

WEEK 6

Sorry, I forgot to make this last week. Anyway we made a lot of progress!

So, we will have 3 similarity matrices, soon – PESQ score in the middle, PESQ score at the beginning, and NSIM score in the middle. These are going to be compared to the perception result, and the classification result. To do so, the first thing you need to do is rescaling your similarity measures. In general, if you want to rescale a variable x into a range from 0 to 1, the formula is

$$\frac{x - x_{\min}}{x_{\max} - x_{\min}}$$

, where x_{\min} is the minimum value of x , and x_{\max} is the maximum value of x .

Note that the score from the perceptual experiment is difference, rather than similarity. That is, the score 1 indicates two voices sound very similar, and the score 10 indicates they sound very different. One way to convert our “objective” measure it would be simply negating the variable first so that higher similarity score results in a lower value. By doing some math, the converting formula results in

$$y = (y_{\max} - y_{\min}) \times \left(y_{\min} + \frac{x - x_{\min}}{x_{\max} - x_{\min}} \right)$$

, where $y_{\max} = 10$ and $y_{\min} = 1$.

Once the conversion is done, you can either look at the similarity matrices (now difference matrices), or plot one variable versus another. For example, change PESQ difference matrix and perceptual difference into corresponding vectors with `PESQ_vec = PESQ_mat(:)`, and `perception_vec = perception_mat(:) - '(:)'` concatenates the columns in the matrix. Just make sure the elements in those two vectors with same indices are from the same pair of tokens. Then you can plot perceived difference versus PESQ difference by typing `plot(PESQ_vec, perception_vec, 'x')`. Same procedure can be applied to NSIM difference.

What do you see from the plot? Is there any obvious relationship between the perceptual difference and objective difference? If what you see is a linear relation, try to fit a line to the data points [6]. Useful Matlab functions are `polyfit` and `polyval`.

Useful Reference

[6] Wikipedia, “Linear Regression,” (URL https://en.wikipedia.org/wiki/Linear_regression)