

Framework for a Tutorial Response Generator in an Intelligent Tutoring System

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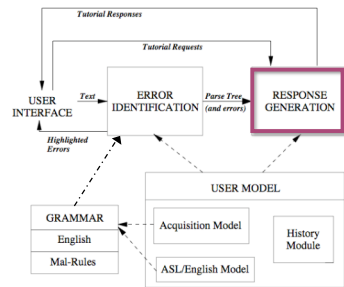
The ICICLE Project

Interactive Computer Identification and Correction of Language Errors

- An intelligent tutoring system to tutor deaf users on grammatical principles of written English
- Intended as an "Intelligent Grammar Checker and Coach"
- Written English is distinct from American Sign Language (ASL)
- People who are deaf have limited access to the English language

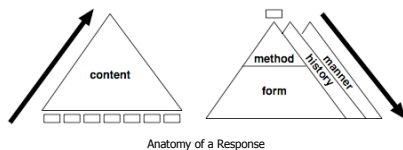
Cycle of user input, system response

- User submits writing to system
- System executes grammatical analysis of text
- System responds with feedback



Tutorial Response Generator

- A multi-level text planner to generate tutorial instructions that will help the student understand their errors and be able to correct them
- Combines bottom-up and top-down processing
- Each level reasons about a different aspect of the response



Anatomy of a Response

Content

- Determines the overall plan for the tutorial response
- Selects the order in which specific errors will be discussed and how related errors will be grouped together
- Is the most general level in generation process

Aggregation and Ordering Strategies:

- To present the errors in order of occurrence one by one with no aggregation (occurrence order)
- To group similar/identical errors together by type and tutor in order of errors of first occurrence in essay
- To group similar errors together and present the group in order of error count within the groups (most common mistakes first)

Method

- Contains different tutoring strategies available to correct the errors
- Starts the top down portion of the planner
- Uses planning operators to create the organization of the resulting text
- Tutoring strategies are not mutually exclusive

Tutoring strategies

- Provide a corrected form of the sentence.
- Explain the grammar construction that was used incorrectly.
- Provide examples of sentences that illustrate proper usage of the faulty grammatical construction.
- Compare and contrast the grammatical construction involved with its corresponding construction in ASL.

Form

- Inserts prerequisite information needed for the method
- Fleashes out the method by providing specific content

History

- Has the task of altering the existing text plan to make it context aware
- Ensures that repetition in the text plan is avoided and adds comparisons to related concepts in the dialogue history and the user's domain knowledge

Manner

- Constructs the formal representation of the tutorial response determined by the other parts
- Takes as input the plan operators and transforms the plan into the plan specification to go into the realizer
- Makes the final decisions about the linear flow of the tutorial response.

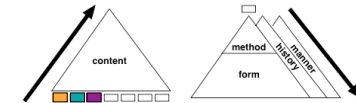
Generating a Tutorial

Sample sentences:

My brother like candy. He hungry. We went the store. They students here. He teach us.

The errors associated with these sentences are:

- lack of subject-verb agreement
- absence of the verb "to be;"
- absence of a preposition



Content Phase

- Groups the errors into three content groups

Method Phase

User Profile:
 User responds well to the tutorial strategy giving examples of proper usage

Lack of subject verb agreement – a common error the user is learning and is within the user's depth of knowledge

Absence of the verb to be – user is not very familiar with the error but ready to learn

Absence of a preposition – a common error the user is learning

- Tutoring Strategies
- Lack of subject verb agreement – **Provide examples of proper usage**
 - Absence of the verb to be – **Explain the grammar construction**
 - Absence of a preposition – **Provide examples of proper usage**

Form Phase

- System knows the user is aware of subject-verb agreement but he or she is uncertain of its syntactic form.

- Prerequisite of this method is that the user understand how to apply the rule.

The realized text equivalent of what is planned in this phase for the 1st content group might look like:

"My brother like candy."

This sentence has a problem in subject-verb agreement. In English, you need an -s ending on verbs that go with third person singular subjects like HE or SHE. An -s ending is not needed for other types of subjects. Here are some examples:

She likes candy.
 I like candy.
 Mark like candy.
 You like candy.
 My brother likes candy.
 We like candy.

History Phase

- The response is analyzed as a whole.
- The system notices that both the second and third content groups have something in common: Both are missing a word that is required in English.
- Alters the third content group to point out the similarity.

The result for the third content group might look like the following:

"We went the store."
 As in the previous example, this sentence is missing a word. The missing word is "to," a preposition. The verb "go" needs a preposition before the location that is its object. These are some examples: We went to the store. She goes to school. He went into the house.

Future Work

- Implementing and integrating the planning operators for the Method and Form Phases
- Creating Initial Tutoring Profiles in the User Model
- Modifying the User Model with additional layers to incorporate Tutoring

References

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