Analysis of Suppositions

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Summary
The goal of this paper is to present "intelligent software" that avoids the well-known disadvantages of computational statistics and expert system approaches. An expert's knowledge is formulated as some kind of suppositions rather than decision rules, and, in addition to that, a choice of a relevant data set. Those clearly defined suppositions are then transformed into rules typical for expert systems.

Keywords: Expert systems, Intelligent Software, Statistical Software.

0. Introduction
The current state of statistical software can be characterized by the existence of, at least, two different lines which seem to be considered as practically independent from each other. There is the line of computational statistics processing information contained in data sets, often using methods of hypotheses testing. On the other hand, expert systems are coming along, belonging to the fields of AI methods (Raufels (1981)). The latter ones are often based on so-called certainty factors (CF's) being an expert's measure of subjective probability with virtually no reference to data sets. However, in many cases, it is not easy or even possible for experts to declare CF's, what severely limits the possibilities of those systems.

1. CONSUL and its goal rules
CONSUL\textsuperscript{x/} is an interactive expert system specially designed and
\textsuperscript{x/}CONSUL is a private property of Dr. Adam Kowalski and Dipl.Ing. Ryszard Tyrcha. Therefore there are NO formal obstacles to sell it, exchange it, or use it as a basis for any joint project. CONSUL is ready for presentation and everyday usage in several computer centers in Warsaw. It is also possible to tailor the Warsaw version to your standards. In the above case the actual PASCAL documentation is necessary.

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implemented for microcomputers. With exchangeable knowledge bases, it is applicable practically in every domain of human activities.

To make software portable, CONSUL has been written in the PASCAL language (Jensen - Wirth standard), but with clearly defined know-how it is quite easy to re-program it in other languages. There are various implementations of CONSUL, including PDP 11/34, SM4, Cromemco etc.

CONSUL has been heavily tested in research environments, now reaching commercial standards (CONSUL 3.0, 26.MAR.1984). Although it requires less than 32Kb memory, the main expert system features like:
- utility;
- high performance;
- transparency
are fully provided, what enables even a completely unprepared user to handle a consultation session.

For a knowledge base designer only a skill of creating text files under a text editor and understanding of the BNF notation is required, as knowledge-base in the sense of CONSUL consists of the following three text files:
- rules;
- attributes;
- comments.

For the purpose of this paper we restrict our attention only to simple non-deterministic, goal rules. Such rules, being also rules in the sense of other expert systems, particularly MYCIN (Shortliffe (1976)) are of the form:

\[(0) (F_{1,i_1} \land F_{2,i_2} \land F_{3,i_3} \land \ldots \land F_{n,i_n} \rightarrow U_j, CF)\]

where \(F_{k,i_k}\) stands for a fact, in constatation of which the \(i_k\)-th value of the \(k\)-th attribute is involved. \(U_j\) stands for the \(j\)-th value of the goal attribute, often interpretable as a classification unit. (In the MYCIN system \(U\) is a set of therapies). \(CF\) is an abbreviation of certainty factor, which is understood here as a measure of subjective probability.

2. Definitions and method

The problem starts in the case (experienced by the authors)