

D. Stuart Conger
D. Stuart Conger & Associates
Ottawa, Ontario

Artificial Intelligence: The next phase of computers in counselling

Abstract

Computer assisted client counselling related programs such as psychological test administration and interpretation, and occupational and educational choice systems have increasingly used some modest features typical of some aspects of artificial intelligence. New programs that will make greater use of artificial intelligence in the short term will be expert advisory systems for use in the training and continuing education of counsellors. In the longer term it is probable that experimental programs using natural language programs will be created to freely engage the client in goal directed conversations in limited domains. Both types of projects will require much new research in the counselling process.

Computerized occupational choice systems such as Ontario's Student Guidance Information System (SGIS) and Choices, created by the Canada Employment Commission are well into their second decade. Similarly computerized psychological test administration and interpretation systems have been well established for many years. Although all of these types of systems are being continually enhanced with new features, computer technology has been advancing more rapidly and counsellors may now look forward to computer programs that make use of artificial intelligence.

Artificial intelligence has several major applications including: robotics, machine vision, natural language processing (including computerized translation), intelligent computer assisted

instruction, and expert advisory systems, which will be the focus of this article.

Expert advisory systems

One might argue that occupational choice systems and some psychological test administration programs both currently represent early applications of expert systems because of the adaptive nature of their use of their databases to each individual client.

Choices, for example, asks the user successively for information in terms of his or her interests, temperaments, aptitudes, preferred working conditions, preferred physical activities, salary expectations, education, training and other factors. The user can choose the sequence with which he or she provides this information. As each characteristic is entered, the computer indicates the number of occupations that have been deleted from consideration and the number that remain in contention so that the user understands the impact of each of his or her characteristics or expectations on potential occupations for his or her ultimate consideration.

All systems use this approach to some degree not only in occupational choice but also in the selection of education and training programs.

A further enhancement currently being developed for **Choices** attempts to address the problem of indecision and inaction by using the method of repertory grids created by George Kelly in his formulation of the psychology of personal constructs and subsequently adapted by Brian Little to the analysis of personal development projects.

The process of this program will involve the client in examining those occupations which both the computer suggests and the client agrees are appropriate, but at the same time the client can't make a "final" choice of either education and training program or of occupation.

Taking these occupations or education programs the client will rate each on a set of dimensions such as importance of the occupation (or training) to him or herself, difficulty, hassle, depression, uplift, stress, potential for success, enjoyment, progress to date, enthusiasm of others, time adequacy, etc. The computer will calculate the occupation or program that is the most important to the person but also has the most difficulties in the way of negative ratings on the dimensions.

The computer then leads the user through a planning process involving listing the major steps of qualifying for the occupation or the major tasks of performing the occupation and breaking

these down into finer and finer elements. Following this the computer presents the client with each element and asks if the negative factors that had been rated as impacting on the occupation or education program applied to the particular element. If it does not the computer proceeds to the next dimension or element.

If the client indicated that a negative dimension does impact on an occupation or education program, then the computer will ask a series of questions to determine whether it is serious enough to be an impediment to decision and action, whether there is an alternative that would not have the negative connotations, or whether the element is a serious stumbling block to decision and action.

Finally, the program provides the client with a summary of the problems that he or she foresees with the qualifying program and/or performing the occupation itself and recommends that he or she consider alternatives and/or discuss the problems with his or her counsellor.

Expert advisory systems for counsellors

The most imminent full use of counselling expert systems, however, will be in the development of computer programs that will advise counsellors on how to handle difficult counselling situations. Expert systems purport to contain the knowledge of experts in the particular subject matter and to date have been used most successfully in such areas as medical diagnosis and the design of computer systems for particular applications.

A program currently under development at the University of Utah will contain detailed information on behavioural deviance of adolescents. Called the Behavioural Consultant (Ferrara) it will be available for school teachers and counsellors to use to describe the problem characteristics of students, to receive suggestions for further diagnostic steps, and finally suggestions for appropriate methods of intervention.

The Canada Employment and Immigration Commission has developed a first generation expert advisory system called "The Counsellor's Coach" which provides an opportunity for counsellors to express a problem that has been encountered in counselling. The counsellor is then led through a tree structure of questions in order to define the problem in some detail as well as the counselling techniques used to date. Finally the computer suggests an approach to use. This system covers some 350 counselling problem situations.

The structure of counselling

The development of a complete expert advisory system does require the existence of a clear structure to the counselling process. Fortunately the discipline of counselling has given much attention to the "anatomy" of counselling over the past two decades and therefore a good knowledge base does exist.

Ivey (1983), for example, describes counselling as including the following hierarchy of skills: attending behaviours, client observation, open and closed questions, encouragement, paraphrasing, summarizing, reflection of feeling, reflection of meaning, focusing, influencing, confrontation, problem definition, defining the goal, exploration of alternatives, confronting incongruity, and generalization to daily life.

Patsula (1985) has identified and described ten steps in the assessment component of the counselling process: 1. Initiating a collaborative relationship with the client; 2. Eliciting from the client a statement of his or her concern or problem; 3. Assisting the client to analyse and clarify the reasons he or she perceives to prevent his or her resolving the concern or problem; 4. Ensuring understanding by the client of the purpose of counselling; 5. Assist the client to clarify the content and feeling components of the perceived constraints to resolution; 6. Assist the client in clarifying and evaluating his or her strengths and barriers in relation to the expressed constraint; 7. Assist the client in clarifying the underlying value or assumption within his or her formulation of the constraint; 8. On the basis of productive values held, assist the client in formulating a statement of what the client must do to achieve his or her goal; 9. Assist the client to test and validate the statement as being realistic, responsible, and as reflecting a stated action to which the client is committed; 10. Assist the client in translating the goal into a mutually agreed upon counselling goal or action plan on which the client is committed to work.

Bezanson, De Coff, and Stewart (1985) added other counselling strategies to this assessment process: information, decision-making, learning, and self-management strategies, each of which has a series of sub-steps.

The structure of advising

The systematic process of explicating and teaching counselling skills does not necessarily represent the structure that an expert uses in answering a question concerning a difficult counselling situation. In the face of the lack of direct evidence a structure is here hypothesized.

It is agreed that the general linear structure put forward by

Patsula (1985), and by Bezanson, De Coff, and Stewart (1985) is reasonable except for one important deficit that has been observed in the auditing of counselling interviews. That additional element derives from the observation that some clients appear to deteriorate in their resolve, or even change their definition of their problem between interviews. For this reason there is a need for an additional step which might be called "review client's definition of problem and commitment to the goal" at the beginning of each interview. Apart from this one change it is accepted that the flow process model of the above named authors is appropriate for an expert system - at least for designating the general area of the problem faced by the counsellor.

Patsula has incorporated several of the skills identified by Ivey in connection with each of his counselling steps. Therefore the advisory system must ask the counsellor if he or she has used the particular skills in connection with the defined problem. But there are other questions as well that a human advisor would ask, including: 1. The state of the client - is he or she, for example, depressed, anxious, obsessive-compulsive, or learning-disabled; 2. Demographic data (for use in the expert's stereotypes) - age, sex, marital status, occupation, etc.; 3. The condition of the client in terms of other psychological, social, medical, etc., problems; and, 4. The goals of the client in terms of self.

For the development of the next generation of the Counsellors' Coach it is advisable to give a predetermined structure to the question tree. This structure tree could vary from problem area to problem area. For example, a client who is depressed is more likely to be female whereas a client who is abusive is more likely to be male. But does one ask the sex or the state first?

That question forces the expert advisory system developer to do a considerable amount of research in the form of posing a wide range of counselling situation problems to human expert counsellors and record not just their answers but also the sequence of considerations that they processed in coming to a conclusion.

At the moment it is hypothesized that the expert generally follows this pattern after being told the problem: 1. Selects the particular step in the counselling process; 2. Asks one question to get a more specific definition of the problem; 3. Asks the age and sex of the client; 4. Asks about the client's state; 5. Asks about the counselling methods used to date; 6. Asks a question about the client's condition; 7. Asks about the client's goals; 8. Asks to whom or what the client attributes his or her problem; 9. Makes an inference about the client and his/her problem; and, 10. Makes a recommendation.

This hypothetical structure of the expert advisory system

will be used in creating a more complete version of the Counsellors' Coach with possibly 700 problem situations addressed.

Computer-assisted training for counsellors

Intelligent computer-assisted instruction differs from regular computer-assisted instruction in that in the former the computer evaluates the responses that the student makes and adjusts the next interaction to suit the assessment that it has made of the student's previous reactions. In some cases it has also been able to identify the false assumptions that the trainee is burdened with and provide a tutorial to assist in rectifying those ideas.

An application of the techniques of intelligent computer assisted instruction to counsellor training is represented by an interactive computer program developed by Thomas Hummel (Lichtenberg et al., 1984). This program (now) called **Roleplay** presents the trainee with a typical client opening statement such as "I wish you could get me a job. The other counsellor sent me on training and it just wasted my time."

The counsellor responds by manufacturing a sentence from leads (You feel, Tell me about it, etc.); an affect word or phrase (frustration, anxiety, out of control, etc.); a preposition (to, about, with, etc.); a topic (training, divorce, job search, etc.); an option of another preposition; and finally, a personal interviewer, husband, etc.).

The computer calculates the "trust" level that the client has in the counsellor as a result of the counsellor's statement, and then decides whether to reveal more information about the client's feelings and situation, to provide about the same level of feeling and information, or even to encourage the counsellor to quit.

The trust level is calculated from the reflection of the client's affect and from the appropriateness of the counsellor's probing. After each exchange between the "client" and the counsellor, the counsellor may ask the computer for feedback on the three dimensions: reflection of feeling, probing, and trust. Future developments of this type may be expected to deal with more complex syntactical formulations by both the client and the counsellor.

Natural language processing

A discussion of artificial intelligence applied to counselling is not complete without reference to natural language processing which is the comprehension by the computer of free flowing natural expression by a human to the computer and an appropriate response by the computer. Such a response may be the reply to

a question or it may be to generate questions for the human to respond to. This is multi-initiative conversation.

Much research on this topic is being conducted, notably at Yale University but with important projects underway at several other universities. It is possible for the computer to understand what is typed into it in a few very restricted domains. While it is possible for the computer to answer questions that are phrased in natural language it is not yet possible for the computer to generate questions and observations on its own to the human conversant.

Multi-initiative conversation as well as several other more prosaic developments in computer understanding are yet to be created. It will certainly be another ten years before we can expect to have a computer program that can purport to counsel clients.

Conclusion

Computer assisted client counselling related programs such as psychological test administration and interpretation and occupational and educational choice systems have increasingly used modest features typical of some aspects of artificial intelligence. Developments that may be expected within the next few years are likely to be enhancements of these systems and the introduction of expert advisory systems as a support to the counsellor in his or her continuing education.

REFERENCES

- Bezanson, M. Lynne, De Coff, Carol A., and Stewart, Norman R. (1985). **Individual employment counselling: An action based approach**. Toronto: Guidance Centre.
- Ivey, Allen E. (1985). **Intentional interviewing and counselling**. Monterey: Brooks/Cole.
- Lichtenberg, James W., Hummel, Thomas J., & Shaffer, Warren. (1984, December). CLIENT 1: A computer simulation for use in counselor education and research. **Counselor Education and Supervision**, 155-167.
- Little, Brian R. (1983, May). Personal projects: A rationale and a method for investigation. **Environment and Behavior**, 15(3), 273-309.
- Patsula, Philip J. (1985). **The assessment component of employment counselling: A goal setting process**. Toronto: Guidance Centre.

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