**SHORT NOTES ON DENDRYL AND PROSPECTOR**

**Dendral**

**Dendral** was a project in [artificial intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence) (AI) of the 1960s, and the [computer software](https://en.wikipedia.org/wiki/Computer_software) [expert system](https://en.wikipedia.org/wiki/Expert_system) that it produced. Its primary aim was to study hypothesis formation and discovery in science. It helped [organic chemists](https://en.wikipedia.org/wiki/Organic_chemistry) in identifying unknown organic molecules, by analyzing their [mass spectra](https://en.wikipedia.org/wiki/Mass_spectrometry) and using knowledge of chemistry. It was done at [Stanford University](https://en.wikipedia.org/wiki/Stanford_University) by [Edward Feigenbaum](https://en.wikipedia.org/wiki/Edward_Feigenbaum) and his team of highly creative research associates and students. It began in 1965 and spans approximately half the history of AI research.

The software program Dendral is considered the first expert system because it automated the decision-making process and problem-solving behavior of organic chemists. The project consisted of research on two main programs **Heuristic Dendral** and **Meta-Dendral**, and several sub-programs.

*Heuristic Dendral* is a program that uses mass spectra or other experimental data together with knowledge base of chemistry, to produce a set of possible chemical structures that may be responsible for producing the data. Heuristic Dendral would use this input mass and the knowledge of atomic mass numbers and valence rules, to determine the possible combinations of atomic constituents

*Meta-Dendral* is a machine learning system that receives the set of possible chemical structures and corresponding mass spectra as input, and proposes a set of rules of mass spectrometry that correlate structural features with processes that produce the mass spectrum

It was written in the [LISP](https://en.wikipedia.org/wiki/Lisp_(programming_language)) [programming language](https://en.wikipedia.org/wiki/Programming_language), which was considered the language of AI because of its flexibility. Many systems were derived from Dendral, including [MYCIN](https://en.wikipedia.org/wiki/MYCIN), MOLGEN, PROSPECTOR, [XCON](https://en.wikipedia.org/wiki/XCON), and STEAMER. There are many other programs today for solving the mass spectrometry inverse problem.The name *Dendral* is an [acronym](https://en.wikipedia.org/wiki/Acronym) of the term "Dendritic Algorithm".

**PROSPECTOR**

**Prospector:** SRI’s Artificial Intelligence Center developed PROSPECTOR for the U.S. Geological Survey to aid geologists in mineral exploration. It is one of the world’s first computer-based expert systems, which represented the knowledge and reasoning process of geological experts. The system was developed between 1976 and 1981. The original research was performed in SRI International located at Menlo Park, California

Its primary intended use was by an exploration geologist in the early stages of investigating a possible drilling site. PROSPECTOR is a rule-based judgmental reasoning system that evaluates the mineral potential of a site or region. It uses inference network models of specific classes of ore deposit. Knowledge about a particular type of ore deposit is encoded in a 2 computational model representing observable geological features and the relative significance.

PROSPECTOR can reach a conclusion about a particular ore deposit. It gives a certainty value of the ore deposit. It as well provides the explanation text for the conclusion. it allows the user to execute commands as well as to answer questions. For example, in response to a WHY command, the program accessed some explanatory text that the expert has previously prepared to explain why a particular piece of evidence is important. Other commands allow the user to do such things as trace internal inferences, change previous answers, change top-level goals, and obtain summaries of conclusions reached up to that point.

PROSPECTOR predicted the existence of a hitherto unknown molybdenum deposit in Washington State.