

| #  | Feature                             | ReliefF weight |
|----|-------------------------------------|----------------|
| 1  | $N_{1,0.001}$                       | 0.0274         |
| 2  | $L_{2,1}$                           | 0.0239         |
| 3  | $\frac{N_{1,0.005}}{N_{2,0.005}}$   | 0.0208         |
| 4  | $\mathbb{E}(SF)$                    | 0.0205         |
| 5  | $\max(STE)$                         | 0.0198         |
| 6  | QPS                                 | 0.0197         |
| 7  | $\mathbb{E}(P)$                     | 0.0192         |
| 8  | $\text{std}(STE)$                   | 0.0188         |
| 9  | $L_{1,1}$                           | 0.0185         |
| 10 | PS                                  | 0.0184         |
| 11 | $\mathbb{E}(STE)$                   | 0.0168         |
| 12 | $\sigma_2^2$                        | 0.0148         |
| 13 | $\text{std}(DWTE)$                  | 0.0146         |
| 14 | $\text{med}(MFCC)$                  | 0.0145         |
| 15 | $\sigma_1^2$                        | 0.0144         |
| 16 | $\mathbb{E}(MFCC)$                  | 0.0143         |
| 17 | $\text{med}(SF)$                    | 0.0140         |
| 18 | $L_{0,1} \cdot (L_{1,1} - L_{1,2})$ | 0.0137         |
| 19 | $\min(SF)$                          | 0.0137         |
| 20 | $\text{std}(SFs)$                   | 0.0137         |
| 21 | $\max(SF)$                          | 0.0130         |
| 22 | $N_{0,0.1}$                         | 0.0130         |
| 23 | $L_{1,1} \cdot L_{2,1}$             | 0.0128         |
| 24 | $m_0$                               | 0.0126         |
| 25 | $\text{med}(STE)$                   | 0.0126         |
| 26 | $L_{0,2}$                           | 0.0125         |
| 27 | FSS                                 | 0.0122         |
| 28 | $L_{0,2} \cdot L_{1,2}$             | 0.0119         |
| 29 | $L_{0,2}$                           | 0.0118         |
| 30 | $L_{1,2}$                           | 0.0118         |
| 31 | $m_1$                               | 0.0114         |
| 32 | $\frac{L_{1,1}}{ L_1 }$             | 0.0113         |
| 33 | $\frac{N_{0,0.005}}{N_{1,0.005}}$   | 0.0113         |
| 34 | $N_{2,0.005}$                       | 0.0112         |
| 35 | $L_{0,1} \cdot (L_{2,1} - L_{2,2})$ | 0.0110         |
| 36 | $\min(STE)$                         | 0.0109         |
| 37 | $\frac{m_1}{m_2}$                   | 0.0109         |
| 38 | $N_{3,0.005}$                       | 0.0106         |
| 39 | $\frac{L_{2,1}}{ L_2 }$             | 0.0106         |
| 40 | $\min(SFs)$                         | 0.0102         |
| 41 | $\max(P)$                           | 0.0098         |
| 42 | $m_2$                               | 0.0092         |
| 43 | $\text{std}(ZCR)$                   | 0.0088         |
| 44 | $\frac{m_0}{m_1}$                   | 0.0087         |
| 45 | $\frac{L_{1,1}}{m_1}$               | 0.0086         |
| 46 | $L_{0,3} \cdot L_{1,3}$             | 0.0080         |
| 47 | $L_{1,1} \cdot (L_{2,1} - L_{2,2})$ | 0.0078         |
| 48 | $L_{0,1} \cdot L_{1,1}$             | 0.0077         |
| 49 | $L_{2,2}$                           | 0.0077         |

|    |                                     |        |
|----|-------------------------------------|--------|
| 50 | $\mathbb{E}(SC)$                    | 0.0076 |
| 51 | $L_{0,2} \cdot (L_{1,2} - L_{1,3})$ | 0.0075 |
| 52 | $L_{1,2} \cdot L_{2,2}$             | 0.0075 |
| 53 | $\text{std}(MFCC)$                  | 0.0074 |
| 54 | $L_{0,2} \cdot (L_{2,2} - L_{2,3})$ | 0.0074 |
| 55 | $\max(SFs)$                         | 0.0074 |
| 56 | $\text{std}(P)$                     | 0.0072 |
| 57 | $L_{1,2} \cdot (L_{2,2} - L_{2,3})$ | 0.0071 |
| 58 | $\min(P)$                           | 0.0070 |
| 59 | $L_{1,3}$                           | 0.0070 |
| 60 | $\text{std}(SRO)$                   | 0.0069 |
| 61 | $L_{1,3} \cdot (L_{2,3} - L_{2,4})$ | 0.0068 |
| 62 | $\text{std}(DWTW)$                  | 0.0068 |
| 63 | $m_3$                               | 0.0067 |
| 64 | $L_{0,2} \cdot L_{2,2}$             | 0.0067 |
| 65 | $L_{0,3} \cdot (L_{1,3} - L_{1,4})$ | 0.0067 |
| 66 | $\frac{m_0}{m_2}$                   | 0.0065 |
| 67 | $m_4$                               | 0.0064 |
| 68 | $\max(ZCR)$                         | 0.0063 |
| 69 | $L_{2,3}$                           | 0.0062 |
| 70 | $L_{3,1}$                           | 0.0062 |
| 71 | $L_{0,1} \cdot L_{2,1}$             | 0.0059 |
| 72 | $L_{0,3} \cdot L_{2,3}$             | 0.0056 |
| 73 | $N_{0,0.005} \cdot N_{2,0.005}$     | 0.0056 |
| 74 | $L_{0,3} \cdot (L_{2,3} - L_{2,4})$ | 0.0056 |
| 75 | $\text{med}(SC)$                    | 0.0056 |
| 76 | $\frac{L_{2,1}}{m_2}$               | 0.0056 |
| 77 | $L_{2,4}$                           | 0.0055 |
| 78 | $\text{med}(P)$                     | 0.0055 |
| 79 | $\sigma_0^2$                        | 0.0055 |
| 80 | $L_{3,2}$                           | 0.0054 |
| 81 | $L_{0,2} \cdot L_{1,2}$             | 0.0053 |
| 82 | $N_{4,0.005}$                       | 0.0050 |
| 83 | $L_{0,4} \cdot L_{2,4}$             | 0.0050 |
| 84 | $L_{0,4} \cdot (L_{2,4} - L_{2,5})$ | 0.0049 |
| 85 | $L_{1,3} \cdot L_{2,3}$             | 0.0048 |
| 86 | $\text{std}(SF)$                    | 0.0048 |
| 87 | $\frac{L_{4,1}}{m_4}$               | 0.0047 |
| 88 | $\frac{L_{3,1}}{m_3}$               | 0.0047 |
| 89 | $\mathbb{E}(SFs)$                   | 0.0046 |
| 90 | $\sigma_3^2$                        | 0.0046 |
| 91 | $\min(MFCC)$                        | 0.0046 |
| 92 | $\mathbb{E}(SRO)$                   | 0.0043 |
| 93 | $L_{0,4} \cdot (L_{1,4} - L_{1,5})$ | 0.0042 |
| 94 | $\frac{L_{0,1}}{ L_0 }$             | 0.0041 |
| 95 | $\text{med}(SRO)$                   | 0.0041 |
| 96 | $L_{0,5} \cdot L_{2,5}$             | 0.0039 |

|     |                                     |        |
|-----|-------------------------------------|--------|
| 97  | $\text{med}(SFs)$                   | 0.0039 |
| 98  | $\text{std}(SC)$                    | 0.0036 |
| 99  | $L_{0,6} \cdot (L_{2,6} - L_{2,7})$ | 0.0032 |
| 100 | $L_{0,6} \cdot L_{2,6}$             | 0.0031 |
| 101 | $L_{1,4} \cdot (L_{2,4} - L_{2,5})$ | 0.0031 |
| 102 | $L_{0,5} \cdot (L_{2,5} - L_{2,6})$ | 0.0031 |
| 103 | $\text{med}(ZCR)$                   | 0.0030 |
| 104 | $L_{0,4} \cdot L_{1,4}$             | 0.0030 |
| 105 | $L_{0,5} \cdot (L_{1,5} - L_{1,6})$ | 0.0028 |
| 106 | $\frac{L_{3,1}}{ L_3 }$             | 0.0028 |
| 107 | $\max(SC)$                          | 0.0027 |
| 108 | $L_{0,5} \cdot L_{1,5}$             | 0.0027 |
| 109 | $\min(SC)$                          | 0.0027 |
| 110 | $L_{1,5} \cdot (L_{2,5} - L_{2,6})$ | 0.0026 |
| 111 | $\sigma_4^2$                        | 0.0026 |
| 112 | $\frac{L_{0,1}}{m_0}$               | 0.0024 |
| 113 | $\min(SRO)$                         | 0.0024 |
| 114 | $L_{1,4} \cdot L_{2,4}$             | 0.0021 |
| 115 | $L_{1,6} \cdot (L_{2,6} - L_{2,7})$ | 0.0019 |
| 116 | $\max(SRO)$                         | 0.0015 |
| 117 | $L_{0,6} \cdot L_{1,6}$             | 0.0014 |
| 118 | $L_{0,6} \cdot (L_{1,6} - L_{1,7})$ | 0.0014 |
| 119 | $\frac{L_{4,1}}{ L_4 }$             | 0.0006 |
| 120 | $\min(ZCR)$                         | 0.0003 |

#### Topological Features

$\mathbb{E}$  – Mean

$\text{std}$  – Standard Deviation

$\text{med}$  – Median

SF – Spectral Flux

STE – Short Time Energy

P – Pitch

ZCR – Zero Crossing Rate

MFCC – Mel-frequency cepstral coefficients

SRO – Spectral Roll-Off

SC – Spectral Centroid

SFs – Spectral Flatness

DWTE – DWT Energy

DWTW – DWT Waveform length