%%Instructions and details about Ulyssess annotations and notes

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A. Basic annotation data fields

The basic annotation data fields are defined in "load\_default\_template",

which are first loaded in "load\_notes\_file", which in turn is called by

"pushbutton\_notes\_select\_Callback"

B. Fields associated with notes.

~handles.notes.saved

~handles.notes.readonly

handles.notes.folder\_name;

set(handles.pushbutton\_notes\_new, 'Enable', opt);

set(handles.pushbutton\_notes\_save, 'Enable', opt);

set(handles.pushbutton\_notes\_edit, 'Enable', opt);

set(handles.checkbox\_notes\_show, 'Enable', opt);

set(handles.checkbox\_notes\_delete, 'Enable', opt);

%%% Annotation template, Annotations template

% Defines default fields

%%load\_default\_template

function [Description, Template, edit\_fields] = load\_default\_template()

%edit fields are fields you can edit...

Description = {'Start Time',...

'Author',...

'Pulse or FM?',...

'Call Type',...

'Min Freq (Hz)',...

'Max Freq (Hz)',...

'Duration (s)',...

'Noise SEL (dB re 1 uPa^2-s)',...

'Noise rms (dB re 1 uPa)',...

'Noise peak PSD (dB re 1uPa^2/Hz)',...

'Signal SEL (dB re 1 uPa^2-s)',...

'Signal rms (dB re 1 uPa)',...

'Signal peak PSD (dB re 1uPa^2/Hz)',...

'Signal SNR (rms)', ...

'Signal SNR (dB rms)', ...

'# of pulses',...

'# of harmonics',...

'Modulation (Hz)',...

'Confidence (1-5)',...

'Comments'};

% Default values

Template.start\_time = 0; %datenumber

Template.author = 'Your name';

Template.sig\_type = 'NA';

Template.call\_type = 'S1';

Template.min\_freq = 0;

Template.max\_freq = 5000;

Template.duration = 10;

Template.noise\_se\_dB = 0;

Template.noise\_rms\_dB = 0;

Template.noise\_peakpsd\_dB = 0;

Template.signal\_se\_dB = 0;

Template.signal\_rms\_dB = 0;

Template.signal\_peakpsd\_dB = 0;

Template.SNR\_rms = 0;

Template.SNR\_rms\_dB = 0;

Template.num\_pulses = 2;

Template.num\_harmonics = -1;

Template.modulation = 0;

Template.confidence = 3;

Template.comments = '';

edit\_fields = fieldnames(Template);

edit\_fields(5:14) = [];

EXAMPLE OF ANNOTATION STRUCTURE IN MATLAB

Your variables are:

Data GUI\_params ans

Data

Data =

Description: {1x20 cell}

Template: [1x1 struct]

Events: [3x1 struct]

Data.Description

ans =

Columns 1 through 9

'Start Time' 'Author' 'Pulse or FM?' 'Call Type' 'Min Freq (Hz)' 'Max Freq (Hz)' 'Duration (s)' [1x27 char] [1x23 char]

Columns 10 through 17

[1x32 char] [1x28 char] [1x24 char] [1x33 char] 'Signal SNR (rms)' 'Signal SNR (dB rms)' '# of pulses' '# of harmonics'

Columns 18 through 20

'Modulation (Hz)' 'Confidence (1-5)' 'Comments'

Data.Template

ans =

start\_time: 0

author: 'Your name'

sig\_type: 'NA'

call\_type: 'S1'

min\_freq: 0

max\_freq: 5000

duration: 10

noise\_se\_dB: 0

noise\_rms\_dB: 0

noise\_peakpsd\_dB: 0

signal\_se\_dB: 0

signal\_rms\_dB: 0

signal\_peakpsd\_dB: 0

SNR\_rms: 0

SNR\_rms\_dB: 0

num\_pulses: 2

num\_harmonics: -1

modulation: 0

confidence: 3

comments: ''

**Need to add: slope, hashtag (time added). The latter consists of a cell array (with other annotation file names) and a numerical array (time added). Thus an annotation can be linked to other annotations, including one in the current file.**

Data.Events

ans =

3x1 <a href="matlab:helpPopup struct" style="font-weight:bold">struct</a> array with fields:

start\_time

author

sig\_type

call\_type

min\_freq

max\_freq

duration

noise\_se\_dB

noise\_rms\_dB

noise\_peakpsd\_dB

signal\_se\_dB

signal\_rms\_dB

signal\_peakpsd\_dB

SNR\_rms

SNR\_rms\_dB

num\_pulses

num\_harmonics

modulation

confidence

comments

Data.Events(1)

ans =

start\_time: 7.3534e+05

author: 'Aaron Thode'

sig\_type: 'Pulse'

call\_type: 'Moo'

min\_freq: 102.5918

max\_freq: 1.0421e+03

duration: 1.1306

noise\_se\_dB: 33.1416

noise\_rms\_dB: 32.6084

noise\_peakpsd\_dB: 53.2359

signal\_se\_dB: 37.5531

signal\_rms\_dB: 37.0198

signal\_peakpsd\_dB: 55.0154

SNR\_rms: 0

SNR\_rms\_dB: '4.4114'

num\_pulses: '10'

num\_harmonics: '-1'

modulation: '0'

confidence: '3'

comments: 'Maybe other'

FORMAT OF BOWHEAD AUTOMATED DETECTIONS….

Original ‘morph’ files… ‘best\_calls’ variable

best\_calls

best\_calls =

features: {1x5068 cell}

ctimes: []

equalization\_freq: [25x1 double]

tstart: [1x5068 double]

ctime: [1x5068 double]

duration: [1x5068 double]

index: [1x5068 double]

equalization: {1x5068 cell}

labeled\_image: {1x5068 cell}

ICI: [1x5068 double]

bearing: [1x5068 double]

labeled\_image is a sparse matrix.

best\_calls.features{1}

ans =

Area: 19

Centroid: [2x1 double]

BoundingBox: [4x1 double]

Eccentricity: 0.7571

Orientation: -29.8718

Image: []

Solidity: 0.9048

Extent: 0.7600

Centroid\_freq: 148.4375

duration: 0.1600

global\_bandwidth: 15.6250

time\_band\_product: 2.3750

fmax: 156.2500

fmin: 140.6250

local\_bandwidth: 15.6250

ctime: 1.3778e+09

comment: ''

robust\_fmin: 145.6116

robust\_fmax: 150.1698

robust\_bandwidth: 8.5380

median\_local\_kurtosis: 0.0549

fstart: 150.0722

fend: 146.0374

Totalfmax: 156.2500

Totalfmin: 140.6250

Totalduration: 0.1600

TotalBoundingBox: [4x1 double]

Nharmonic: 0

harmonic\_spacing: 0

Contour\_Area: 70

Contour\_global\_bandwidth: 54.6875

Contour\_duration: 0.7040

Contour\_local\_bandwidth: 11.7188

Contour\_fmin: 136.7188

Contour\_fmax: 191.4062

AreaRatio: 3.6842

final\_image: {[129x37 double]}

dF: 3.9062

dT: 0.0320

T: [1x37 double]

F: [129x1 double]

SNR: 11.3530

SEL: 77.4465

power: 3.4716e+08

best\_calls.features{2}.BoundingBox

ans =

0.4800 0.3200 0.2880

82.0312 164.0625 238.2812

0.4480 0.9920 0.3840

15.6250 58.5938 35.1562

**This describes a harmonic call…**

>>best\_calls.features{2}.TotalBoundingBox

ans =

0.2880

238.2812

1.0240

171.8750

**LOCALIZATION OBJECT STRUCTURE**

Icase ans goodName locations param run\_options station\_single

Isite goodFile linking\_index locations\_ctime raw\_station station

Icase 1x35 70 char

Isite 1x1 8 double

ans 1x2 16 double

goodFile 1x7 1834 cell

goodName 1x7 1092 cell

linking\_index 1x1 151488 struct

locations 1x632 15941230 cell

locations\_ctime 632x7 35392 double

param 1x1 25826 struct

raw\_station 1x7 271152 struct

run\_options 1x1 4786 struct

station 1x7 6067958 struct

station\_single 1x7 2727968 struct

**STRUCTURE OF A STATION**

station =

1x7 struct array with fields:

Contour\_Area

Contour\_duration

Contour\_fmax

Contour\_fmin

Contour\_global\_bandwidth

Contour\_local\_bandwidth

Nsegments

SEL

SNR

Totalduration

Totalfmax

Totalfmin

ctime\_debug

ctime\_min

duration\_debug

equalization

feature

indicies

param

Image

bearing

kappa

bearing\_sd

bearing\_rel

locations{10}.feature

ans =

1x7 struct array with fields:

Eccentricity

Nharmonic

Orientation

SEL

SNR

Solidity

ctime

duration

harmonic\_spacing

local\_bandwidth

median\_local\_kurtosis

robust\_bandwidth

robust\_fmax

robust\_fmin

time\_band\_product

**Thus the ‘location’ and ‘station’ objects are closely linked through location.station\_indicies.**

**Totalfmin, Totalfmax, and Totalduration should allow bounding box to be identified.**

**Note sure how harmonics are contained in localization objects…**

**%%How a station is related to the ‘best\_calls’ variable in ‘\*morph.mat’**

**station(Istation)=create\_station(best\_calls.equalization\_freq,best\_calls.equalization,best\_calls.features, ...**

**best\_calls.labeled\_image, ...**

**debug\_ctimes,debug\_durations,param.feature.names,param.feature.global\_names, ...**

**param.feature.index ,param.feature.Nsegments);**

**station.indicies connects the contents of a station with the original best\_call structure: [2 Nobjects] where first row is index of best\_call and second row is the feature number (which has the largest time-bandwidth product.**

**To reproduce the orginal linked segment detection (output of extract\_image\_feature), I use**

**The second image output of S513G0T20130830T000000\_morph.mat…**

**T=best\_calls.features{2}.T;**

**F=best\_calls.features{2}.F; imagesc(T,flipud(F),best\_calls.features{2}.final\_image{1})**

**axis('xy')**

**The number of segments (harmonics) provided by best\_calls.features{2}.Nharmonic**

/Users/thode/Desktop/Ulysses/AutomatedBowheadAnnotations.dir

test\_results.m, demonstrates all these relationships, including the broken linking\_index…