**Results**

**Classifiers used: Support Vector Machine (SVM), k-Nearest Neighbor (KNN) and Random Forest (RF)**

Formulas used**:**

**Segment size = 10 beats. Threshold 20%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 99.15 (98.85) | 95.04 (99.89) | 99.65 (97.82) | 97.10 (97.86) | 0.99738 (0.99752) | 73.878 (231.47) | 74.156 (231.79) |
| **Quadratic SVM** | 99.30 (99.39) | 95.59 (100) | 99.75 (98.79) | 97.92 (98.80) | 0.99927 (0.99895) | 63.632 (163.92) | 63.902 (164.18) |
| **Cubic SVM** | 99.33 (99.53) | 96.14 (100) | 99.72 (99.07) | 97.63 (99.07) | 0.99954 (0.99947) | 68.956 (177.99) | 69.238 (178.25) |
| **Fine Gaussian SVM** | 98.99 (99.58) | 92.46 (99.93) | 99.78 (99.23) | 98.11 (99.23) | 0.99925 (0.99962) | 230.02 (309.53) | 230.27 (309.79) |
| **Medium Gaussian SVM** | 98.97 (99.73) | 92.37 (99.90) | 99.77 (99.57) | 98.02 (99.57) | 0.99969 (0.99987) | 196.29 (319.58) | 196.55 (319.84) |
| **Coarse Gaussian SVM** | 98.96 (99.76) | 92.93 (99.90) | 99.70 (99.63) | 97.38 (99.63) | 1.0000 (1.0000) | 192.25 (305.14) | 192.52 (305.40) |
| **kNN, k = 3** | 99.24 (99.48) | 96.31 (100) | 99.60 (98.95) | 96.68 (98.96) | 0.99989 (1.0000) | 47.592 (156.07) | 47.853 (156.33) |
| **kNN, k = 5** | 99.19 (99.32) | 96.02 (100) | 99.58 (98.64) | 96.51 (98.65) | 0.99981 (1.0000) | 47.765 (155.06) | 48.022 (155.32) |
| **kNN, k = 7** | 99.21 (99.18) | 95.68 (100) | 99.64 (98.36) | 97.03 (98.38) | 0.99972 (1.0000) | 47.904 (156.43) | 48.160 (156.70) |
| **kNN, k = 9** | 99.26 (99.06) | 95.72 (100) | 99.69 (98.12) | 97.41 (98.15) | 0.99969 (1.0000) | 47.733 (155.58) | 47.995 (155.84) |
| **RF, 5 Trees** | 93.89 (91.34) | 60.17 (98.14) | 98.00 (84.57) | 78.50 (86.37) | 0.91206 (0.92560) | 0.83092 (1.8434) | 1.1139 (2.1021) |
| **RF, 10 Trees** | 95.11 (92.95) | 66.31 (96.67) | 98.61 (89.25) | 85.33 (89.96) | 0.92361 (0.94485) | 1.0283 (2.2218) | 1.3109 (2.4841) |
| **RF, 20 Trees** | 97.04 (95.04) | 82.63 (99.22) | 98.79 (90.88) | 89.29 (91.55) | 0.98093 (0.95674) | 1.1726 (2.6992) | 1.4345 (2.9649) |
| **RF, 30 Trees** | 97.98 (96.04) | 86.82 (99.46) | 99.34 (92.63) | 94.08 (93.08) | 0.98653 (0.96535) | 1.3504 (3.0238) | 1.6062 (3.2831) |
| **RF, 40 Trees** | 98.27 (96.59) | 89.58 (99.54) | 99.32 (93.64) | 94.17 (93.98) | 0.98890 (0.97174) | 1.5761 (3.1622) | 1.8400 (3.4613) |
| **RF, 50 Trees** | 98.38 (97.00) | 90.21 (99.66) | 99.38 (94.35) | 94.62 (94.61) | 0.99090 (0.97690) | 1.5584 (3.4432) | 1.8465 (3.7031) |

**Segment size = 20 beats. Threshold 20%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 99.05 (98.73) | 94.70 (100) | 99.59 (97.45) | 96.57 (97.52) | 0.99772 (0.99794) | 31.370 (135.09) | 31.749 (142.31) |
| **Quadratic SVM** | 99.19 (99.26) | 94.95 (100) | 99.71 (98.52) | 97.58 (98.54) | 0.99925 (0.99931) | 26.306 (112.73) | 26.601 (113.34) |
| **Cubic SVM** | 98.97 (99.51) | 95.20 (100) | 99.43 (99.02) | 95.36 (99.03) | 0.99998 (0.99986) | 29.429 (126.15) | 29.723 (126.62) |
| **Fine Gaussian SVM** | 98.33 (99.68) | 86.70 (99.98) | 99.76 (99.39) | 97.82 (99.39) | 0.99975 (0.99995) | 70.342 (230.33) | 70.622 (230.76) |
| **Medium Gaussian SVM** | 98.33 (99.74) | 87.04 (99.98) | 99.72 (99.50) | 97.46 (99.51) | 1.0000 (1.0000) | 63.823 (210.10) | 64.097 (210.64) |
| **Coarse Gaussian SVM** | 98.30 (99.78) | 87.12 (99.98) | 99.68 (99.59) | 97.09 (99.59) | 1.0000 (1.0000) | 60.833 (189.62) | 61.098 (189.96) |
| **kNN, k = 3** | 98.98 (99.05) | 94.70 (100) | 99.50 (98.10) | 95.91 (98.14) | 0.99981 (1.0000) | 11.507 (194.02) | 11.777 (194.36) |
| **kNN, k = 5** | 99.03 (98.72) | 94.78 (100) | 99.55 (97.44) | 96.32 (97.51) | 0.99964 (1.0000) | 11.256 (196.51) | 11.529 (196.90) |
| **kNN, k = 7** | 98.91 (98.28) | 94.61 (100) | 99.44 (96.56) | 95.42 (96.68) | 0.99942 (0.99999) | 11.838 (183.47) | 12.110 (183.88) |
| **kNN, k = 9** | 98.88 (97.99) | 94.28 (100) | 99.45 (95.97) | 95.48 (96.13) | 0.99920 (0.99998) | 11.985 (178.61) | 12.257 (179.06) |
| **RF, 5 Trees** | 90.55 (92.17) | 79.71 (98.83) | 91.88 (85.51) | 54.71 (87.22) | 0.92365 (0.92413) | 0.38945 (3.3063) | 0.67326 (3.6761) |
| **RF, 10 Trees** | 93.91 (93.69) | 85.69 (98.84) | 94.93 (88.55) | 67.51 (89.62) | 0.94604 (0.94159) | 0.50755 (4.0056) | 0.77673 (4.4157) |
| **RF, 20 Trees** | 95.97 (95.94) | 81.65 (99.24) | 97.73 (92.64) | 81.58 (93.10) | 0.98140 (0.96913) | 0.70302 (6.0064) | 0.97462 (6.3945) |
| **RF, 30 Trees** | 97.49 (97.10) | 90.49 (99.47) | 98.35 (94.73) | 87.12 (94.97) | 0.98820 (0.97809) | 0.72851 (6.8438) | 0.99756 (7.2444) |
| **RF, 40 Trees** | 98.27 (97.58) | 91.84 (99.54) | 99.06 (95.62) | 92.30 (95.79) | 0.99323 (0.98381) | 0.82251 (7.9681) | 1.0860 (8.3596) |
| **RF, 50 Trees** | 98.52 (98.14) | 92.76 (99.59) | 99.22 (96.69) | 93.63 (96.78) | 0.99585 (0.99498) | 0.88215 (9.3651) | 1.1489 (9.7383) |

**Segment size = 60 beats. Threshold 20%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.78 (98.57) | 88.32 (99.97) | 98.96 (97.16) | 91.34 (97.27) | 0.99514 (0.99587) | 5.8589 (15.912) | 6.1608 (16.191) |
| **Quadratic SVM** | 98.32 (99.42) | 92.89 (99.94) | 98.99 (98.90) | 91.96 (98.92) | 0.99986 (0.99977) | 5.8440 (18.440) | 6.1014 (18.693) |
| **Cubic SVM** | 98.15 (99.33) | 91.88 (99.88) | 98.93 (98.77) | 91.41 (98.80) | 1.0000 (1.0000) | 6.2708 (20.236) | 6.5266 (20.493) |
| **Fine Gaussian SVM** | 97.53 (99.51) | 82.49 (99.63) | 99.40 (99.40) | 94.48 (99.41) | 1.0000 (1.0000) | 10.153 (24.109) | 10.408 (24.368) |
| **Medium Gaussian SVM** | 97.56 (99.47) | 82.99 (99.53) | 99.37 (99.40) | 94.24 (99.41) | 1.0000 (1.0000) | 10.137 (23.277) | 10.395 (23.531) |
| **Coarse Gaussian SVM** | 97.59 (99.48) | 83.25 (99.53) | 99.37 (99.43) | 94.26 (99.44) | 1.0000 (1.0000) | 9.8045 (23.998) | 10.061 (24.248) |
| **kNN, k = 3** | 98.15 (97.71) | 91.62 (99.97) | 98.96 (95.43) | 91.62 (95.67) | 0.99912 (0.99998) | 1.4371 (4.1608) | 1.6932 (4.4102) |
| **kNN, k = 5** | 97.92 (96.58) | 90.86 (99.97) | 98.80 (93.16) | 90.40 (93.65) | 0.99855 (0.99997) | 1.4158 (4.1785) | 1.6763 (4.4293) |
| **kNN, k = 7** | 97.92 (95.95) | 90.61 (99.97) | 98.83 (91.90) | 90.61 (92.57) | 0.99792 (0.99996) | 1.3914 (4.1677) | 1.6458 (4.4198) |
| **kNN, k = 9** | 97.56 (95.40) | 89.59 (100) | 98.55 (90.76) | 88.47 (91.62) | 0.99680 (0.99994) | 1.4073 (4.1892) | 1.6611 (4.4417) |
| **RF, 5 Trees** | 92.62 (92.85) | 75.63 (97.44) | 94.74 (88.21) | 64.09 (89.30) | 0.94760 (0.94236) | 0.12905 (0.26996) | 0.38122 (0.52210) |
| **RF, 10 Trees** | 94.20 (95.00) | 79.44 (98.94) | 96.03 (91.02) | 71.30 (91.75) | 0.96901 (0.95764) | 0.16061 (0.31127) | 0.41783 (0.56076) |
| **RF, 20 Trees** | 96.35 (96.60) | 85.03 (99.06) | 97.76 (94.10) | 82.51 (94.43) | 0.98365 (0.97597) | 0.23626 (0.45125) | 0.49653 (0.70096) |
| **RF, 30 Trees** | 96.41 (97.79) | 85.53 (99.13) | 97.76 (96.44) | 82.60 (96.56) | 0.99467 (0.99263) | 0.23359 (0.52322) | 0.48914 (0.77303) |
| **RF, 40 Trees** | 96.66 (98.26) | 85.79 (98.91) | 98.01 (97.60) | 84.29 (97.66) | 0.99839 (0.99654) | 0.23957 (0.68017) | 0.49294 (0.93418) |
| **RF, 50 Trees** | 96.63 (98.26) | 85.53 (98.56) | 98.01 (97.95) | 84.25 (97.98) | 0.99839 (0.99844) | 0.26003 (0.84739) | 0.51531 (1.1006) |

**Segment size = 128 beats. Threshold 20%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.55 (98.25) | 85.95 (100) | 99.03 (96.48) | 91.91 (96.63) | 0.99372 (0.99658) | 1.5223 (4.2456) | 1.8089 (4.5781) |
| **Quadratic SVM** | 98.22 (99.18) | 91.35 (100) | 99.10 (98.34) | 92.86 (98.39) | 0.99983 (1.0000) | 1.4924 (4.4723) | 1.7563 (4.7378) |
| **Cubic SVM** | 97.61 (99.38) | 90.81 (100) | 98.48 (98.76) | 88.42 (98.79) | 1.0000 (1.0000) | 1.5893 (4.7839) | 1.8560 (5.0426) |
| **Fine Gaussian SVM** | 96.94 (99.55) | 75.14 (99.80) | 99.31 (99.31) | 93.29 (99.32) | 1.0000 (1.0000) | 2.3355 (5.6481) | 2.5984 (5.9100) |
| **Medium Gaussian SVM** | 96.94 (99.55) | 76.76 (99.80) | 99.38 (99.31) | 94.04 (99.32) | 1.0000 (1.0000) | 2.2306 (5.4947) | 2.4905 (5.7630) |
| **Coarse Gaussian SVM** | 96.94 (99.55) | 77.84 (99.80) | 99.38 (99.31) | 94.12 (99.32) | 1.0000 (1.0000) | 2.2088 (5.6009) | 2.4753 (5.8980) |
| **kNN, k = 3** | 97.06 (95.74) | 89.19 (100) | 98.07 (91.44) | 85.49 (92.19) | 0.99778 (0.99998) | 0.33517 (1.0209) | 0.63770 (1.3064) |
| **kNN, k = 5** | 97.18 (94.95) | 87.03 (100) | 98.48 (89.85) | 87.98 (90.88) | 0.99686 (0.99998) | 0.33089 (1.0234) | 0.60054 (1.2837) |
| **kNN, k = 7** | 97.12 (94.06) | 87.03 (100) | 98.41 (88.05) | 87.50 (89.43) | 0.99536 (0.99995) | 0.34611 (1.0244) | 0.60797 (1.2791) |
| **kNN, k = 9** | 96.39 (93.48) | 96.39 (100) | 84.32 (86.88) | 83.87 (88.51) | 0.99468 (0.99994) | 0.34743 (1.0127) | 0.60828 (1.2702) |
| **RF, 5 Trees** | 93.75 (94.81) | 84.86 (96.58) | 94.89 (93.02) | 67.97 (93.33) | 0.97359 (0.96522) | 0.053596 (0.12915) | 0.32088 (0.38725) |
| **RF, 10 Trees** | 96.45 (97.15) | 85.41 (98.84) | 97.86 (95.44) | 83.60 (95.64) | 0.99153 (0.98070) | 0.064683 (0.16663) | 0.34510 (0.45649) |
| **RF, 20 Trees** | 96.57  (98.42) | 82.70 (98.98) | 98.34 (97.86) | 86.44 (97.91) | 0.99966 (0.99746) | 0.071634 (0.24433) | 0.32985 (0.49726) |
| **RF, 30 Trees** | 96.57 (98.49) | 82.70 (98.84) | 98.34 (98.14) | 86.44 (98.17) | 0.99966 (0.99964) | 0.074641 (0.32323) | 0.33662 (0.59542) |
| **RF, 40 Trees** | 96.57 (98.49) | 82.70 (98.84) | 98.34 (98.14) | 86.44 (98.17) | 0.99966 (0.99964) | 0.071541 (0.28343) | 0.33029 (0.54573) |
| **RF, 50 Trees** | 96.57 (98.49) | 82.70 (98.84) | 98.34 (98.14) | 86.44 (98.17) | 0.99966 (0.99964) | 0.073629 (0.29046) | 0.33751 (0.54458) |