GenIE: an Intelligent System for Writing Genetic Counseling Patient Letters*

Nancy Green, Ph.D.
Department of Mathematical Sciences/Computer Science Division
University of North Carolina at Greensboro
Greensboro, NC 27402, USA

Abstract

We are developing GenIE, a prototype intelligent system to create first drafts of genetic counseling patient letters. GenIE will apply natural language generation techniques to construct the first draft of a letter for subsequent review and editing, if needed, by the genetic counselor. For purposes of knowledge acquisition, we have been analyzing a corpus of patient letters. Based on the corpus analysis we are developing a knowledge base and text generation strategies.

We are developing GenIE, a prototype intelligent system intended to assist genetic counselors by creating editable first drafts of genetic counseling *patient letters*. In the USA, genetic counselors meet with clients to explain genetic testing, inheritance of genetic disorders, and risks of multifactorial diseases such as cancer. In current practice, the information and clinical services provided to the client are summarized in the patient letter [1].

GenIE's interface should enable a writer to quickly enter information on the patient's pedigree, symptoms, test results, and diagnosis. GenIE will create a first draft of the patient letter, using artificial intelligence and natural language generation techniques [2, 3], from a non-linguistically represented knowledge base on clinical genetics. A letter will be synthesized following guidelines on standard organization strategies and writing styles for this genre. A document editor will present the synthesized first draft for review and editing by the human writer.

One motivation for developing GenIE is to save the genetic counselor time by partially automating the letter writing process. In current practice, genetic counselors have limited time available for letter writing, and thus may use "cut-and-paste" methods to reuse pieces of previously written letters. Time constraints on members of this profession are not likely to lessen, given the increasing role of genetics in health care. (Note, however, GenIE's role is not to provide decision-support functions, but to generate tailored documents for a lay audience explaining the clinical genetics experts' beliefs and reasoning.) Another motivation is to support delivery of patient information in electronic media, opening the door to tailored multimedia presentations in the future. For example, we are investigating use of interactive animations to help explain inheritance risks.

As part of the knowledge acquisition phase of the project we have encoded an anonymized corpus of twenty-one patient letters written by genetic counselors. The corpus was encoded using a coding scheme we developed for representing the biomedical content of genetics counseling patient letters from a lay-oriented perspective [4]. The coding scheme is used as an analytical tool for studying how causal, probabilistic concepts in clinical genetics are communicated to a lay audience in current practice [5]. In addition, we are using it as the basis for designing the system's knowledge base.

The status of the project is as follows. A formal evaluation of the intercoder reliability of the coding scheme is reported in [4]. An initial implementation of the user interface is undergoing formative evaluation and revision. We have begun implementation and evaluation of the knowledge base and natural language generation techniques.

References

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