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User friendly signal processing web services for annotators in AVATecH and AUVIS

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AVATecH and AUVIS

- Joint Max Planck / Fraunhofer project 2009 – 2012
- Assist with annotation of audio and video recordings
- User friendly ELAN editor integration for annotators
- Basic and versatile building blocks for developers
- Multiple recognizers available, with CMDI metadata
- AUVIS project will add advanced recognizers

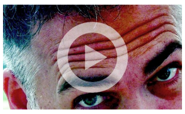
CLIN 2013 - University of Twente - Enschede

http://www.clarin.eu/cmdi

AVATecH building blocks

- Binary files: Audio, video, other (send, receive)
- Text files: Annotation tier, timeseries (XML, CSV)
- New: XML multitier (independent tiers in one XML)
- Numerical parameter: Min, max
- Text parameter: Choices or free
- All items have name / description

metadata and all parameters have defaults

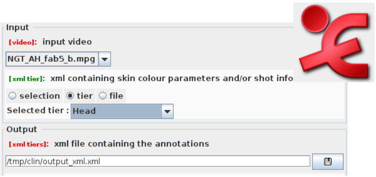


Metadata examples for developers

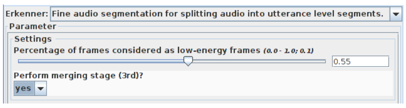
- <input type="video" optional="false" mimetypes="video/mpeg video/mp4" level="basic" info="video to scan for motion">source_video</input>
- <output type="csvtimeseries" optional="true" mimetypes="text/csv" level="advanced" info="amount of motion over time">motion_curve</output>
- <output type="multitier" optional="false" mimetypes="text/xml" level="basic" info="motion annotation">motion_anno</output>
- <numparam min="23" max="42" default="33" level="basic" info="sensitivity (higher triggers more easily)">motion_threshold</numparam>
- <textparam convoc="yes no automatic" default="automatic" level="advanced" info="ignore movement in the background">background_suppression</textparam>
- <recognizer recognizerType="local" runWin="motionAnnotator.exe /z" runLinux="/opt/avatech/bin/motionAnnotator -z" info="Human motion analysis"> motion_recognizer</recognizer>

What the annotator sees in ELAN

- Binary files:
- Text files:
- Multitier:
- Recognizer:
- Number:
- Choice:



Input
[video]: input video
NGT_AH_fab5_b.mpg
[xml tier]: xml containing skin colour parameters and/or shot info
○ selection ● tier ○ file
Selected tier : Head
Output
[xml tiers]: xml file containing the annotations
/tmp/clin/output_xml.xml

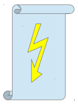


Erkenner: Fine audio segmentation for splitting audio into utterance level segments.
Parameter
Settings
Percentage of frames considered as low-energy frames *(0.0 - 1.0; 0.1)*
0.55
Perform merging stage (3rd)?
yes

Recognizer invocation under the hood

- <PARAM> <param name="source_video"> /home/eric/gebarentaal/NGT_AH_fab5_b.mpg</ param>
- <param name="skin_segment_info">/tmp/head_21432.xml</ param>
- <param name="motion_anno">/tmp/motion_21432.xml</ param>
- <param name="motion_threshold">33</param>
- <param name="background_supppression">no</param>
- <param name="InvocationContext">motion_recognizer 2013-01-15 15:00:01+01:00</ param> </PARAM>

Recognizer action



- PARAM XML block is pipelined to recognizer
- Recognizer starts computation, reads user files
- Recognizer creates output files and pipelines logs
- Tagged logs: DEBUG: INFO: WARN: ERROR: RESULT:
- RESULT: DONE. (or FAILED.) – ELAN imports results
- ELAN could show logs (with syntax highlighting) during computation. New: PROGRESS: 42% Mogrify

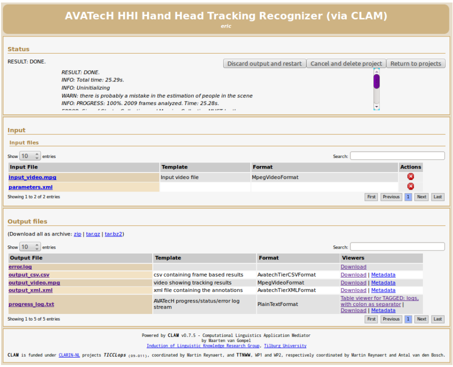
AVATecH webservices with CLAM

- Free open source (GPL) – http://ilk.uvt.nl/clam/
- Generic command line wrap by Maarten van Gompel
- Straightforward REST webservice interface
- CLAM-specific XML metadata and messages
- Smart CSS / XSLT for manual webapp style invocation
- AVATecH proxy client mimicks recognizers – sole command line args: metadata file, webservice URL

Webservice lifecycle under the hood

- Init - create temporary workspace: PUT http://catalog.clarin.eu/avatech/clin/E487ED5110BBA772 (random name generated by proxy helper)
- Send files: POST http://.../...772/ input/skin_segment_info.xml multipart/form-data, 1. name="inputtemplate" (value: skin_segment_info) 2. name="file"; filename="skin_segment_info.xml" Content-Type: text/xml (value: file content)
- Start computation: POST http://.../...772/ application/x-www-form-urlencoded, e.g. motion_threshold=33 background_suppression=automatic ...
- Monitor computation: GET http://.../...772/ returns CLAM XML, e.g. ... <status code="..." ... /> ... (repeat / poll until computation is done or aborts)
- Fetch log: GET http://.../...772/output/progress_log.txt (fixed name here, log can be "tailed" during computation with HTTP HEAD and GET Range requests)
- Fetch output files: GET http://.../...772/output/motion_annotation.xml
- Finally remove workspace: DELETE http://.../...772/ (this also aborts computations in case they were still running)

Manual web recognizer invocation



AVATecH HHI Hand Head Tracking Recognizer (via CLAM)

eric

Status

RESULT: DONE.

```
RESULT: DONE.
INFO: Total time: 25.29s.
INFO: Uninitializing
WARN: there is probably a mistake in the estimation of people in the scene
INFO: PROGRESS: 100%. 2009 frames analyzed. Time: 25.28s.
```

Input

Input files

Show 10 entries Search:

Input File	Template	Format	Actions
input_video.mpg	Input video file	MpegVideoFormat	✖
parameters.xml			✖

Showing 1 to 2 of 2 entries

Output files

(Download all as archive: zip | tar.gz | tar.bz2)

Show 10 entries Search:

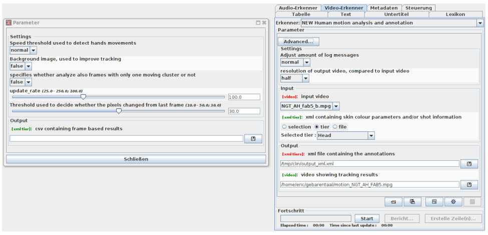
Output File	Template	Format	Viewers
error.log			Download
output_csv.csv	csv containing frame based results	AvatechTierCSVFormat	Download | Metadata
output_video.mpg	video showing tracking results	MpegVideoFormat	Download | Metadata
output_xml.xml	xml file containing the annotations	AvatechTierXMLFormat	Download | Metadata
progress_log.txt	AVATecH progress/status/error log stream	PlainTextFormat	Table viewer for TAGGED: logs, with colon as separator | Download | Metadata

Showing 1 to 5 of 5 entries

Powered by CLAM v0.7.5 - Computational Linguistics Application Mediator
by Maarten van Gompel
Induction of Linguistic Knowledge Research Group, Tilburg University

CLAM is funded under CLARIN-NL projects TICCLops (09-011), coordinated by Martin Reynaert, and TTNWW, WP1 and WP2, respectively coordinated by Martin Reynaert and Antal van den Bosch.

ELAN 4.5 web recognizer invocation



Parameter

Settings

Speed threshold used to detect hands movements: normal

Background image, used to improve tracking: false

specifies whether analyze also frames with only one moving cluster or not: false

update_rate (25.0 - 250.0; 100.0): 100.0

Threshold used to decide whether the pixels changed from last frame (10.0 - 50.0; 30.0): 30.0

Output

[xml tier]: csv containing frame based results

Erkenner: NEW Human motion analysis and annotation

Parameter

Settings

Adjust amount of log messages: normal

resolution of output video, compared to input video: half

Input

[video]: input video: NGT_AH_fab5_b.mpg

[xml tier]: xml containing skin colour parameters and/or shot information

○ selection ● tier ○ file

Selected tier : Head

Output

[xml tiers]: xml file containing the annotations: /tmp/clin/output_xml.xml

[video]: video showing tracking results: /home/eric/gebarentaal/motion_NGT_AH_FAB5.mpg

Fortschritt

Elapsed time : 00:00 Time since last update : 00:00

- "Same as local recognizer" but proxy has to transfer files – still server can be faster or have more tools
- Advanced settings in (normally closed) pop-up window

Recognizers accessible via CLAM

- Fine and Standard Audio Segmentation
- Model Based Speech Segmentation
- Relative Silence Recognizer
- Speaker Diarization (who speaks when)

Fraunhofer IAIS

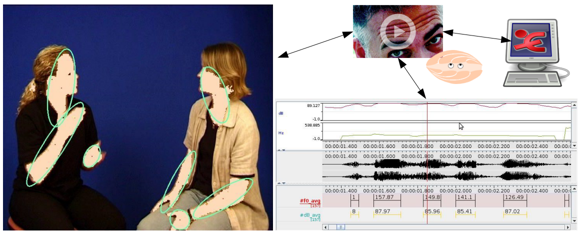
- Sphinx Model Based Speech Alignment
- Praat Based Tag Vowel Segmentation

(demos)

- Video Hand Head Tracking
- Video Key Frame Extraction
- Video Skin Tone Estimator

Fraunhofer HHI

Recognizer output examples

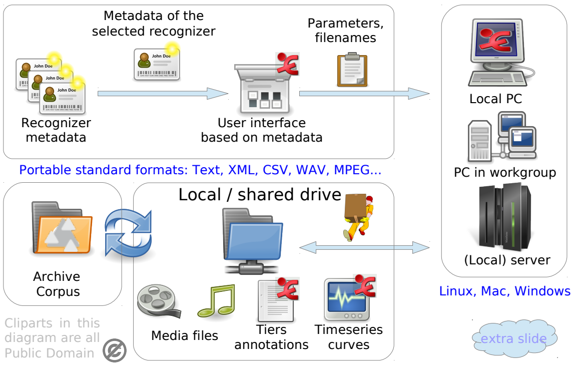


- Video can be added to media list or reviewed manually
- Timeseries to view in ELAN or use in math software
- ELAN helps annotators to send and receive tiers

Questions! And references.

- AVATecH: http://tla.mpi.nl/projects_info/avatech/
- AUVIS: http://tla.mpi.nl/projects_info/auvis/
- ELAN: http://tla.mpi.nl/tools/tla-tools/elan/
- CLAM: http://proycon.github.com/clam/

Answers? The AVATecH framework.



extra slide

Apache and WSGI config snippets

```
WSGIScriptAlias /model_speech_alignment \
  "/opt/clam/config/model_speech_alignment.wsgi /"
WSGIDaemonProcess model_speech_alignment \
  user=avatech group=users home=/opt/clam threads=5 \
  maximum-requests=42
WSGIProcessGroup model_speech_alignment
```

```
#!/usr/bin/env python
import os
import sys
CLAMPARENTDIR = '/opt' # directory with 'clam' subdirectory
sys.path.append(CLAMPARENTDIR)
os.environ['PYTHONPATH'] = CLAMPARENTDIR
import clam.config.model_speech_alignment
import clam.clamservice
application = clam.clamservice.run_wsgi(
  clam.config.model_speech_alignment)
```

extra slide

Wrapper shell script excerpt

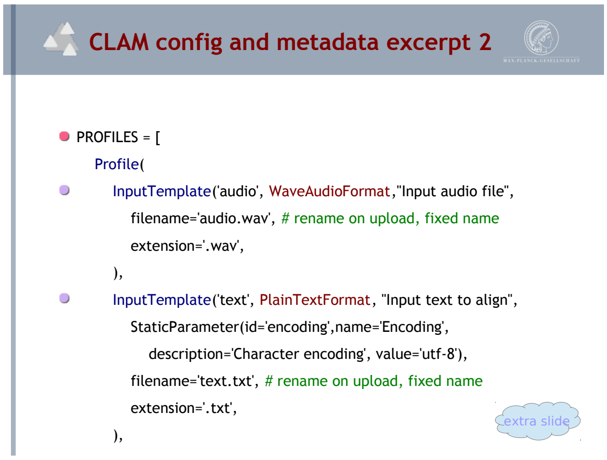
```
STATUSFILE=$1; INDIR=$2 ; OUTDIR=$3 ; MODEL=$4
ln -s $STATUSFILE $OUTDIR/progress_log.txt
# … create $INDIR/parameters.xml to pass the values:
# audio = $INDIR/audio.wav model = $MODEL
# text = $INDIR/text.wav output = $OUTDIR/output.csv …
if /opt/recognizers/msa/ModelSpeechAligner.sh \
  < $INDIR/parameters.txt >> $STATUSFILE
then # make sure that progress log contains RESULT: DONE.
else # make sure that progress log contains RESULT: FAILED.
fi
grep '^RESULT: DONE.' < $STATUSFILE > /dev/null
exit # return status of the grep: success iff result == done
```

extra slide

CLAM config and metadata excerpt 1

```
SYSTEM_ID = "mpimodelspeechalignment"
SYSTEM_NAME = "Sphinx-based Speech Alignment"
SYSTEM_DESCRIPTION = "CLAM-wrapped Sphinx..."
ROOT = "/tmp/model_speech_alignment/" # for temp workspaces
CLAMDIR = "/opt/clam/" # … where CLAM is installed
HOST = "catalog.clarin.eu"
URL = "http://catalog.clarin.eu/"
URLPREFIX = "avatech/model_speech_alignment"
COMMAND = CLAMDIR + "wrappers/model-speech-alignment.sh
  $STATUSFILE $INPUTDIRECTORY $OUTPUTDIRECTORY $PARAMETERS"
PARAMETERS =  [
    ('Main', [ # Boolean Choice Integer Float String Text Static …
        ChoiceParameter(id='model', name='Language Model',
            description='Which CMU Sphinx language model?',
            choices=['English','German','Dutch'],
            default='English', required=True, paramflag='' ),
    ] )
]
```

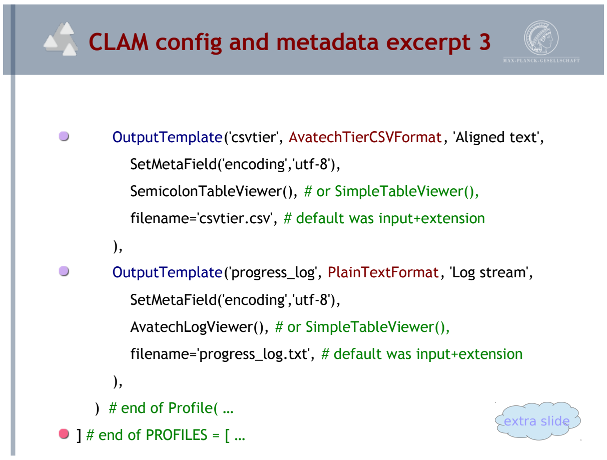
extra slide



CLAM config and metadata excerpt 2

```
PROFILES = [
    Profile(
        InputTemplate('audio', WaveAudioFormat,"Input audio file",
            filename='audio.wav', # rename on upload, fixed name
            extension='.wav',
        ),
        InputTemplate('text', PlainTextFormat, "Input text to align",
            StaticParameter(id='encoding',name='Encoding',
                description='Character encoding', value='utf-8'),
            filename='text.txt', # rename on upload, fixed name
            extension='.txt',
        ),
```

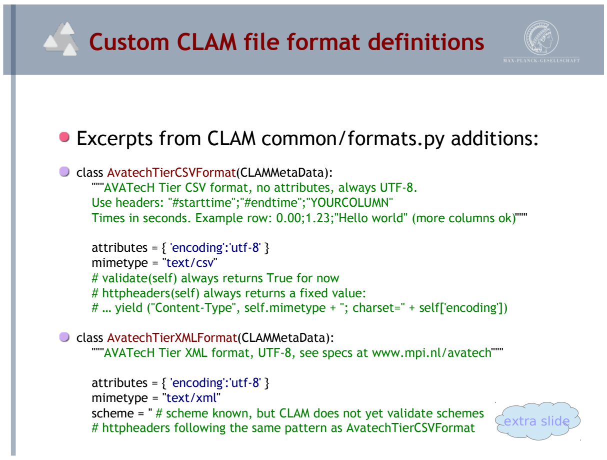
extra slide



CLAM config and metadata excerpt 3

```
        OutputTemplate('csvtier', AvatechTierCSVFormat, 'Aligned text',
            SetMetaField('encoding','utf-8'),
            SemicolonTableViewer(), # or SimpleTableViewer(),
            filename='csvtier.csv', # default was input+extension
        ),
        OutputTemplate('progress_log', PlainTextFormat, 'Log stream',
            SetMetaField('encoding','utf-8'),
            AvatechLogViewer(), # or SimpleTableViewer(),
            filename='progress_log.txt', # default was input+extension
        ),
    ) # end of Profile( ...
] # end of PROFILES = [ ...
```

extra slide



Custom CLAM file format definitions

- Excerpts from CLAM common/formats.py additions:

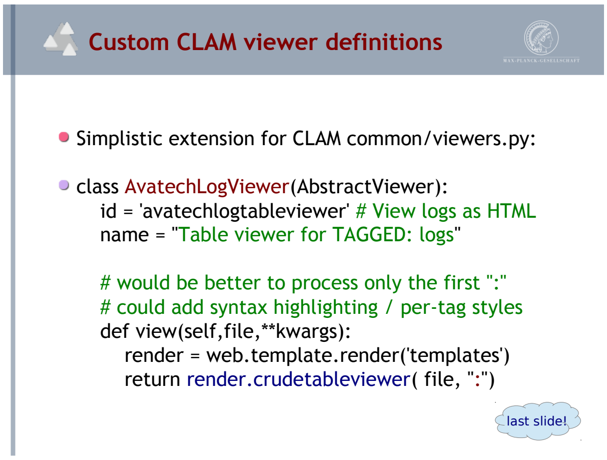
```
class AvatechTierCSVFormat(CLAMMetaData):
    """AVATecH Tier CSV format, no attributes, always UTF-8.
    Use headers: "#starttime";"#endtime";"YOURCOLUMN"
    Times in seconds. Example row: 0.00;1.23;"Hello world" (more columns ok)"""

    attributes = { 'encoding':'utf-8' }
    mimetype = "text/csv"
    # validate(self) always returns True for now
    # httpheaders(self) always returns a fixed value:
    # … yield ("Content-Type", self.mimetype + "; charset=" + self['encoding'])

class AvatechTierXMLFormat(CLAMMetaData):
    """AVATecH Tier XML format, UTF-8, see specs at www.mpi.nl/avatech"""

    attributes = { 'encoding':'utf-8' }
    mimetype = "text/xml"
    scheme = '' # scheme known, but CLAM does not yet validate schemes
    # httpheaders following the same pattern as AvatechTierCSVFormat
```

extra slide



Custom CLAM viewer definitions

- Simplistic extension for CLAM common/viewers.py:

```
class AvatechLogViewer(AbstractViewer):
    id = 'avatechlogtableviewer' # View logs as HTML
    name = "Table viewer for TAGGED: logs"

    # would be better to process only the first ":"
    # could add syntax highlighting / per-tag styles
    def view(self,file,**kwargs):
        render = web.template.render('templates')
        return render.crudetableviewer( file, ":")
```

last slide!