TELIDA: A Package for Manipulation and Visualization of Timed Linguistic Data

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Introduction
TELIDA consists of
- a light-weight graphical viewer,
- an accompanying library and
- command line tools
to view, process and manage timed linguistic data.

Unlike other tools, TELIDA not only represents interval and point events, in several tracks, but also hypothesis events, which are the points of creation of hypotheses about events (and may contain even arbitrary, user-defined data).

TEDview, the viewing component, has some unique features such as
- a film view that proceeds smoothly during play,
- ability to process and display incremental data, visualizing the dynamics of speech processing and interpretation as it happens,
- ability of online visualization for speech processing applications (e.g., spoken dialogue systems), helping to debug and understand temporal aspects of system behaviour,
- fine grained control of visualization for intuitive use.

The accompanying library features
- easy import and export to a variety of formats (Frat, Boombox, WAVE), WAVesurf (Graubner and Rehder, 2000, XML)
- object-oriented interface to handling timed linguistic data, with a broad API suited to process language data
- handling of incremental and n-best speech processing results with a focus on evaluation measurements
- fully documented and thus (fairly) easy to extend
- written in Perl

The library-based tools contain
- simple scripts that capture the most common tasks like adding or removing alignments, searching in transcription files, etc.
- scriptable command-line applications that give fast and easy access to most of the library functions (removing the need to actually program a script yourself).

The Viewer
Unlike other tools (Wavesurf, Frat, and others), a track’s display changes with time (represented by a red line). If there are hypothesis events, always displaying the content of the most recent hypothesis. This makes TEDview ideal to display and understand the dynamic aspects of language processing, e.g., in dialogue systems or the ACT-R framework, as processing unfolds.

TEDView is not limited to displaying alignments in tracks, but can be extended to display all sorts of data in separate inspector widgets through the use of plugins. Additionally, TEDView can be fed data incrementally via TCP, allowing multiple components to work in a simultaneous and acting as the viewing/debugging component of multiple agents in a distributed language processing system.

Analysis of Dialogue Data
In the DEAUW project (Schlagen and Fels, 2007), we combined Fraart transcriptions and MMAX2 (Graubner and Rehder, 2000) annotations in a time-aligned view.
We also encoded numerical values through color of labels, (e.g., mouse motion in the track above).

Analysis of SDS Performance
In the INFRO project we use TEDview to analyze and visualize the incremental hypotheses of several modules of a spoken dialogue system (Krueller et al., 1998).
This application makes heavy use of TEDview’s incrementality features.
Incremental changes to a track are shown as diamonds. When playing, the track display changes as time passes the diamonds.

Analysis of Cognitive Models
In another project, we use TEDview to visualize the output of an ACT-R (Anderson, 1990) simulation of human sentence parsing (Wallace et al., 2000). Different tracks show different aspects of the model over (simulated) time. Notice the plug-in that incrementally displays generated parse trees.

Extending TEDview
- generic plug-in architecture to display data of almost any kind.
- plug-ins are written in Python
- many pre-written widgets can be used in plug-in writing
- plug-ins for parse trees and bar-charts are already included
- As an example, the code for the parse-tree widget, which makes use of NIFTY (Bird et al., 2009)
  parse drawing ability is shown to the right.

Bibliography

Download
TELIDA is open source software and available for download from http://www.1ing.uni-potsdam.de/~timo/code/telida/

Further Information
Please contact the authors via e-mail at: malsburg | timo | uas | dst@ling.uni-potsdam.de. More information on this and related research is available on the authors’ websites where you can also find a PDF version of this poster.

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