Bridging the Communication Gap – a South African Perspective

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Abstract

First world support systems are not always available to, or affordble for, South Africans with assistive requirements. Our group focuses on persons with communication needs, such as persons with sight, hearing or autism barriers.

Introduction

Financial support for assistive devices for South Africans comes almost exclusively from personal funds, or private non-profit welfare organisations. This means that dedicated imported assistive devices are out of the financial reach of many South Africans. Hence, the work in my research group concentrates on the development of homegrown applications specific to South African needs. We concentrate on communication assistance, and hence exploit the use of mobile phones (but not necessarily smartphones), as these are ubiquitous, cheap and socially acceptable. Where we develop non-mobile applications, our aim is always to set minimal requirements on computer and networking resources.

One of our largest projects thus far has centered on the machine translation of English text to South African Sign Language. We are currently also looking at assistive technologies for children on the autism spectrum and, related to that, children with barriers to learning. Much of our preliminary work here concerned awareness and policy, apart from technical assistance.

In all our projects, we concentrate on bridging a communication gap. This means that we not only work on the assistive requirements of individuals, but also on building communication bridges that can help caregivers and family to understand and communicate with the specific individual.

We give a short informal overview of each of some of our projects.

Machine translation of English text to South African Sign Language

There are more than 4 million deaf or hard of hearing South Africans. Before 1994, there was no explicit development of South African Sign Language (SASL), and SASL was simply informally used at the various schools for the Deaf in South Africa. Since then, much effort has been put into the linguistic investigation of SASL, and SASL is unofficially

seen as South Africa's twelfth national language. Interpreters for the Deaf is scarce, and prohibitively expensive. Hence, assistive translation can be helpful.

We developed a prototype English text to SASL rule-based machine translation system. The parsing of the English text was facilitated by Pennsylvania University's Treebank system [1]. A set of example translation rules was constructed (see below), and various subprojects on SASL generation via graphical avatars were completed.

Access to SASL linguistic data was a major issue. In principle it would have been possible to start a data acquisition project [2], but the cost and availability of using first language Deaf SASL speakers, and having the data annotated by trained linguists, was prohibitive. Informal data acquisition was completed, and all data and source code was made available free of charge. Since then, we collaborated with a German group on the statistical machine translation of sign language given a small corpus [3].

On the flip side of the research, we developed an educational game to help siblings of Deaf children to learn basic signs. We are also in the process of implementing an eTutor for SASL [4].

Children with barriers to learning

The Department of Education in South Africa actively encourages children with barriers to learning to attend mainstream schools whenever possible. Only in the most severe cases do children attend special schools. Mainstreaming is a commendable idea, given that the necessary support is available at the mainstream schools – this is seldom the case, and the children have to find support through their parents and sometimes supportive teachers. A lack of specialized training, as well as the additional workload on teachers, causes difficulties in many cases. We focus on increasing the access to academic material by technological means.

The technology to facilitate diverse access to printed materials, is well known. However, such technology is seldom used in schools, and we are actively campaigning for awareness and policy changes. For example, children with barriers to reading may request the use of a human reader during written assessment opportunities (tests and examinations). It is up to the school to decide whether this will be granted or not. If readers are to be renumerated, the parents have to pay the fee. And logistically, the school is responsible for all administrative arrangements around this assessment opportunity – clearly, a large additional workload on the teacher responsible for the administration of the reading. We suggested a very simple solution from a technology point of view, namely, that tests and examinations are read onto an MP3 player, and made available to learners during the assessment. Special permission from the Department of Education has to be obtained for each individual learner every year. A pilot project at three local high schools is running for 2012 [5]. We set up the technology required, at a very low cost per learner, and will evaluate the psychological and educational advantages/disadvantages towards December 2012.

Another issue for learners with barriers to learning, is access to textbooks. We are currently working with Maskew Miller Longman publishers on a pilot project in this regard. As South African school textbooks are not available to purchase electronically, we hope to be able to let children with barriers to reading register for the traditional disability concession by publishers, and obtain an electronic copy. This would enable

these children to have access to printed materials via speech technology. Two issues are relevant here: (1) finding the cheapest reliable e-reading device that provides speech technology, and (2) finding a low cost speech generator that can produce understandable output for indigenous languages such as Afrikaans.

Again, awareness of the possibilities offered by technology, and how that can improve the situation of learners and teachers alike, is foremost on our agenda.

Assistive technologies for autism spectrum conditions

Children on the autism spectrum present with individual and different assistive needs, and a one-size-fits-all solution is not always desirable. We work with different schools in our area, and assessment of individual needs is always the first step. In this case, mobile technology is useful and mostly practical.

We developed a classroom administrative program, called StarLight [6], which provides teachers with an easy to use class worksheet preparation, class administration and class interaction system. Teachers have one interface, and students another, and both log into a central web server with full database storage facilities. Teachers can observe multiple students simultaneously in a classroom situation as they fill in worksheets, and students and teachers can communicate via a built-in messaging facility. The messaging facility was envisaged for children with autism who prefer to communicate non-verbally, but it has also proved to provide a communication facility without drawing any attention to a specific learner in the classroom situation. One of the major advantage of StarLight is that all interfaces are multilingual (all text are externally entered via XML files, and hence any of the eleven national languages can be used easily in the program). Another is that it is easy to prepare different worksheets for each individual learner in a classroom, thus relieving the teacher's workload in this respect. The StarLight system is currently in a beta development phase and is being tested at a local school.

Although there are many, many smartphone and tablet apps on the market, their usability differ greatly. We worked with autism experts to set up guidelines for mobile apps, and now develop specific apps for individual persons with autism.

Conclusions

Bridging the communication gap in South Africa has many unique problems. This includes cost, availability of data, policy and awareness. We work on all these issues for South African specific problems.

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