DISCO
Development and Integration of Speech technology into Courseware for language learning

Stevin project
partners: CLST, UA, UTN, Polderland

Partners

- CLST - Centre for Language & Speech Technology
  Catia Cucchiarini & Helmer Strik
- UA - Univ. Antwerpen, Linguapolis
  Jozef Colpaert
- UTN - Universitair Taal- en Communicatiecentrum
  José Bakx
- Polderland Language & Speech Technology
  Inge de Mönnink

Some details

Stevin project
Duration: 3 years
Start date: February 1st, 2008

In short: The main challenge is
to develop exercises in such a way that they are suitable for training pronunciation, morphology and syntax, and are such that errors in the spoken responses can be detected automatically.

Work-package	Principal party	Other parties involved	Deliverables
A. Courseware application			
A1. Design	UA	CLST	Design
A2. Development & Integration	PDL		Development & application integration
B. Exercises			Database with various exercises
B1. Content	UA	CLST, UTN	Content of the exercises
B2. Responses	PDL		List of correct and incorrect responses
B3. Feedback	UA	CLST, UTN	Specification of feedback for the responses
C. Speech technology			
C1. Speech recognition	CLST		Speech recognition module
C2. Error detection	CLST		Error detection module
D. Evaluation	UA, UTN	CLST	Evaluation reports
E. Dissemination of results	CLST	UA, UTN, PDL	Website, reports, papers & presentations
F. Project management	CLST		Progress reports, final report

The application

The application will contain the following components:
- an exercise module (see work-package B1),
- a response expansion module (work-package B2),
- a feedback module (work-package B3),
- a speech recognition module (work-package C1), &
- an error detection module (work-package C2).

The first three modules will operate off-line, to develop a database with exercises, lists of (correct and incorrect) responses for all the exercises, and feedback for each of these response.

Speech technology

2 phases:
1. Utterance verification - what has been said
2. Error detection – how has it been said
   - One of the predicted errors
   - Another error

Non-native speech (differences) - challenges :
- Pronunciation
- Word order
- Disfluencies

Training oral proficiency

- one-on-one interactive learning, corrective feedback
- time-consuming and costly
- particularly applies to oral proficiency
- Computer Assisted Language Learning (CALL) systems

The present project aims to develop and test a prototype of an ASR-based CALL application for training oral proficiency for Dutch as a second language (DL2).

The communicative settings employed in Nieuwe Buren (DL2 training method developed by Malmberg) will constitute the starting point for the application.

Errors

Errors on pronunciation, morphology and syntax

The errors to be addressed in this system will be selected according to a number of criteria:

- Frequent
- Salient
- Persistent and
- Detectable with sufficient reliability (ASR)

Predictable responses

The main challenge is

to develop exercises in such a way that they are suitable for training pronunciation, morphology and syntax, and are such that errors in the spoken responses can be detected automatically.

How to elicit responses that are such (predictable, etc.) that they can be handled automatically, and still are suitable for training oral proficiency?

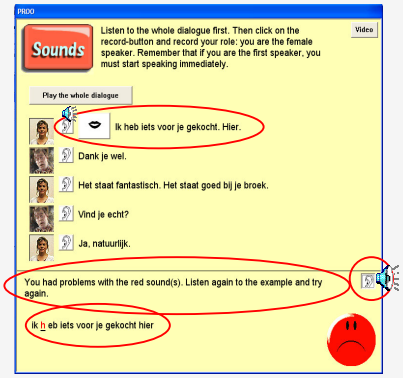
Pronunciation

Types of exercises:

- Read utterances
- Listen to and repeat utterances
- Answer questions
- Role-playing, dialog imitation (video)

Content:

- Minimal pairs, e.g. man – maan, hoed – goed, etc.
- Short utterances
- Graphics & videos



Morphology

Examples
/loop/, /loopt/, /lope(n)/, etc.
Errors: */lopet/, */loopte/, */lopete/

Possible exercise:
Present
Verb: lopen; written (read) or spoken (listen)
Utterance: De jongen …. naar huis.
Ask to speak the complete utterance
(optionally: include graphics)

Examples of exercises - Syntax

Possible exercise:
- show individual word(-group)s on the screen
  e.g. “naar huis”, “de jongen”, “loopt”
- or give carrier sentence & word(s) to insert
  e.g.: “x de x jongen x naar x huis x” & loopt (or lopen)

And ask to speak the complete utterance
(optionally: include graphics)

Combination - possible morpho-syntactic errors:
*naar huis lopen; *naar huis loopt; *lopen naar huis; *loopt naar huis de jongen.

Feedback

- CF provided through user interface similar to Dutch-CAPT
- Extended to provide CF on morphology and syntax
- Pilot experiments required to determine optimal CF on these aspects
- CF provided only on errors that can be detected with acceptable degree of reliability
- Same approach as in Dutch-CAPT: minimize FRs

Evaluation

- 1st pilot exp: exercises
- 2nd pilot exp: speech recognition module
- 3rd pilot exp: error detection module
- 4th pilot exp: whole system

Final evaluation:
- Students use the system and fill in questionnaire
- Teachers evaluate sets of system prompt, student response and system feedback

Evaluation

Project successful:

- if teachers agree that the system is useful
- if students rate the system positively
- if publishers take up the results