysis using geophysical, petrophysical, geological and reservoir engineering data. This is followed by a paper by Zhang and Simaans on seismic interpretation using an automatic segmentation of seismic sections with large areas with common textural properties. Then is a paper by Lashgari on the fuzzy classification of geophysical data., a paper by Veezhinathan, Wagner and Ehlers on picking first breaks on seismic data, a paper by Fang, Chen, and Wright on the identification of minerals in thin section and finally a paper by Betty Miller on the use of expert systems to classify sedimentary basins.

This text is addressed at a mixed audience of earthscientists who are interested in expert systems and the computer programmers who design them. The readers of this book can recognize the potential power of expert systems and the general simplicity of their design. Thus those considering this field, would do themselves no harm to read this text. It is nice book which should be in your local professional library at least.