FASTY – FASTER TYPING FOR DISABLED PERSONS

W.L. Zagler and C. Beck

fortec – Research Group on Rehabilitation Technology,
Institute of Industrial Electronics and Material Science, Vienna Univ. of Technology,
Favoritenstrasse 11/366-1B, A-1040 Vienna, Austria

Abstract: **The partially EU funded project FASTY – FASTer TYping for disabled persons will demonstrate, that the good text prediction results of programs for the English language are also reachable with high inflecting languages like Dutch, German, French and Swedish. Additionally, new pressure sensitive input devices and a very flexible and modular human machine interface will improve the input speed and lower the strain of the user. This paper shows the main results of the first half of the project period.**
Keywords: **predictive typing, human machine interface, special input devices, communication enhancement**

Introduction

Motor impairments make the use of standard text input devices to the computer difficult and hence slow. But motor impairment often goes together with articulatory deficiencies. Therefore, communication often relies on slow text-input and that leads to communication disorders and influences the quality of life negatively.

FASTY will assist motor, speech, learning and language impaired persons to produce texts faster, with less physical/cognitive load and with better spelling and grammar. FASTY will be configurable for different types of disabilities, different communication settings and different European languages. It will allow easier access to PC based office systems, to modern forms of IT communication and a faster usage of text to speech synthesisers for voice communication.

Materials and Methods

Higher text generation rates will be achieved on one hand by using a very adaptable User-Interface with a variety of feedback options such as different selection lists and orders for the predicted words/phrases, different audible feedback options and synthetic speech output. These feedback options will be accompanied by different input methods, which may be optimized or totally new defined by the user. The third direction of the advanced HMI are pressure sensitive input devices such as keyboards and single switches. These devices will virtually double the number of switches/keys.

On the other hand a very strong prediction engine, which is independent from the used language, is developed. Based on an n-gram method the engine uses Part-of-Speech statistics, grammar-based prediction and prediction ranking and collocation-based prediction, too. Furthermore, a new technique for compound prediction will enhance the keystroke-saving rate for some languages. With these new approaches the keystroke saving rate of high inflecting languages such as German, French, Swedish or Dutch will be the same as state-of-the-art programs do for English.

Results

After the first half of the project a very modular system specification with an equivalent user interface and language part and with a common adjustment module (see figure 1) was developed.

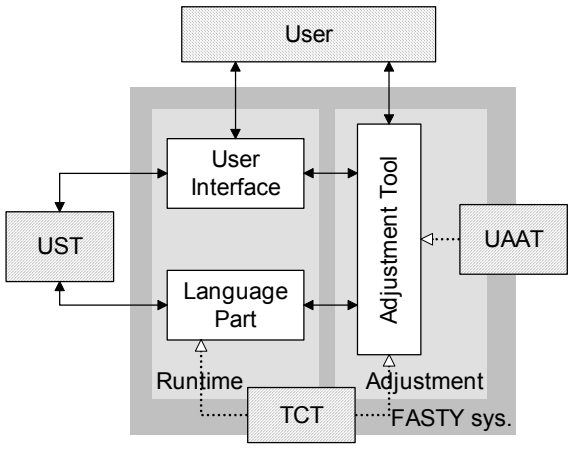

Figure 1: General structure of the FASTY system (UST = User Simulation Tool, UAAT = User Ability Assessment Tool, TCT = Text Collection Tool)

The system is furthermore divided in a runtime part (for the daily use of the primary user) and an adjustment part, which is used to adjust the system to the needs of the primary user (with or without the help of a care person).

The additional developer tools (marked with lined background in figure 1) are ready. The TCT (text collection tool) was used to collect text samples from disabled persons via internet or from their home computers. These text samples are used to support the dictionary generation and for tests with the UST (user simulation tool) with the developer versions of the FASTY system. The UAAT (User Ability Assessment Tool) was used to find out how persons use their current input devices.

The first UI and language component prototypes are available for developer tests. First results in the laboratory substantiate the taken decisions during the general research and specification phase. The keystroke saving rate (KSR) for short German newspaper texts touches the 65% line. This was made possible using a combination of state of the art and newly developed techniques as described in [1][2][3] comprehensively. The performance will be further increased in the near future by adding additional modules (such as grammar rules, collocation-based prediction, aso.). Figure 2 shows the current version of the developer tool for the language modules with a German text reaching nearly 61% KSR. This tool shows the prediction finding process with all substeps, gives the developer the possibility to adjust parameters and have a look on the result on the fly.

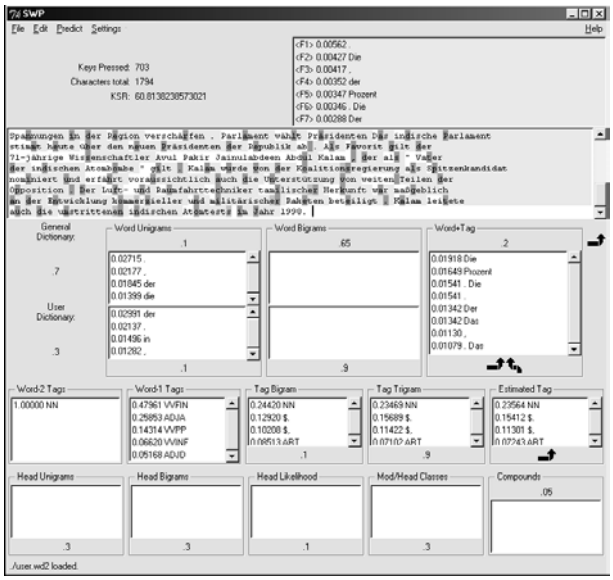

Figure 2: Screenshot of a developer tool for testing the language modules

The user interface is under development and first tests of submodules by experts give a promising outlook. Some versions of advanced input devices were developed and tested by experts and users. Figure 3 shows a standard keyboard placed on a pressure sensitive ground plate (in an early experimental state). Using this additional device with any keyboard doubles virtually the number of keys and makes it for instance easier for mouth stick typers to write upper and lower case texts.

Figure 3: Standard keyboard placed on an experimental pressure sensitive ground plate

A first prototype of the FASTY system, ready for user tests, will be available late in 2002.

Conclusions

The FASTY system will contribute to ensure equal access to Information Society for all Citizens. FASTY is an intelligent system by using methods of Natural Language Processing, Artificial Intelligence, adaptive user interfaces and pressure sensitive input devices in order to significantly increase the key stroke saving rate especially for those European languages which are highly inflected.

The first results give a very promising outlook for the second half of the project. The development of the FASTY system will go on and intense user tests will give feedback to the developers. More information may be found on the official project web-page:
http://www.fortec.tuwien.ac.at/fasty

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