Example analysis for annotatedLibrary

Table of Contents

The following example illustrates basic usage of some of the commonly used functions from the annotatedLibrary github repository https://github.com/BrianSMiller/annotatedLibrary.

Define local locations of data (wav files and annotations)

```
sorpFolder = 'w:\annotatedLibrary\SORP\';
siteCode = 'kerguelen2014';
ravenFile = [sorpFolder, siteCode, '\Kerguelen2014.Bm.Ant-Z.selections.txt'];
```

Register a new wavFolder and load metadata

```
wavFolder = [sorpFolder siteCode '\wav\'];
[~, timestampFormat] = guessFileNameTimestamp(wavFolder);
wavInfo = wavFolderInfo(wavFolder,timestampFormat);
```

Load a Raven Selection Table

```
% Simple wrapper around readtable to link the selection & soundFolder
rt = ravenTableToDetection(ravenFile,wavFolder,siteCode,'Z-call');
```

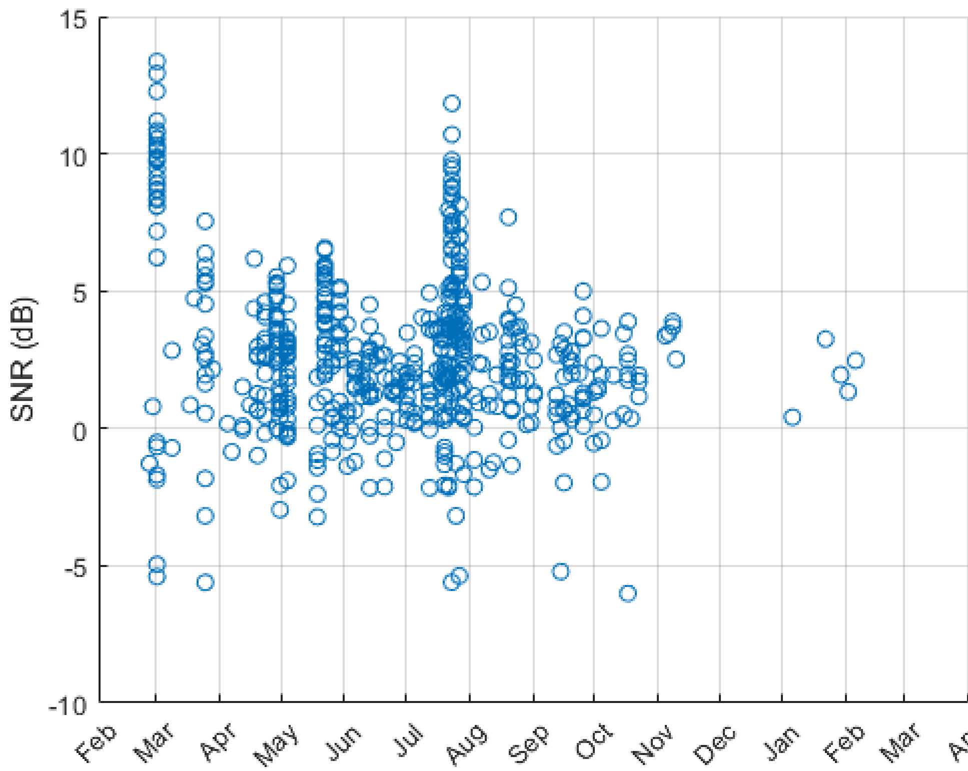
Warning: Column headers from the file were modified to make them valid MATLAB identifiers before creating variable names for the table. The original column headers are saved in the VariableDescriptions property.
Set 'VariableNamingRule' to 'preserve' to use the original column headers as table variable names.

Estimate SNR for annotations

```
params.showClips = false;
params.noiseDelay = 1;
params.freq = [24 29];  % Antarctic blue whale: Unit-A of full Z-calls

[snr, rt.signalRms, rt.noiseRms, rt.noiseVar] = annotationSNR(rt,params);
rt.snr = 10*log10(rt.signalRms) - 10*log10(rt.noiseRms);

% Plot results as a time series
```

```
figure;
scatter(rt.t0,rt.snr);
datetick('x');
ylabel('SNR (dB)');
grid on;
```

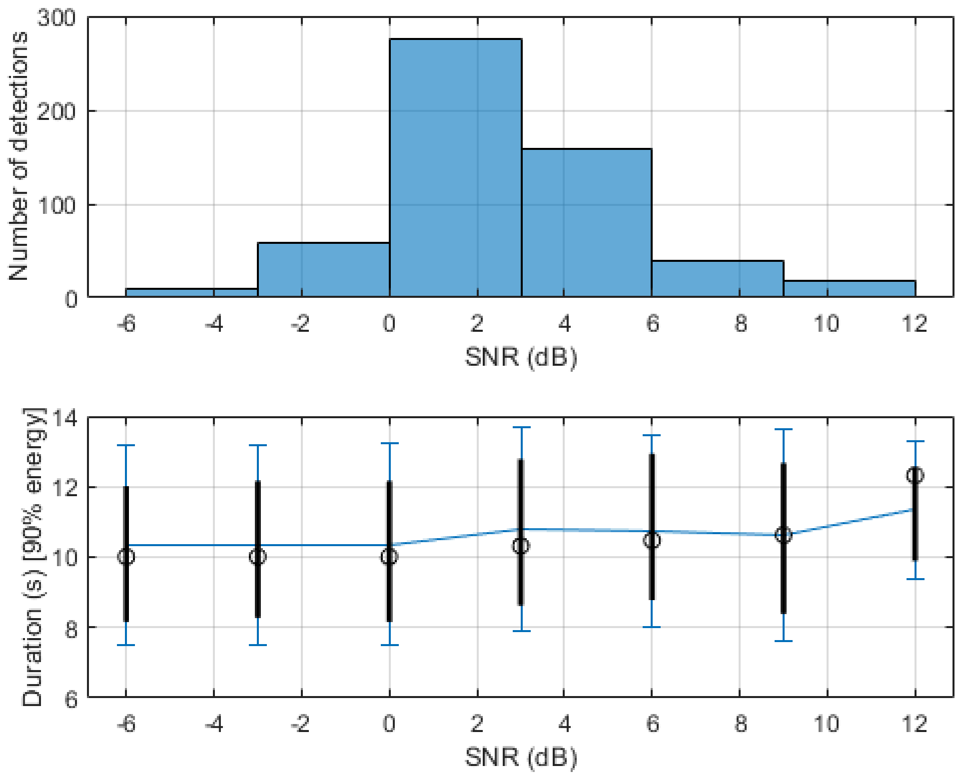
563/563 SNR measurements completed in 14.9 s



Simple 'sensitivity analysis' to see if a parameter is sensitive to SNR

```
thresholds = -6:3:14;

tiledlayout(2,1);
ax2 = nexttile;
histogram(rt.snr,thresholds);
xlabel('SNR (dB)')
ylabel('Number of detections')
grid on;

% Calculate mean, std, 25, 50, 75 percentiles of durations for each
% threshold
duration = [];

for i = 1:length(thresholds);
```

```
    ix = rt.snr > thresholds(i);
    duration.Q1(i) = quantile(rt.Dur90__s_(ix),0.25);
    duration.median(i) = median(rt.Dur90__s_(ix));
    duration.Q3(i) = quantile(rt.Dur90__s_(ix),0.75);
    duration.mean(i) = mean(rt.Dur90__s_(ix));
    duration.std(i) = std(rt.Dur90__s_(ix));
end

ax3 = nexttile;
errorbar(thresholds,duration.mean,duration.std);
hold on;
plot(thresholds,duration.median,'ok');
line([thresholds;thresholds],[duration.Q1; duration.Q3], ...
    'lineWidth',2,'color','k');
xlabel('SNR (dB)');
ylabel('Duration (s) [90% energy]')
grid on;
linkaxes([ax2 ax3],'x');
```



Sensitivity analysis conclusions

On the surface, the results of the sensitivity analysis are a bit ambiguous. It looks to me like the duration appears to be increasing with SNR at 3 dB as well as at 12 dB.

However, there are few annotations with SNR > 12 dB, so I wouldn't rely on that last point for anything. And the increase at threshold of 3 dB is only from 10.37 - 10.78 = 0.41 s on top of a duration of about 10 s (so around 4%).

Since the effect appears small, but potentially could be real,statistical analysis might be warranted to confirm or reject any relationship between SNR and duration.

Additionally, it's worth noting that the outcome here could also be due to the nature of the dataset. For example, there may be a relationship between SNR and duration that we are unable to detect because we have only a limited range of SNRs from -6 to 13.3 dB. The relationship may be more apparent if we had substantially more low- and/or high-SNR detections.

Published with MATLAB® R2022a