Identifying Interludes in VOCALOID-Related Music

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Background

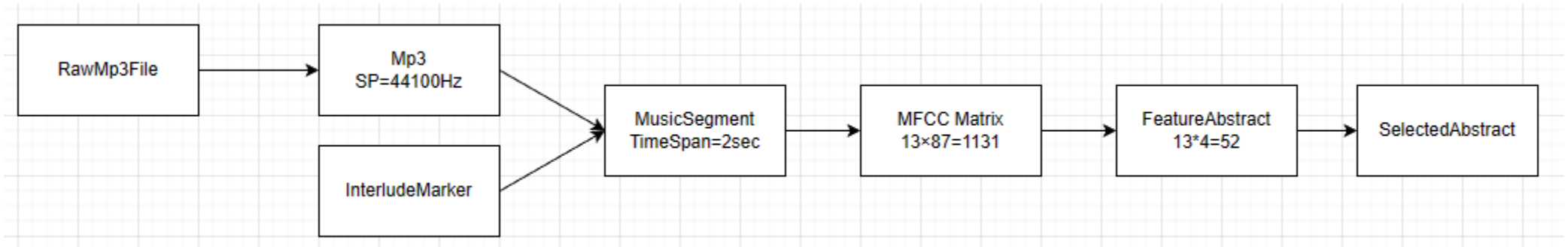
- 周刊VOCLOID中文排行榜

- The QR code in the top right corner is for the latest issue of the weekly magazine (2023-04-16 #558).

- Music Segment Recognition => Interlude Identification

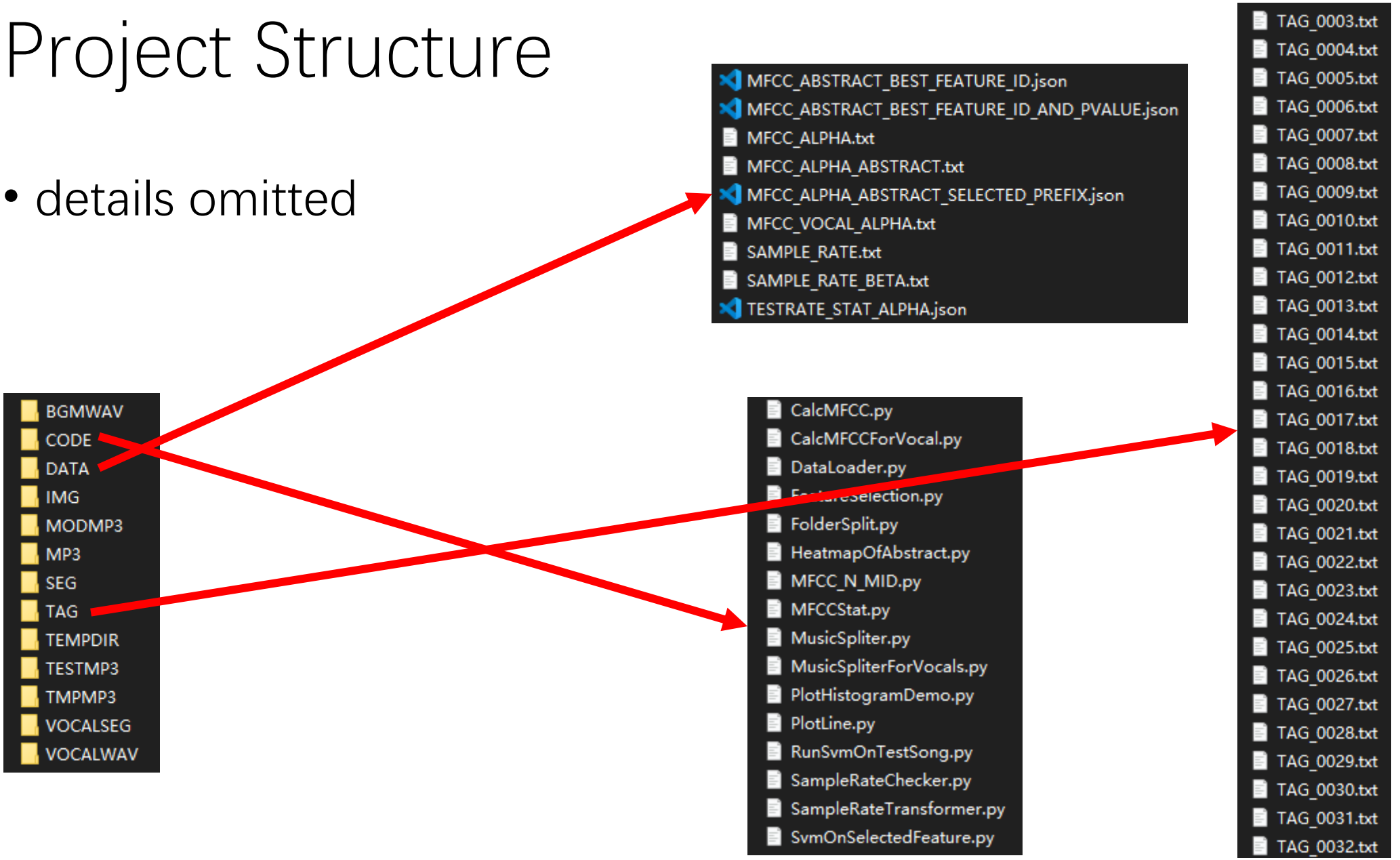
Pipeline

- Automated Boundaries
  - Complete mp3 music file, interlude marker file



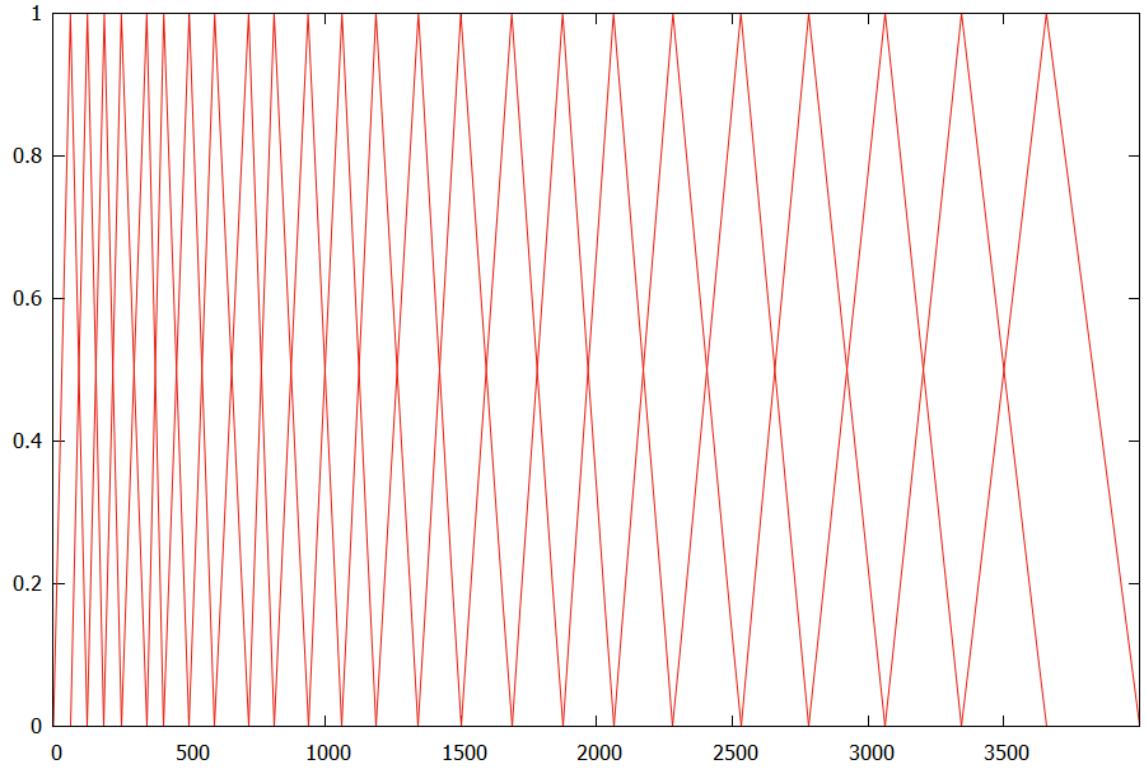
Project Structure

- details omitted



About MFCC

- $M(f) = 1125 \cdot \ln\left(1 + \frac{f}{700}\right) = 2595 \cdot \lg\left(1 + \frac{f}{700}\right)$
- https://zhuanlan.zhihu.com/p/365714663



Feature Abstract

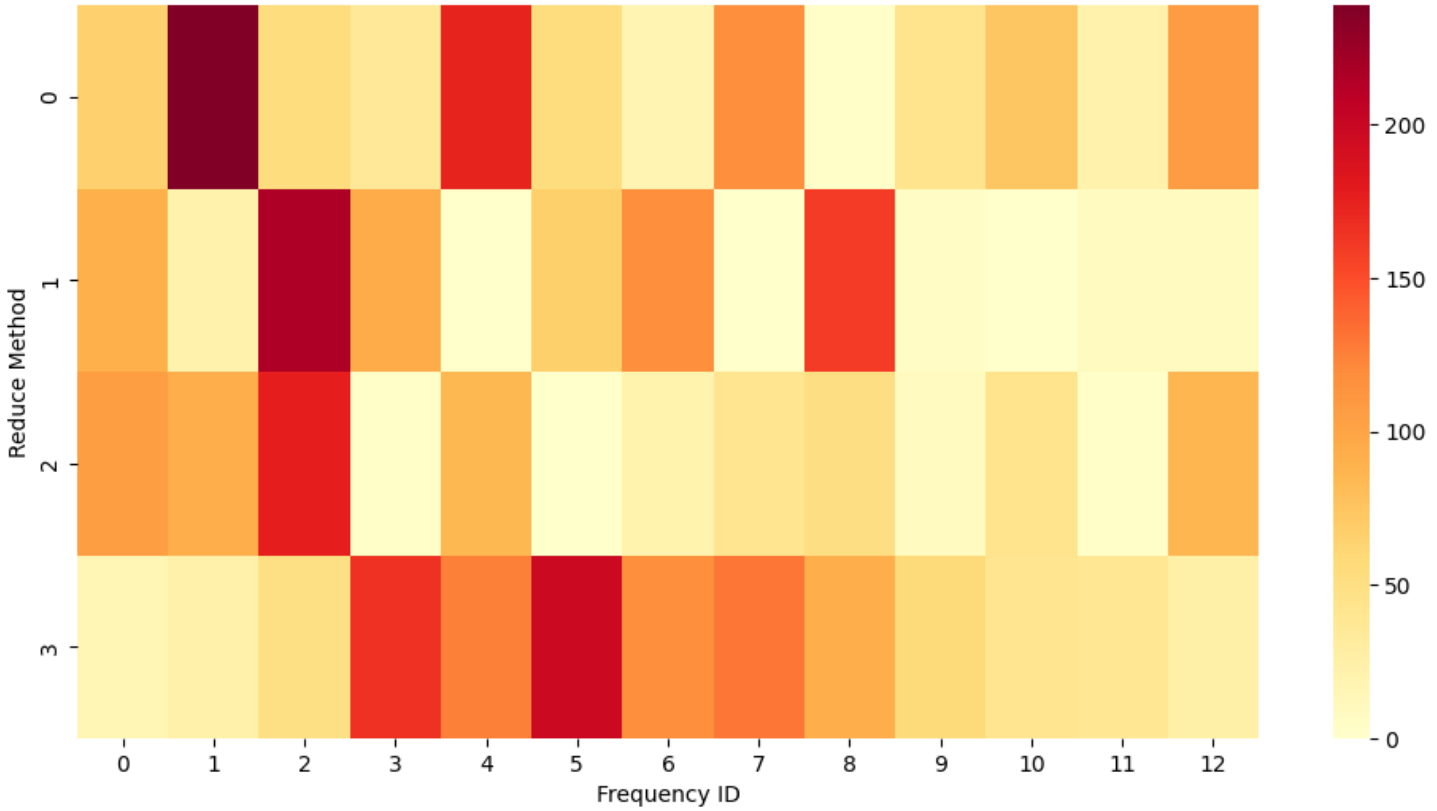
- List of log(E) => Min, Max, Avg, Std

- (There is a lot of professional knowledge related to music data characteristics here, and it cannot be explained fully in a short period of time.)

Feature Selection

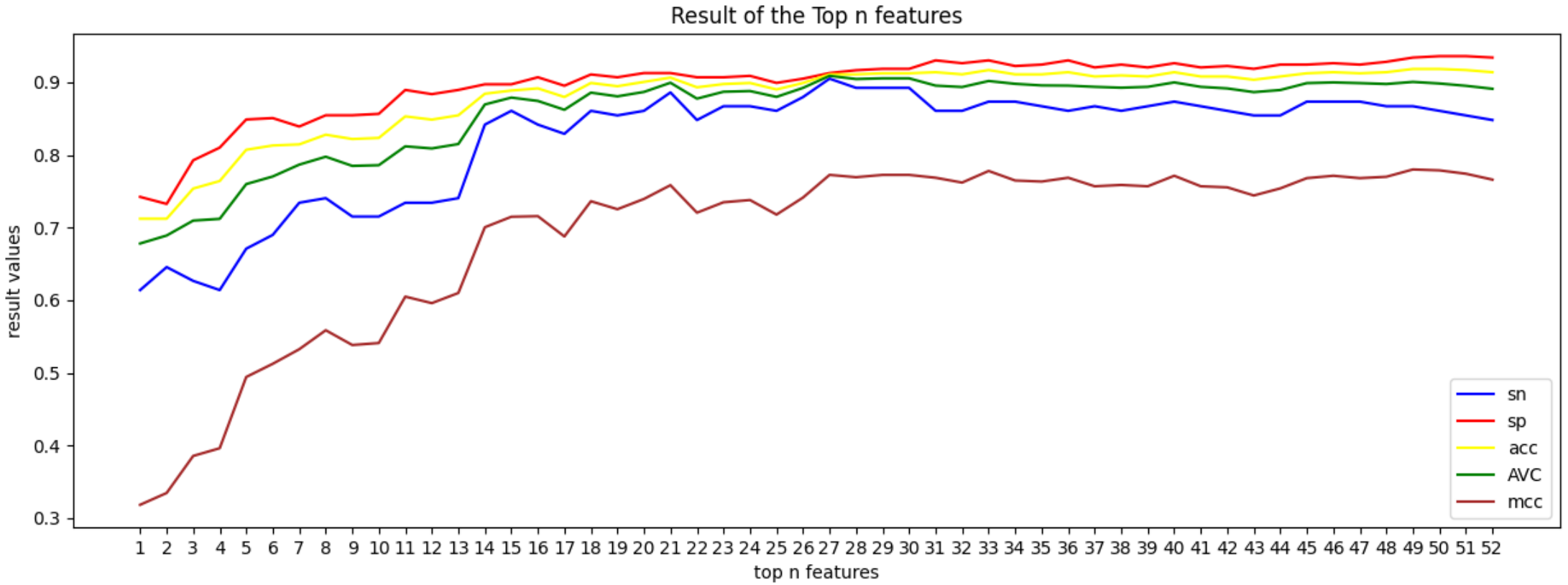
- Ttest: 0-Min, 1-Max, 2-Avg, 3-Std
- based on: $-\ln(\text{pvalue})$

1:	0.00(Hz),	55.40(Hz),	115.19(Hz)
2:	55.40(Hz),	115.19(Hz),	179.71(Hz)
3:	115.19(Hz),	179.71(Hz),	249.33(Hz)
4:	179.71(Hz),	249.33(Hz),	324.47(Hz)
5:	249.33(Hz),	324.47(Hz),	405.55(Hz)
6:	324.47(Hz),	405.55(Hz),	493.05(Hz)
7:	405.55(Hz),	493.05(Hz),	587.47(Hz)
8:	493.05(Hz),	587.47(Hz),	689.37(Hz)
9:	587.47(Hz),	689.37(Hz),	799.33(Hz)
10:	689.37(Hz),	799.33(Hz),	918.00(Hz)
11:	799.33(Hz),	918.00(Hz),	1046.06(Hz)
12:	918.00(Hz),	1046.06(Hz),	1184.25(Hz)



Feature Selection (cont.)

- Top **27** Features, SVM(rbf), $sn = 90.5\%, sp = 91.3\%$



Feature Selection (cont.): Baseline

- SVM on total **1131** Features: $sn = 72.8\%, sp = 93.2\%$
- SVM on total **52** Abstracts: $sn = \%84.8, sp = 93.4\%$

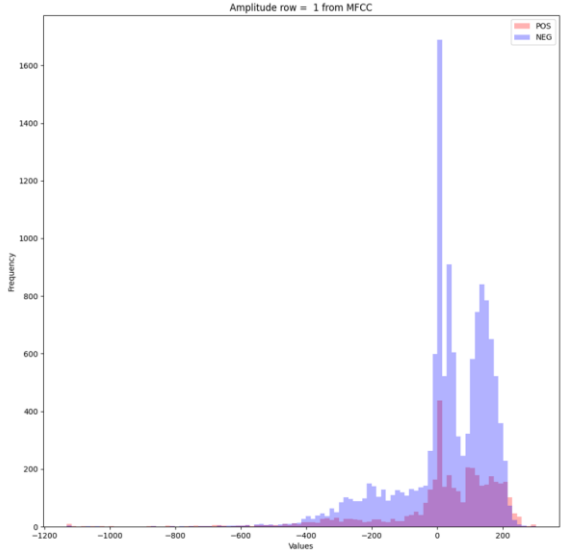
- Feature selection provides a classification method with better interpretability and accuracy.

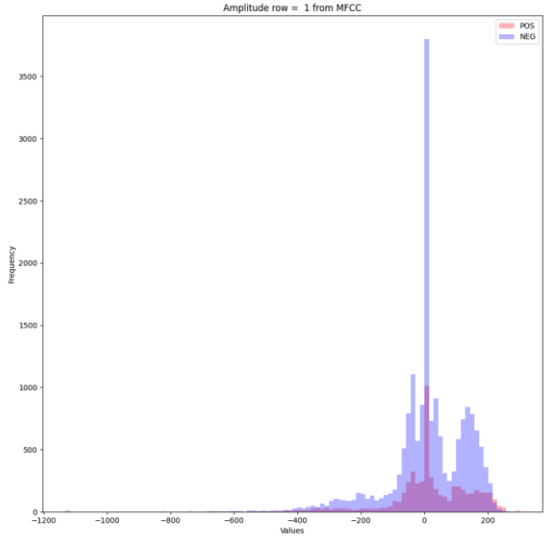
Related Work

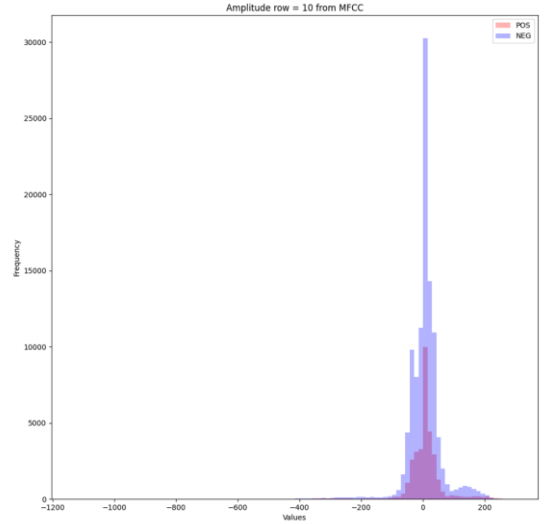
- In addition to the aforementioned feature selection, we also attempted to use deep learning models (CNN) for voice extraction, but the optimal classification performance, as measured by **SN**, was around **84**.
- After voice extraction, a significant amount of information is lost, which is not sufficient for accurate detection of interludes.

Related Work (cont.)

- Regarding the distribution of data, on the Abstract dataset, the logarithmic energy in most frequency intervals follows a normal distribution, and the distributions of POS and NEG are the same.
- In the low-frequency range (Index=1), the (logarithm) energy seldom follows a normal distribution.







Future Research

- Due to time constraints, here are some further research works that can be explored.

- Combining clustering and binary classification methods.
- Analyze the correlation between spectral summary items.
- Enumerate and select better feature combinations.

That’s All

- Thank you for your listening.

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- Version=01