The Various Options for the Choice of frequencies

- rob_one
- rob_two
- rob_three
- vowel_formants_one
- vowel_formants_two
- evenly_spaced_ftest
- **evenly_spaced_fcent** (use this as the default option)

Purpose of Fcent and Ftest:

These vectors are lists of specific frequencies. Fcent values are communicated to the recreation of fixF, and are the frequencies played back. Ftest values are the range of frequencies that correspond to each bin in Fcent (bin being a specific frequency). Ftest has to be one unit longer than Fcent. For example, if elements zero and one in Ftest are 100 and 200 Hz, and element zero in Fcent is 150 Hz, then all amplitudes between 100 and 200 are added up into the 150 bin.

Ftest values are converted into indices for the "bins" because of FFT x axis.

The number of samples in the FFT is the number of samples in an individual window, and the maximum frequency is the sampling rate (aliasing occurs at the halfway point and beyond), so to convert frequency values into index values, we use the equation (frequency in Ftest)/deltaf, or (freq Ftest) * frameTime.

Aliasing: human speech rarely passes 4,000 Hz, so due to Nyquist's theorem, the minimum sampling rate necessary is 8,000 samples/second. The sampling rate used in most of our files was 44,100.

rob_one, rob_two, and rob_three are hardcoded Fcent and Ftest values with varying ranges.

From Dr. Robertson's MatLab code, rob_two is the best

rob_one

Ftest = [250, 350, 425, 475, 525, 575, 625, 675, 750, 850, 950]

Fcent = [300, 400, 450, 500, 550, 600, 650, 700, 800, 900]

rob_two

Ftest = [100, 200, 375, 525, 675, 825, 975, 1125, 1275, 1425, 1575, 1725, 3000, 4000, 5000]

Fcent = [150, 300, 450, 600, 750, 900, 1050, 1200, 1350, 1500, 1650, 2000, 3250, 4250]

rob_three

Ftest = [300, 360, 390, 420, 460, 580, 640, 750, 840, 930, 1050, 1140, 1250, 1450, 1600]

Fcent = [330, 370, 405, 430, 560, 600, 680, 830, 860, 980, 1100, 1170, 1310, 1550]

The Vowel Formants are hardcoded values specifically chosen because they are the crucial frequencies in vowel formation.

Vowel_formants_one

https://soundbridge.io/formants-vowel-sounds/

Ftest = [100,285,345,415,465,505,525,550,615,695,785,855,945,1055,1140,1270,1520,1705,1780,1915,2115,2265,2340,2400,2425,2460,2515,2780,3500]

Fcent = [270,300,390,440,490,520,530,570,660,730,840,870,1020,1090,1190,1350,1690,1720,1840,1990,2240,2290,2390,2410,2440,2480,2550,3010]

Vowel_formants_two

https://www.phon.ucl.ac.uk/courses/spsci/iss/week5.php

Ftest = [100,300,340,370,430,520,580,670,750,780,860,930,1060,1250,1400,1620,1910,2130,2210,2260,2400,2510,2540,2590,2630,2740,2900,3170,3500]

Fcent = [280,320,360,380,480,560,600,740,760,800,920,940,1180,1320,1480,1760,2060,2200,2220,2300,2500,2520,2560,2620,2640,2840,2960,3380]

Evenly Spaced

start_range and end_range are the first and last values in the frequency array, either Fcent or Ftest depending on which is chosen. num_elements is the number of frequencies present in the respective array. The values in the opposing array are found by taking the average … ah maybe it would be clearer with a picture.

For example, if evenly_spaced_fcent is chosen, then the first and last values of Fcent are start_range and end_range, and the number of frequencies in Fcent is equal to num_elements. Ftest's first and last values are +/- 50Hz the first and last values of Fcent, respectively, and the interior values of Ftest are the averages of two neighboring values in Fcent.