

Net4Voice – New Technologies for voice-converting in barrier-free learning environment

R. Primiani¹, D. Tibaldi², and L. Garlaschelli²

¹ DSAW - Management and Development of Web Activities, Alma Mater Studiorum Università di Bologna, Bologna, Italy

² DSAW - Management and Development of Web Activities, Alma Mater Studiorum Università di Bologna, Bologna, Italy

² DSAW - Management and Development of Web Activities, Alma Mater Studiorum Università di Bologna, Bologna, Italy

Abstract - *Net4Voice project consists in testing voice recognition techniques and methods within learning contexts. The need to support learning process with non traditional technologies derives from an issue of not completely accessible teaching information by users with disabilities in different learning contexts. Students with disabilities, who find note-taking difficult for cognitive, physical or sensory reasons, can benefit from this approach, due to the accessibility to multimedia notes, especially in those regional areas where access to intermediaries, such as sign languages interpreters for deaf, are in short supply or unavailable. The exploitation of interactive technologies facilitates students to learn by doing, receive feedback, and continually refine their understanding. This facilitate the participation in lifelong learning by people with various needs.*

Keywords: learning methodologies, technologies, accessibility, lifelong learning, barrier-free environment.

1 The context

As outline by European Union, “Modern, effective education and training systems are vital to a vast array of social dimension from economic competitiveness to social inclusion. Information and communications technologies (ICTs) are part of the answer, improving traditional education and providing flexible learning solutions to people throughout their life.” **Errore. L'origine riferimento non è stata trovata..**

Starting from these assumptions, Net4Voice considers education in traditional classroom as still the most pervasive way to support learning. Nevertheless, there are needs related to accessibility, effectiveness of learning that are not properly satisfied in the traditional classrooms. On this regard, traditional face to face (F2F) education, although extremely important and unique, presents constraints due to physical, temporal, cultural barriers that could hinder the access and the effectiveness of learning.

2 The project

The proposal comes from the participation of the University of Bologna to Liberated Learning Consortium **Errore. L'origine riferimento non è stata trovata.** which permits the University to encourage students with disabilities to attend lessons together with their non-disabled classmates. In addition, the Liberated Learning is an innovative system that exploits the technology in order to automatically transform lecturer speech in digital text at real time, by generating electronic transcription of lesson or conference material to be printed or delivered through different devices and channels. The process is exploited in different contexts, not strictly related to educational activities: for instance during meetings, conferences, or any other learning situation where groups of people listen to someone.

Net4Voice proposal, in particular, consists in testing voice recognition techniques and methods within learning contexts.

Speech-recognition technology automatically creates a digital text transcript synchronized with audio/video. These multimedia transcriptions can be downloaded by students whenever they want and in the environmental conditions they prefer. Second language learners can benefit from these multimedia text captions, because they can be read and listened to at any time students desire. Moreover, the provisioning of many outputs such as multimedia text captions, recorded speech and images, enables all kinds of communication qualities and strengths to be available for different contexts, content, tasks, learning styles and preferences.

Professors are not obliged to test the speech-recognition technology which can be tested once and forever by a tutor after the lesson. This means saving of time and resources. Thus the project aim is to test innovative teaching modalities that enable the widespread delivery of lesson and informative contents, by let them to be universally accessible.

In a wider view of universally accessible information, technology can be a support means for learning and

teaching processed, by facilitating people interactions, such as students and teachers **Errore. L'origine riferimento non è stata trovata. Errore. L'origine riferimento non è stata trovata. Errore. L'origine riferimento non è stata trovata.**

3 Objectives

The final aim of the project is to increase quality and learning opportunities for the whole society, promoting the adoption of barrier free learning environments and the development of innovative learning methodologies based on speech-recognition (SR) technologies.

In particular, Net4Voice aims at defining a clear scheme to assess the impact of SR technologies in education, by experimenting SR on at least three different learning contexts: university, school and adult education classrooms. Secondly it evaluates the impact on key actors involved, such as students and teachers, by particularly focusing on learning settings addressed to people with disabilities.

4 Previous results and feedback

From January 2007 to December 2007 the speech recognition technology (SRT) was tested in two classes. The testing was focused on the SRT accessibility aspects and SR accuracy.

4.1 SR Accuracy

During the Italian Liberated Learning testing, it was noticed that when created a new voice profile, an initial training before the first professor lesson is necessary. In fact, the time that elapses between two lessons are very short, while the first correction activities require a very long time due the high recognition error rate. So within Net4Voice testing we will ask the new professors to train their voice profile before the first lesson.

During the testing it was noticed that in order to improve the SR accuracy, its necessary that the professor speech is clear, loud, and provided with a regular rhythm and a pitched voice, etc. So, since the professors contribution is very important to let the SR works, professors motivation is fundamental. In other words, the technology should be recognized as an helpful software that facilitate professor teaching activity when a disabled students attends a course.

4.2 SRT Accessibility Output

During the testing, it was observed that SRT output is not fully coherent with some Italian accessibility rules. For this reason, a collaboration with some students started in order to evaluate what aspects of SRT output can be modified to improve its coherence with the Italian accessibility directives.

5 Expected Outcomes

As a result, the project will produce a tested and validated learning methodology that can be shared with other educational Institutions in order to create a stable and broader network.

Net4Voice also aims at producing a standardised and innovative pedagogical documentation and the share of expertise among the partners.

6 Beneficiaries

- *Students with learning disabilities*: Net4Voice gives students an access to both auditory and visual learning channels, improving integration and retention of lecture content. Thus Deaf, or people unable to take their own notes, due to physical disabilities, can have access to synchronized speech recognized text without intermediary support and without losing lesson content.
- *Second language learners*: in Net4Voice students acquire an alternative to traditional classroom note taking with the opportunity to see the lecture on a screen in real time, at the same time that they hear the lecture being delivered by the professor. This instantaneous display of the lecture acts as a reference check for individual notes and lecture comprehension. Moreover, students can exploit the available multimedia transcriptions in a second time, after the lesson, by reading and listening to the lesson content anywhere and at anytime they desire.
- *Students of various educational settings* can benefit from the exploitation of Net4Voice that deliver lesson contents, at real time and at a second moment, through accessible rich multimedia.
- *Teachers/Professors*: Net4Voice supports academic staff in taking a proactive, rather than a reactive, approach to teaching students with different learning styles. It provides educators with a practical means of making their teaching accessible and improves the quality of instruction in the process.
- *Tutors*: tutors are people who support professors in the post-editing activities after lessons. In particular, they actively contribute to improve the application of the SR technology within educational contexts, because they help professors on making corrections within the speech-recognized text.
- In the medium term, *other educational institutions than the partners and their networks* will also take advantage of the results of the project, finding a learning methodology already tested and valid indicators that they can use to develop other projects or for joining the network.

7 Impact of the ICT (and of Net4Voice project) in education

ICT can be an effective means to raise up the quality of educational processes in term of accessibility and effectiveness. The adoption of clear methods of universally accessible learning methodology will guarantee a better quality of education in the whole community.

8 Activities

The main activities carried out by the partners during the project will be:

- Developing a joint speech-recognition technology based learning methodology, to increase the accessibility and the effectiveness of learning at all of its stages
- Training professors of the educational settings identified by partners on the developed methodology
- Testing the speech-recognition technology based methodology within the educational settings identified by partners
- Sharing and validating the results of the experimentation
- Setting up a virtual intranet workspace for the management of the project and the exchange of information
- Setting up the project web site for the exploitation and disseminating actions
- Evaluating the scalability of the testing results and planning dissemination and exploitation activities

9 Activity plan

In the first year we will test the Liberated Learning and speech recognition new technologies in higher educational contexts and at least another educational context, such as school, adult education or vocational training. In particular, the project addresses generic issues related with learning approach. The project first aims at testing the SR technology in various educational settings, by evaluating its impact on students and teachers. In particular, it considers three different languages as a reference, representative of different learning models: Italian, English and German.

The final aim is to promote research into barrier free learning environments by facilitating development of EU centres where delivering innovative learning processes and methods based on the Liberated Learning concept. The students of various educational settings that can benefit from the exploitation of novel technologies that deliver lesson contents through various accessible rich multimedia. In particular, users with a range of learning disabilities and second language learners are given with novel opportunities to better fit their learning attitudes by exploiting the SR

outcomes.

The project exploits novel designed speech recognition technology that provides potential benefits for students and teachers at any stage of learning. The adopted technology creates automatically formatted synchronised captioned multimedia from live or recorded speech and viewable on Internet browsers or media players. Effective and readable visual indications of pauses are automatically provided to indicate how the speaker grouped words together while an editor can correct errors in real-time to improve accuracy. Other speech recognition technologies require the dictation of punctuation and lose speech and synchronisation after editing.

In the first year a virtual intranet environment will be realized in order to support the partner activities.

In the second year process experimentation results will be evaluated and a methodology to disseminate the acquired knowledge and the obtained results. Moreover the access to the Intranet environment will be enlarged to the other European Community Stakeholders.

10 Partners

The project is born as research activity within the International Consortium, the Liberated Learning, which is born from a partnership among IBM and the University of Saint Mary, Halifax, Canada.

Project partners are:

- Alma Mater Studiorum, Università di Bologna, Italy
- University of Southampton, Great Britain
- Universität Ulm, Germany
- Istituto Professionale di Stato per i Servizi Sociali "Iris Versari", Italy
- Totton College, Great Britain

11 General description of the University of Bologna

The University of Bologna, Alma Mater Studiorum, was founded in 1088 and is considered to be the oldest university in Western Europe. Nowadays, it still remains one of the most important institutions of higher education across Europe with more than 100.000 enrolled students, 3000 academics and 3000 administrative staff. From an organizational prospective, it is divided in Faculties (23), Departments (69) and Interdepartmental Research Centres (22).

As far as the Web and e-learning services concern, the University of Bologna is divided in a Unit in charge to coordinating Web services (DSAW - Management and Development of Web Activities) and an e-learning centre. In particular, the DSAW (Management and Development of Web Activities), is at the very centre of the Portal system

development, both catalyzing and driving University of Bologna strategic actions. The DSAW main task is to build Web sites, services and the corresponding support infrastructures, striving for the creation of a technological, informative and organizational system, capable of adapting and sustaining the University structures as efficiently as possible. The DSAW carries out the Web strategy of the overall University of Bologna community, by fully supporting its educational, academic, and administrative activities and by providing and integrated technological support infrastructure.

The e-learning centre, on the other hand, coordinate with Faculties in order to support the educational processes and the didactical services within the University through e-learning methodologies. The centre defines standardised design/develop/evaluation methods to deliver e-learning courses, guaranteeing high quality.

Both units are crucially focused on promoting accessibility and effectiveness of educational processes.

In particular, the University of Bologna includes an office specifically set up to meet the needs of disabled and dyslexic students of the University of Bologna. One of the main activity is Cooperation with the faculties and in particular with the persons of reference where present, to identify and plan any help which may be necessary to enable each student to successfully follow their chosen course. In particular as regards the creation of appropriate practical, logistical and relationship conditions for learning; Moreover, the web portal of the University won the following awards:

- “Oscar of Web” at the European Exhibition of Public Communication and Services to Citizen and Business (COM-PA) for two consecutive years: 2005 and 2006 **Errore. L'origine riferimento non è stata trovata.**
- 1st prize as “Best Italian University Portal” for LabItalia for the following years: 2005, 2006 and 2007 **Errore. L'origine riferimento non è stata trovata.**
- 1st prize as “Best Italian University Portal” for WebOmetrics dei portali for two consecutive years: 2007 and 2008 **Errore. L'origine riferimento non è stata trovata.**
- 2nd prize as “Best Italian University Portal” for Censis/Repubblica in 2007 **Errore. L'origine riferimento non è stata trovata.**

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