Tutorial Response Generation in a Writing Tool for Deaf Learners of English

Lisa N. Michaud
michaud@cis.udel.edu
http://www.eecis.udel.edu/~masterma
Computer and Information Sciences Department
214 Smith Hall
University of Delaware
Newark, DE 19716

ICICLE (Interactive Computer Identification and Correction of Language Errors) is a tutoring system under development that instructs deaf users of American Sign Language on written English skills[1]. (See (McCoy & Masterman (Michaud) 1997) for a discussion of overall system architecture.) The text generation module it will employ produces original text to instruct the user on errors found in his or her writing, tailored to the user's understanding and learning style. The model I propose for planning this text composes it according to a four-tier response anatomy. It combines bottom-up and top-down planning approaches and takes into account a detailed representation of user language proficiency and a history of interaction with a user in order to create text that is maximally understandable and informative to the individual.

The initial bottom-up part of the planning will employ a domain knowledge base containing information about the errors recognized by the system to cluster similar errors found in a piece of writing and to order those clusters according to guidelines directing the flow of a tutorial session. My work is concerned with the subsequent top-down phase which builds and fleshes out a hierarchical text plan to tutor on an error. This phase employs a response anatomy which is comprised of *content*, *method*, *form*, and *manner*. *Content* refers to the error(s) to be discussed; the *method* is the choice between possible pedagogical approaches to discussing the error; the *form* is the determination of how to structure the approach defined by the *method*; and the *manner* refers to cohesive factors involved in a contextually-aware explanation. The top-down planning begins with the posting of the goal of instructing the user on an error and the selection of plan operators that represent approaches toward realizing this goal. My plan operator design is based largely on the work in (Moore & Paris 1992); operators are selected according to the *effect* they have on the user's knowledge and a list of *constraints* which state when an operator is applicable, referencing multiple sources of knowledge including the user proficiency model, the long-term history module, recent dialogue, and the domain knowledge base. When a selection is made from the first tier of operators representing *method* choices, subgoals are posted that help drive the further selection of *form* operators which contain schemata for structuring the text. A *manner* phase then applies operators to generate comparisons to established user knowledge and previous explanations. The contextually-aware final output is a theoretic text specification which can then be sent to a generator to be realized as English.

A longer discussion of my proposed planner can be found in (Michaud & McCoy 1998). Future tasks include refining the concept of the user model proposed in (McCoy, Pennington, & Suri 1996), developing a domain knowledge base, and further specifying our planning operators.

[1]This work has been supported by NSF Grant # IRI-9416916, NSF Research Traineeship Grant #GER-9354869, and a Rehabilitation Engineering Research Center Grant from the National Institute on Disability and Rehabilitation Research of the U.S. Dept. of Education (#H133E30010).

References

McCoy, K. F., and Masterman (Michaud), L. N. 1997. A tutor for teaching english as a second language for deaf users of american sign language. In *Proceedings of Natural Language Processing for Communication Aids, an ACL/EACL97 Workshop*, 160–164.

McCoy, K. F.; Pennington, C. A.; and Suri, L. Z. 1996. English error correction: A syntactic user model based on principled mal-rule scoring. In *Proceedings of User Modeling '96*.

Michaud, L. N., and McCoy, K. F. 1998. Planning text in a system for teaching english as a second language to deaf learners. In *Proceedings of Integrating Artificial Intelligence and Assistive Technology, an AAAI '98 Workshop*.

Moore, J. D., and Paris, C. L. 1992. Planning text for advisory dialogues: Capturing intentional and rhetorical information. *Computational Linguistics* 19(4):651–695.