Running head: SNDOUT

SNDOUT: Software for cleaning audio files for discrete timeseries analyis

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Abstract

SNDOUT: Software for cleaning audio files for discrete timeseries analyis

Sound Output (sndout)

The program extracts a list of communication events from a stream of Distributed Interactive Simulation (DIS) Protocol Data Unit(s).

Considerations

The Distributed Interactive Simulation (DIS) protocol uses two mechanisms for publishing communication events to the network.

When an operator engages the push-to-talk button and speaks into the microphone, the computer performs a complex series of actions. The simulator sends a Transmitter State PDU indicating that the radio is now transmitting. Then, at regular time intervals, the simulator sends Signal PDUs buffers of compressed audio. On release of the push-to-talk button, the simulator sends another Transmitter State PDU indicating that the radio is no longer transmitter. The total transmit duration intended by the operator, is caluclated by comparing the times at which the Transmitter PDUs were sent.

The duration of audio sent by the simulator calculated by totalling the Signal PDU buffers sent. This duration is almost always different to the total transmit duration. This discrepancy occurs because the task of digitizing audio from the microphone is performed in discrete block sizes (between 20-100 milliseconds depending on the radio implementation). As such, when the push-to-talk is engage there may be a short delay in the computer responding, and a similar delay on push-to-talk release.

Filtering

Communication events sometimes contain no meaningful information. This situation occurs when the operator engages the push-to-talk button but fails to speak, or when engaging the push-to-talk button bounces his/her foot on the pedal resulting in erroneous communication events. The software uses two techniques to flag such events: 1. Duration theshold. Communication events are too short to contain meaningful information. 2. Voice activity. Communicaton events where the Signal PDU contains no voice activity. The Voice Activity Detection (VAD) algorithm from the Adaptive Multi-Rate (AMR) audio codec is used. This algorithm examines energy levels at different frequencies[?].

Output

The module outputs comma separated values (CSV) to the standard output. It will optionally write the audio content of each communication event to disk.

Note: the program will output human readable descriptions of DIS Identifiers and Transmit Frequencies if they exist in the enumerations document. See SISO-REF-010-AL1.xml.

Usage examples

1. Process the E1.lgr input file, extract events to E1.csv, and write .au audio files to E1_audio directory.

```
mkdir E1_audio
log.exe .taardis E1 .sndout -write-prefix E1_audio > E1.csv
```

2. Process the E2.lgr input file, extract events to E2.csv, exclude events below the duration and VAD thresholds, and do not write any sound files to disk.

```
log.exe .taardis E2 .sndout -write-network 0 -exclude 1 > E2.csv
```

3. Extract events from a DIS exercise in real-time, but do not write any sound files

to disk. This example assumes the DIS exercise is running on multicast group 224.1.1.1, UDP port 3000.

```
log.exe .udp -maddr 224.1.1.1 3000 .sndout -write-network 0
```

Experiment 1

Manuscripts in APA style often contain descriptions of experiments. The APA manual specifications for referring to experiments are to use a lowercase "e" when speaking generally, as in the previous phrase, but an uppercase "E" when mentioning a particular experiment (as in the following phrase), such as Experiment 1.

Method

The "method" is a subsection of the experimental presentation in which all the details of setting up and conducting the experiment are described. There a number of more or less standard components to a method, shown below.

Participants. Psychological experiments are conducted with participants, usually humans. Note that these used to be called "subjects" but apparently APA now finds it inappropriate to refer to people with this term. Here we mention how many participants there were, their ages and other information about them.

Apparatus. Sometimes it is necessary to give the apparatus a special section.

Stimuli. What the subjects saw, heard, or felt.

Procedure. What happened to the poor subjects.

Results

In this subsection, one shows numbers and statistical analyses. Students are especially unlikely to read this section, but seasoned researchers often avoid it in the first reading, especially if the article is not of particular interest for their own research.

Discussion

If the results of the experiment mean anything, this is the place to talk about it.

Experiment 2

Usually one experiment is not enough to convince anyone; you need additional control experiments to make your point.

Method

The method can be the same as for the previous experiment, since here we are simply interested in showing the structure of the manuscript.

Results & Discussion

This is a good point to show an example of a table following APA conventions. Note that we don't use any vertical separators and that columns can be grouped with partial horizontal lines. Also keep in mind that the caption must precede the table. The label is entirely optional, but useful for referring to the table in the text, for example this one would be Table 1.

General Discussion

In psychological articles there is usually some point to the whole experimental exercise, and in the end we get to discuss how important it all is. Although literature is supposed to have been covered in the introduction, for this example we can illustrate the use of bibliographic citations in this final section (?, ?). The accompanying package "apacite" by Erik Meijer provides everything an APA-style writer needs for citations, such as in-text citations in which one can claim that ? (?) mentioned or failed to mention something.

Author Note

Table 1

Field	Description
DIS-ID-NAME	DIS Identifier name (if available)
DIS-ID	DIS Identifier
RADIO-ID	Radio Identifier
FREQUENCY-NAME	Transmit frequency name (if available)
FREQUENCY	Transmit frequency (Hz)
PTT-ON, PTT-OFF	Push to talk event times (HH:MM:SS.sss or seconds)
PTT-DURATION	Push to talk duration (seconds)
DAC-SAMPLES	Audio duration (seconds)
VAD	Proportion of audio frames containing voice activity ([0-1])
FILENAME	Sound filename
TRUNCATED	Set to 1 if the PTT never returns to not-transmitting state. This occurs when the input (log file) terminates before an operator has finished transmitting.
CONTENT	When set to 1, the event is regarded as having meaningful content. This is equivelent to testing that the PTT-DURATION and VAD fields are greater than the respective thresholds. When set to 0, the event is regarded as having no meaningful content, and can be ignored from further analysis.

Table 2

Option	Description	Default value
-format-time INTEGER	format time using 'hours:minutes:seconds' notation	1
-hyperlink INTEGER	embed hyperlinks into CSV output	1
-write-network INTEGER	write network audio bitstream (.au)	1
-write-decoded INTEGER	write decoded audio bitstream (.au)	0
-write-prefix STRING	audio bitstream filename prefix	
-vad INTEGER	perform Voice Activity Detection	1
-duration-threshold REAL	duration threshold (seconds)	0.100
-vad-threshold REAL	vad score threshold	0.000
-exclude INTEGER	exclude events that have no meaningful content from CSV output	0

Table 3

Some numbers that could be experimental data.

	Factor 2	
Factor 1	Condition A	Condition B
First	586 (231)	649 (255)
	2.2	7.5
Second	590 (195)	623 (231)
	2.8	2.5