Get the data summary files:

<https://www.dropbox.com/sh/2adska18vg58ub6/AABkkYu6inRLbug7A2h01GrUa?dl=0>

Also in this folder you’ll find “case\_ids.mat”. This includes a bunch of lists of neuron/syllable pairs that meet various criteria. The one you want is “case\_ids\_all\_1\_50”, this is “all” (both single- and multi-unit) cases that fire at least one spike and for which we have at least 50 trials. Note that case\_ids.mat also includes “case\_ids\_all\_1\_50\_window\_m40\_0” (the suffix just means that the temporal window used was from -40 to 0 milliseconds before the time of pitch measurement). These two arrays should be identical (125 cases each).

You can then load each entry of case\_ids\_all\_1\_50 to recover the mutual information values. As you’ll see, each entry contains a large number of values about that neuron/syllable combination. For example, case\_ids\_all\_1\_50{1} is “pu26y2\_b\_1054” – this is bird ID pu26y2, syllable b, neuron number 1054.

For the metric-space (Victor-Purpura) analysis, the terms you want are

H\_mean\_subtracted\_pitch (or amplitude, or entropy, etc.) and

significance\_of\_H\_pitch (or amp etc.)

The first is the value of mutual information of the VP analysis after subtracting the random distribution. For details on this (and everything else about Claire’s analysis), you should read through Metric\_Space\_Analysis\_Documentation.docx, which Claire wrote and which I’ll attach along with this document.

For both of the above, you’ll see that these are length-11 vectors. This corresponds to the 11 values of *q* tested, which I believe are ordered as follows:

[0, 0.05, 0.1, 0.2, 0.3, 0.5, 1, 2, 5, 10, and 20 ms-1]

Using the above information (and that in Metric\_Space\_Analysis\_Documentation.docx), you should be able to extract which are rate cases and which are temporal cases. I suggest that you read Claire’s .docx carefully and then try to replicate Fig. 2D from the PLoS paper.

**Update: how to recover NSB (direct-method) information estimates + standard deviations**

Code to generate figure 4 (mean+SD mutual info computed via NSB) from Tang et al 2014:

plot\_MI\_avg\_across\_cases\_weighted\_average\_all.m

As you’ll see from inspection, this assembles an array “MIs” of mutual infos. Note that for some cases, we’re using the partition strategy to compute MI, and in other cases we are not.

load('MI\_Feb132014.mat');

load Sept2014\_MI.mat

MIs = {MI1\_partition, MI2, MI3, MI4\_partition, MI5, MI6, MI7, MI8, MI9, MI10, MI11, MI12\_partition, MI13\_partition, MI14, MI15\_partition, MI16\_partition, MI17\_partition, MI18\_partition, MI19,MI20, MI21, MI22\_partition, MI23, MI24, MI25, MI26, MI27, MI28, MI29\_partition, MI30\_partition, MI31, MI32, MI33, MI34, MI35, MI36, MI37, MI38, MI39\_partition, MI40, MI41\_partition};

So per the above, mutual info from cases 1, 4, 12, etc. use partition, but cases 2,3,5, etc. do not. Each entry in “MIs” is a 4x2 array, with each entry in the array being a 1x6 vector. Each array entry is

MIs = {MI\_3dacoustics\_nsbs, MI\_sd\_3dacoustics\_nsbs;

MI\_pitch\_nsbs, MI\_sd\_pitch\_nsbs;

MI\_amplitude\_nsbs, MI\_sd\_amplitude\_nsbs;

MI\_spectral\_entropy\_nsbs, MI\_sd\_spectral\_entropy\_nsbs};

(The above code is from plot\_MI\_nsb\_vs\_dt.m, which saves MIs)

So the first column is mean, and second column is SD. The first row is for the “3D acoustics” analysis, second row is pitch, third row is amplitude, and fourth row is entropy. Within each entry, the 1x6 vector is arranged in decreasing order of dt: [40 20 10 5 2 1] (in msec).

OK – next question – how to figure out which entries in “MIs” correspond to which cases? You can find these by loading variable 'case\_ids\_1\_200' from the file 'case\_ids\_with\_200.mat'. (The reason for the name is that we restricted NSB analysis to cases where we had an average of at least one spike and 200 trials.)

load('case\_ids\_with\_200.mat', 'case\_ids\_1\_200')

'case\_ids\_1\_200' is a 1x43 array of case names, e.g. case\_ids\_1\_200{1}=’ pu26y2\_b\_1415’. (You’ll note that plot\_MI\_avg\_across\_cases\_weighted\_average\_all.m only analyzes the first 41 of these 43 cases. I’m not sure why this is the case, I’ll dig through old email from Claire to try to figure this out.) So, in “MIs”, the first entry - MI1\_partition – is from case ’ pu26y2\_b\_1415’.