Setting I: Gaussian Scores with $\tau = 0, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{1\leq k\leq 3, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 9.95(1.70) | 0 | 19.64(2.93) | 79.58(3.02) | 80.03(3.02) | 79.80(2.99) |
| | $r_n = 3$ | 2.33(0.88) | 0 | 3.07(1.29) | 96.68(1.39) | 96.94(1.34) | 96.81(1.34) |
| | $r_n = 5$ | 0.56(0.28) | 0 | 0.63(0.57) | 99.33(0.61) | 99.36(0.59) | 99.35(0.59) |
| $\delta = 2$ | $r_n = 1$ | 0.40(0.17) | 0 | 4.43(1.47) | 95.26(1.60) | 95.54(1.54) | 95.40(1.54) |
| | $r_n = 3$ | 0.25(0.02) | 0 | 0.01(0.05) | 99.99(0.05) | 99.99(0.05) | 99.99(0.05) |
| | $r_n = 5$ | 0.25(0.02) | 0 | 0 | 1 | 1 | 1 |

Setting II: Gaussian Scores with $\tau = 0, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 0.35(0.28) | 0 | 21.84(5.14) | 80.96(4.26) | 74.27(6.56) | 77.40(5.19) |
| | $r_n = 3$ | 0.40(0.22) | 0 | 0.26(0.40) | 99.75(0.38) | 99.71(0.44) | 99.73(0.40) |
| | $r_n = 5$ | 0.31(0.19) | 0 | 0.01(0.07) | 99.99(0.07) | 99.99(0.09) | 99.99(0.07) |
| $\delta = 2$ | $r_n = 1$ | 0.45(0.22) | 0 | 0.67(0.71) | 99.36(0.68) | 99.25(0.79) | 99.31(0.73) |
| | $r_n = 3$ | 0.26(0.05) | 0 | 0 | 1 | 1 | 1 |
| | $r_n = 5$ | 0.25(0.00) | 0 | 0 | 1 | 1 | 1 |

Setting III: Gaussian Scores with $\tau = 0, \phi = 0.1,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 0.44(0.31) | 0 | 22.65(4.88) | 80.40(4.09) | 73.42(6.23) | 76.65(4.72) |
| | $r_n = 3$ | 0.47(0.27) | 0 | 0.28(0.41) | 99.72(0.41) | 99.71(0.45) | 99.71(0.43) |
| | $r_n = 5$ | 0.30(0.19) | 0 | 0.01(0.06) | 99.99(0.05) | 99.99(0.07) | 99.99(0.06) |
| $\delta = 2$ | $r_n = 1$ | 0.52(0.26) | 0 | 0.57(0.60) | 99.46(0.56) | 99.36(0.69) | 99.41(0.61) |
| | $r_n = 3$ | 0.26(0.05) | 0 | 0 | 1 | 1 | 1 |
| | $r_n = 5$ | 0.25(0.02) | 0 | 0 | 1 | 1 | 1 |

Setting IV: Gaussian Scores with $\tau = 0, \phi = 0.2,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 1.17(0.54) | 0 | 33.37(6.26) | 76.76(9.19) | 63.12(10.20) | 68.56(7.76) |
| | $r_n = 3$ | 0.82(0.37) | 0 | 0.31(0.41) | 99.70(4.03) | 99.65(4.74) | 99.68(4.27) |
| | $r_n = 5$ | 0.49(0.27) | 0 | 0 | 1 | 1 | 1 |
| $\delta = 2$ | $r_n = 1$ | 9.85(4.28) | 0 | 0.96(0.75) | 99.07(0.72) | 98.93(0.90) | 99.00(0.78) |
| | $r_n = 3$ | 0.27(0.06) | 0 | 0 | 1 | 1 | 1 |
| | $r_n = 5$ | 0.25(0.02) | 0 | 0 | 1 | 1 | 1 |

Setting V: Gaussian Scores with $\tau = 0.2, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 0.47(0.35) | 0 | 17.08(4.61) | 86.58(3.08) | 79.28(5.70) | 82.70(4.23) |
| | $r_n = 3$ | 0.48(0.26) | 0 | 0.34(0.45) | 99.67(0.45) | 99.63(0.52) | 99.65(0.47) |
| | $r_n = 5$ | 0.32(0.23) | 0 | 0.01(0.07) | 99.99(0.08) | 99.99(0.08) | 99.99(0.08) |
| $\delta = 2$ | $r_n = 1$ | 0.58(0.31) | 0 | 0.63(0.57) | 99.38(0.57) | 99.30(0.66) | 99.34(0.60) |
| | $r_n = 3$ | 0.27(0.08) | 0 | 0 | 1 | 1 | 1 |
| | $r_n = 5$ | 0.26(0.03) | 0 | 0 | 1 | 1 | 1 |

Setting VI: Gaussian Scores with $\tau = 0.5, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 1.17(0.57) | 0 | 3.38(2.13) | 97.36(1.56) | 95.74(2.71) | 96.54(2.13) |
| | $r_n = 3$ | 0.87(0.47) | 0 | 0.20(0.35) | 99.79(0.36) | 99.78(0.39) | 99.79(0.38) |
| | $r_n = 5$ | 0.57(0.34) | 0 | 0.01(0.06) | 99.99(0.08) | 99.99(0.05) | 99.99(0.06) |
| $\delta = 2$ | $r_n = 1$ | 1.04(0.50) | 0 | 0.31(0.41) | 99.68(0.43) | 99.67(0.46) | 99.67(0.43) |
| | $r_n = 3$ | 0.31(0.12) | 0 | 0 | 1 | 1 | 1 |
| | $r_n = 5$ | 0.26(0.03) | 0 | 0 | 1 | 1 | 1 |

Setting VII: non-Gaussian Scores with $df = 9, \tau = 0, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 23.99(17.16) | 0 | 44.18(7.85) | 43.09(15.50) | 52.27(3.74) | 46.14(10.30) |
| | $r_n = 3$ | 18.30(12.95) | 0 | 24.77(10.49) | 81.93(10.92) | 70.80(15.14) | 75.19(12.25) |
| | $r_n = 5$ | 15.99(11.81) | 0 | 9.99(5.53) | 92.42(3.03) | 88.13(7.25) | 90.15(5.19) |
| $\delta = 2$ | $r_n = 1$ | 20.86(15.92) | 0 | 27.80(11.38) | 73.35(20.44) | 67.38(16.33) | 68.94(17.36) |
| | $r_n = 3$ | 5.53(5.23) | 0 | 0.61(0.53) | 99.40(0.54) | 99.33(0.60) | 99.36(0.55) |
| | $r_n = 5$ | 0.97(1.17) | 0 | 0.04(0.15) | 99.96(0.15) | 99.96(0.16) | 99.96(0.15) |

Setting VIII: non-Gaussian Scores with $df = 3, \tau = 0, \phi = 0,$ and $\beta_{jk}^{*} = \delta(-1)^{k+1}k^{\frac{2}{5}}I_{\{4\leq k\leq 6, j\in T^{*}\}}$

| Value of $\delta$ | $T^{*} = \{1, \ldots, r_n\}$ | FPR (%) | FNR (%) | MCR (%) | Macro_Precision (%) | Macro_Recall (%) | Macro_F1 (%) |
|---|---|---|---|---|---|---|---|
| $\delta = 1$ | $r_n = 1$ | 33.21(21.12) | 0 | 42.65(7.76) | 44.88(17.40) | 53.88(5.98) | 47.84(12.33) |
| | $r_n = 3$ | 25.10(16.45) | 0 | 16.98(9.49) | 87.90(5.72) | 79.84(12.79) | 83.33(9.35) |
| | $r_n = 5$ | 18.51(14.66) | 0 | 4.89(3.19) | 95.92(2.15) | 94.27(4.00) | 95.07(3.06) |
| $\delta = 2$ | $r_n = 1$ | 30.34(20.26) | 0 | 23.35(11.87) | 81.30(14.93) | 71.85(16.46) | 75.44(14.93) |
| | $r_n = 3$ | 4.45(4.92) | 0 | 0.63(0.57) | 99.37(0.57) | 99.33(0.64) | 99.35(0.59) |
| | $r_n = 5$ | 0.51(0.77) | 0 | 0.09(0.23) | 99.90(0.25) | 99.91(0.24) | 99.90(0.24) |

Real data

Average k-fold cross-validated misclassification rates (%)

| | Leave-one-out | 5-fold | 10-fold | 20-fold |
|---|---|---|---|---|
| MCR (%) | 21.75(41.31) | 20.85(8.00) | 20.10(10.71) | 20.25(15.60) |
| Macro_Precision (%) | NA | 79.18(9.30) | 79.91(13.26) | 76.81(21.20) |
| Macro_Recall (%) | NA | 75.89(9.23) | 76.26(12.57) | 75.86(19.38) |
| Macro_F1 (%) | NA | 77.41(8.85) | 77.81(12.26) | 75.99(20.08) |