Table 1: Features ordered by their importance for the Extremely Randomized Trees (ERT) algorithm, considering the mean and standard deviation, in parentheses, of the Gini score calculated considering the ten pre-trained ERT models.

| **Ranking** | **Feature** | **Gini score** |
|---|---|---|
| #1 | stdev_phase_A_current | 4.2000E-02 (2.6056E-03) |
| #2 | stdev_phase_C_current | 4.1800E-02 (2.2051E-03) |
| #3 | stdev_phase_B_current | 3.9100E-02 (2.3033E-03) |
| #4 | variance_phase_B_current | 2.9300E-02 (1.2778E-03) |
| #5 | variance_phase_A_current | 2.8300E-02 (1.7970E-03) |
| #6 | variance_phase_C_current | 2.7800E-02 (2.3230E-03) |
| #7 | geometric_mean_phase_B_current | 2.7400E-02 (1.6177E-03) |
| #8 | geometric_mean_phase_A_current | 2.6000E-02 (2.1522E-03) |
| #9 | geometric_mean_phase_C_current | 2.3800E-02 (2.1111E-03) |
| #10 | distance_phase_B_voltage | 2.3100E-02 (8.7426E-04) |
| #11 | distance_phase_C_voltage | 2.1900E-02 (8.3371E-04) |
| #12 | auc_phase_B_current | 2.0600E-02 (1.4745E-03) |
| #13 | auc_phase_C_current | 2.0300E-02 (2.3626E-03) |
| #14 | covariance_phase_A_C_current | 1.9900E-02 (1.5607E-03) |
| #15 | covariance_phase_B_C_current | 1.9600E-02 (1.0864E-03) |
| #16 | distance_phase_A_voltage | 1.9500E-02 (6.5629E-04) |
| #17 | covariance_phase_A_B_current | 1.9400E-02 (8.5223E-04) |
| #18 | auc_phase_A_current | 1.9200E-02 (1.6199E-03) |
| #19 | energy_phase_C_voltage | 1.8000E-02 (9.7622E-04) |
| #20 | variance_phase_A_voltage | 1.7900E-02 (1.1498E-03) |
| #21 | variance_phase_B_voltage | 1.7900E-02 (9.7280E-04) |
| #22 | energy_phase_A_voltage | 1.7800E-02 (1.4003E-03) |
| #23 | energy_phase_B_voltage | 1.7700E-02 (9.1380E-04) |
| #24 | variance_phase_C_voltage | 1.7000E-02 (9.5077E-04) |
| #25 | rms_phase_C_current | 1.6100E-02 (1.3401E-03) |
| #26 | rms_phase_B_current | 1.5500E-02 (1.8063E-03) |
| #27 | rms_phase_B_voltage | 1.5400E-02 (9.9355E-04) |
| #28 | rms_phase_A_voltage | 1.5400E-02 (1.3677E-03) |
| #29 | stdev_phase_B_voltage | 1.5300E-02 (1.1439E-03) |
| #30 | stdev_phase_A_voltage | 1.5200E-02 (1.0014E-03) |
| #31 | rms_phase_A_current | 1.5200E-02 (1.2586E-03) |
| #32 | stdev_phase_C_voltage | 1.5000E-02 (6.2306E-04) |
| #33 | rms_phase_C_voltage | 1.4800E-02 (9.1283E-04) |
| #34 | auc_phase_C_voltage | 1.3400E-02 (8.4250E-04) |
| #35 | auc_phase_B_voltage | 1.3000E-02 (6.8464E-04) |
| #36 | auc_phase_A_voltage | 1.3000E-02 (1.0135E-03) |
| #37 | correlation_phase_A_B_voltage | 1.0900E-02 (9.9020E-04) |
| #38 | correlation_phase_A_C_voltage | 1.0500E-02 (7.5469E-04) |
| #39 | correlation_phase_B_C_voltage | 1.0500E-02 (6.7458E-04) |
| #40 | energy_phase_C_current | 1.0200E-02 (8.2585E-04) |

Table 1: Continued from the previous page.

| Ranking | Feature | Gini score |
|---|---|---|
| #41 | energy_phase_B_current | 9.6700E-03 (9.5086E-04) |
| #42 | pk_pk_distance_phase_C_current | 8.8800E-03 (1.1211E-03) |
| #43 | energy_phase_A_current | 8.8100E-03 (1.0431E-03) |
| #44 | distance_phase_B_current | 8.8100E-03 (1.1723E-03) |
| #45 | pk_pk_distance_phase_B_current | 8.7700E-03 (1.2930E-03) |
| #46 | distance_phase_A_current | 8.7600E-03 (7.7535E-04) |
| #47 | distance_phase_C_current | 8.3400E-03 (9.7109E-04) |
| #48 | pk_pk_distance_phase_A_current | 8.2100E-03 (9.9163E-04) |
| #49 | covariance_phase_A_C_voltage | 8.0500E-03 (3.1886E-04) |
| #50 | covariance_phase_B_C_voltage | 7.9600E-03 (4.2570E-04) |
| #51 | covariance_phase_A_B_voltage | 7.8800E-03 (3.5044E-04) |
| #52 | maxFrequency_phase_C_current | 6.9700E-03 (4.5325E-04) |
| #53 | min_phase_B_current | 6.8400E-03 (1.7545E-03) |
| #54 | max_phase_C_current | 6.7900E-03 (1.1355E-03) |
| #55 | max_phase_A_current | 6.3000E-03 (1.2483E-03) |
| #56 | maxFrequency_phase_A_current | 5.9600E-03 (4.9666E-04) |
| #57 | min_phase_A_current | 5.6500E-03 (8.0015E-04) |
| #58 | min_phase_C_current | 5.6500E-03 (7.3590E-04) |
| #59 | correlation_phase_A_C_current | 5.4900E-03 (1.5362E-04) |
| #60 | correlation_phase_B_C_current | 5.4700E-03 (1.9980E-04) |
| #61 | maxFrequency_phase_B_current | 5.4200E-03 (4.3794E-04) |
| #62 | correlation_phase_A_B_current | 5.3400E-03 (3.6046E-04) |
| #63 | max_phase_B_current | 5.3000E-03 (5.3685E-04) |
| #64 | geometric_mean_phase_A_voltage | 5.1000E-03 (4.7386E-04) |
| #65 | geometric_mean_phase_B_voltage | 4.9100E-03 (5.4003E-04) |
| #66 | geometric_mean_phase_C_voltage | 4.6300E-03 (2.8865E-04) |
| #67 | pk_pk_distance_phase_B_voltage | 4.0900E-03 (8.0593E-04) |
| #68 | pk_pk_distance_phase_C_voltage | 3.2300E-03 (5.6128E-04) |
| #69 | pk_pk_distance_phase_A_voltage | 2.7600E-03 (4.2818E-04) |
| #70 | maxFrequency_phase_C_voltage | 2.2100E-03 (2.0645E-04) |
| #71 | maxFrequency_phase_B_voltage | 1.8800E-03 (1.5277E-04) |
| #72 | maxFrequency_phase_A_voltage | 1.7900E-03 (1.3512E-04) |
| #73 | kurtosis_phase_A_current | 9.7200E-04 (6.7805E-05) |
| #74 | kurtosis_phase_C_current | 9.4900E-04 (6.3416E-05) |
| #75 | kurtosis_phase_B_current | 8.7200E-04 (7.4582E-05) |
| #76 | max_phase_C_voltage | 5.4300E-04 (1.6194E-04) |
| #77 | kurtosis_phase_B_voltage | 5.2500E-04 (1.9223E-05) |
| #78 | max_phase_B_voltage | 4.6800E-04 (7.5995E-05) |
| #79 | kurtosis_phase_A_voltage | 4.1400E-04 (2.5856E-05) |
| #80 | min_phase_B_voltage | 4.0500E-04 (1.8585E-04) |
| #81 | kurtosis_phase_C_voltage | 3.9300E-04 (1.8621E-05) |
| #82 | min_phase_A_voltage | 3.7900E-04 (1.2338E-04) |

Table 1: Continued from the previous page.

| Ranking | Feature | Gini score |
|---|---|---|
| #83 | min_phase_C_voltage | 3.4400E-04 (1.6889E-04) |
| #84 | max_phase_A_voltage | 3.1700E-04 (7.8298E-05) |
| #85 | harmonic_mean_phase_C_current | 2.3400E-04 (1.3946E-04) |
| #86 | harmonic_mean_phase_B_current | 1.8600E-04 (1.5282E-04) |
| #87 | harmonic_mean_phase_A_current | 1.5300E-04 (1.0500E-04) |
| #88 | mean_phase_B_current | 1.5000E-04 (2.5766E-05) |
| #89 | mean_phase_C_current | 1.4900E-04 (3.3544E-05) |
| #90 | shannon_entropy_phase_B_current | 1.4800E-04 (5.1165E-05) |
| #91 | shannon_entropy_phase_C_current | 1.3300E-04 (3.0557E-05) |
| #92 | mean_phase_A_current | 1.3200E-04 (2.8143E-05) |
| #93 | shannon_entropy_phase_A_current | 9.8200E-05 (3.6484E-05) |
| #94 | median_phase_A_current | 8.3000E-05 (2.8707E-05) |
| #95 | median_phase_C_current | 7.7100E-05 (2.3456E-05) |
| #96 | median_phase_B_current | 7.3700E-05 (1.7774E-05) |
| #97 | skewness_phase_C_current | 6.4600E-05 (4.5346E-06) |
| #98 | median_phase_B_voltage | 6.3500E-05 (2.5503E-06) |
| #99 | skewness_phase_A_current | 6.3400E-05 (6.1738E-06) |
| #100 | median_phase_A_voltage | 6.2900E-05 (3.8083E-06) |
| #101 | skewness_phase_B_current | 6.2200E-05 (3.1106E-06) |
| #102 | shannon_entropy_phase_A_voltage | 6.2000E-05 (3.2964E-06) |
| #103 | median_phase_C_voltage | 6.1400E-05 (2.8213E-06) |
| #104 | shannon_entropy_phase_B_voltage | 5.0900E-05 (2.6573E-06) |
| #105 | shannon_entropy_phase_C_voltage | 4.9300E-05 (1.0120E-06) |
| #106 | skewness_phase_C_voltage | 4.7600E-05 (3.6985E-06) |
| #107 | skewness_phase_A_voltage | 4.7500E-05 (3.3593E-06) |
| #108 | skewness_phase_B_voltage | 4.6600E-05 (3.6953E-06) |
| #109 | powerBandwidth_phase_C_voltage | 4.1800E-05 (2.7130E-06) |
| #110 | powerBandwidth_phase_B_voltage | 3.8800E-05 (2.5542E-06) |
| #111 | powerBandwidth_phase_A_voltage | 3.4700E-05 (2.6729E-06) |
| #112 | harmonic_mean_phase_B_voltage | 3.3500E-05 (9.5276E-07) |
| #113 | harmonic_mean_phase_A_voltage | 3.2600E-05 (6.8064E-07) |
| #114 | harmonic_mean_phase_C_voltage | 3.1800E-05 (9.5736E-07) |
| #115 | mean_phase_A_voltage | 3.0500E-05 (6.2406E-06) |
| #116 | slope_phase_B_voltage | 3.0500E-05 (3.0171E-06) |
| #117 | mean_phase_B_voltage | 3.0400E-05 (3.3780E-06) |
| #118 | mean_phase_C_voltage | 2.9200E-05 (2.3653E-06) |
| #119 | slope_phase_C_voltage | 2.8700E-05 (3.4836E-06) |
| #120 | slope_phase_C_current | 2.6300E-05 (2.0945E-06) |
| #121 | slope_phase_A_current | 2.5700E-05 (1.6138E-06) |
| #122 | slope_phase_B_current | 2.5500E-05 (8.6944E-07) |
| #123 | slope_phase_A_voltage | 2.4800E-05 (1.6786E-06) |
| #124 | powerBandwidth_phase_C_current | 4.5000E-06 (2.1050E-06) |
| #125 | powerBandwidth_phase_A_current | 3.3700E-06 (1.0928E-06) |
| #126 | powerBandwidth_phase_B_current | 2.9400E-06 (7.2434E-07) |

Table 2: Features ordered by their importance for the Extremely Randomized Trees (ERT) algorithm, considering the mean and standard deviation, in parentheses, of the Gini score calculated considering the ten pre-trained ERT models. Here, we grouped the features previously separated for each phase (A, B, or C) into a single feature.

| **Ranking** | **Feature** | **Gini score** |
|---|---|---|
| #1 | stdev_current | 4.0967E-02 (1.6197E-03) |
| #2 | variance_current | 2.8467E-02 (7.6376E-04) |
| #3 | geometric_mean_current | 2.5733E-02 (1.8148E-03) |
| #4 | distance_voltage | 2.1500E-02 (1.8330E-03) |
| #5 | auc_current | 2.0033E-02 (7.3711E-04) |
| #6 | covariance_current | 1.9633E-02 (2.5166E-04) |
| #7 | energy_voltage | 1.7833E-02 (1.5275E-04) |
| #8 | variance_voltage | 1.7600E-02 (5.1962E-04) |
| #9 | rms_current | 1.5600E-02 (4.5826E-04) |
| #10 | rms_voltage | 1.5200E-02 (3.4641E-04) |
| #11 | stdev_voltage | 1.5167E-02 (1.5275E-04) |
| #12 | auc_voltage | 1.3133E-02 (2.3094E-04) |
| #13 | correlation_voltage | 1.0633E-02 (2.3094E-04) |
| #14 | energy_current | 9.5600E-03 (7.0150E-04) |
| #15 | pk_pk_distance_current | 8.6200E-03 (3.5930E-04) |
| #16 | distance_current | 8.6367E-03 (2.5813E-04) |
| #17 | covariance_voltage | 7.9633E-03 (8.5049E-05) |
| #18 | maxFrequency_current | 6.1167E-03 (7.8679E-04) |
| #19 | min_current | 6.0467E-03 (6.8705E-04) |
| #20 | max_current | 6.1300E-03 (7.5941E-04) |
| #21 | correlation_current | 5.4333E-03 (8.1445E-05) |
| #22 | geometric_mean_voltage | 4.8800E-03 (2.3643E-04) |
| #23 | pk_pk_distance_voltage | 3.3600E-03 (6.7446E-04) |
| #24 | maxFrequency_voltage | 1.9600E-03 (2.2113E-04) |
| #25 | kurtosis_current | 9.3100E-04 (5.2374E-05) |
| #26 | max_voltage | 4.4267E-04 (1.1511E-04) |
| #27 | kurtosis_voltage | 4.4400E-04 (7.0930E-05) |
| #28 | min_voltage | 3.7600E-04 (3.0610E-05) |
| #29 | harmonic_mean_current | 1.9100E-04 (4.0731E-05) |
| #30 | mean_current | 1.4367E-04 (1.0116E-05) |
| #31 | shannon_entropy_current | 1.2640E-04 (2.5548E-05) |
| #32 | median_current | 7.7933E-05 (4.7057E-06) |
| #33 | skewness_current | 6.3400E-05 (1.2000E-06) |
| #34 | median_voltage | 6.2600E-05 (1.0817E-06) |
| #35 | shannon_entropy_voltage | 5.4067E-05 (6.9169E-06) |
| #36 | skewness_voltage | 4.7233E-05 (5.5076E-07) |
| #37 | powerBandwidth_voltage | 3.8433E-05 (3.5642E-06) |
| #38 | harmonic_mean_voltage | 3.2633E-05 (8.5049E-07) |
| #39 | mean_voltage | 3.0033E-05 (7.2342E-07) |
| #40 | slope_voltage | 2.8000E-05 (2.9138E-06) |
| #41 | slope_current | 2.5833E-05 (4.1633E-07) |
| #42 | powerBandwidth_current | 3.6033E-06 (8.0575E-07) |