
audio_synch_tool Documentation

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AUDIO_SYNCH_TOOL PACKAGE

1.1 Subpackages

1.1.1 audio_synch_tool.data package

1.1.1.1 Module contents

1.2 Submodules

1.3 audio_synch_tool.mvn module

This module contains functionality concerning the adaption of the XSENS MVN format into our Python setup.

The following section introduces the contents of the imported MVN file and the way they can be accessed from Python:

```
# load mvn schema https://www.xsens.com/mvn/mvnx/schema.xsd
MVN_SCHEMA_PATH = "xxx"
mvn_path = "yyy"
mmvn = Mvn(mvn_path, MVN_SCHEMA_PATH)

# These elements contain some small metadata:
mmvn.mvn.attrib
mmvn.mvn.comment.attrib
mmvn.mvn.securityCode.attrib["code"]
mmvn.mvn.subject.attrib

# subject.segments contain 3D pos_b labels:
for ch in mmvn.mvn.subject.segments.iterchildren():
    ch.attrib, [p.attrib for p in ch.points.iterchildren()]

# sensors is basically a list of names
for s in mmvn.mvn.subject.sensors.iterchildren():
    s.attrib

# Joints is a list that connects segment points:
for j in mmvn.mvn.subject.joints.iterchildren():
    j.attrib["label"], j.getchildren()

# miscellaneous:
for j in mmvn.mvn.subject.ergonomicJointAngles.iterchildren():
    j.attrib, j.getchildren()
```

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```

for f in mmvn.mvn.subject.footContactDefinition.iterchildren():
    f.attrib, f.getchildren()

# The bulk of the data is in the frames.
print("frames_metadata:", mmvn.frames_metadata)
print("first_frame_type:", mmvn.config_frames[0]["type"])
print("normal_frames_type:", mmvn.normal_frames[0]["type"])
print("num_normal_frames:", len(mmvn.normal_frames))

# Metadata looks like this:
{'segmentCount': '23', 'sensorCount': '17', 'jointCount': '22'}

# config frames have the following fields:
['orientation', 'position', 'time', 'tc', 'ms', 'type']

# normal frames have the following fields:
['orientation', 'position', 'velocity', 'acceleration',
 'angularVelocity', 'angularAcceleration', 'footContacts',
 'sensorFreeAcceleration', 'sensorMagneticField', 'sensorOrientation',
 'jointAngle', 'jointAngleXZY', 'jointAngleErgo', 'centerOfMass', 'time',
 'index', 'tc', 'ms', 'type']

```

The following fields contain metadata about the frame:

time ms since start (integer). It is close to $\text{int}(1000.0 * \text{index} / \text{samplerate})$, being equal most of the times and at most 1 milisecond away. It is neither truncated nor rounded, maybe it is given by the hardware.

index starts with 0, +1 each normal frame

tc string like '02:23:28:164'

ms unix timestamp like 1515983008686 (used to compute time)

type one of "identity", "tpose", "tpose-isb", "normal"

The following fields are float vectors of the following dimensionality:

orientation $\text{segmentCount} * 4 = 92$

position, velocity, acceleration, angularVelocity, angularAcceleration $\text{segmentCount} * 3 = 69$

footContacts 4

sensorFreeAcceleration, sensorMagneticField $\text{sensorCount} * 3 = 51$

sensorOrientation $\text{sensorCount} * 4 = 68$

jointAngle, jointAngleXZY $\text{jointCount} * 3 = 66$

jointAngleErgo 12

centerOfMass 3

class audio_synch_tool.mvn.**Mvn**(mvn_path, schema_path=None)

Bases: object

This class imports and adapts an XML file (expected to be in MVN format) to a Python-friendly representation. See this module's docstring for usage examples and more information.

get_segments()

Returns A list of the segment names in `self.mvn.subject.segments`, ordered by id (starting at 1 and incrementing +1).

1.4 audio_synch_tool.plotters module

```
class audio_synch_tool.plotters.MultipleDownsampledPlotter1D(arrays,          sam-
                                                             plerates=None,
                                                             max_datapoints=10000,
                                                             shared_plots=None)
```

Bases: object

This class generates a matplotlib figure that plots several 1-dimensional arrays. Since some arrays can be quite long, it features a built-in downsampling mechanism that plots a (configurable) number of points at most. The downsampling mechanism is based on this code:

https://matplotlib.org/3.1.0/gallery/event_handling/resample.html

Note: The downsampling mechanism only affects the display, not the data, and is refreshed every time the user changes the perspective. If the user zooms close enough the data will be displayed in its original form. Therefore downsampling helps to provide a quicker interaction when scrolling large files, while allowing for sample-precise inspection.

```
FIG_ASPECT_RATIO = (10, 8)
```

```
FIG_MARGINS = {'bottom': 0.1, 'hspace': 0.5, 'left': 0.1, 'right': 0.95, 'top': 0.1}
```

```
make_fig(num_xticks=15, num_yticks=10, tick_fontsize=7, tick_rot_deg=15, num_decimals=3,
          show_idx=True)
```

Returns A matplotlib Figure containing the array given at construction. The interactive plot of the figure will react to the user's zooming by showing approximately `self.max_datapoints` number of samples.

1.5 audio_synch_tool.utils module

```
class audio_synch_tool.utils.DownsampleableFunction(arr, max_datapoints)
```

Bases: object

Encapsulates the downsampling functionality to prevent side effects, and reduce code verbosity in plotter.

```
downsampled(xstart, xend)
```

This function performs downsampling by reading one sample every $(xend - xstart) // \text{max_datapoints}$ from `x_vals` and `y_vals`.

```
class audio_synch_tool.utils.SampleToTimestampFormatter(samplerate,
                                                         num_decimals=3,
                                                         show_idx=True)
```

Bases: object

This functor can be passed to `plt.FuncFormatter` to generate custom tick labels. It fulfills the interface `(val, pos) -> str`.

Specifically, converts `val` number representing a sample into a string showing the corresponding elapsed time since sample 0, assuming the given samplerate. Usage example:

```
ax.xaxis.set_major_formatter(plt.FuncFormatter(  
    SampleToTimestampFormatter(sr)))
```

class audio_synch_tool.utils.**SharedXlimCallbackFunc***tor* (*func**tors*)

Bases: object

If multiple axes share

class audio_synch_tool.utils.**Timestamp** (*sample_nr*, *samplerate*)

Bases: object

as_tuple()

Returns the tuple of integers (days, hours, mins, secs, microsecs)

days

hours

microsecs

mins

sample_nr

samplerate

secs

total_seconds

class audio_synch_tool.utils.**XlimCallbackFunc***tor* (*axis*, *lines*, *arrays*)

Bases: object

Encapsulates the downsampling callback functionality to prevent side effects. Instances of this functor can be passed to an axis like this:

```
``ax.callbacks.connect('xlim_changed',  
    DownsamplingCallbackFunc(ax, [line1..], [arr1...]))``
```

1.6 Module contents

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