**Results**

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

Formulas used**:**

**Segment size = 10 beats. Threshold 30%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 99.31 (98.62) | 96.39 (99.81) | 99.66 (98.02) | 97.10 (98.07) | 0.99766 (0.99807) | 71.711 (338.72) | 71.982 (344.87) |
| **Quadratic SVM** | 99.49 (99.48) | 96.86 (99.98) | 99.81 (98.97) | 98.38 (98.98) | 0.99914 (0.99937) | 61.086 (249.50) | 61.348 (250.10) |
| **Cubic SVM** | 99.41 (99.61) | 96.73 (99.99) | 99.73 (99.23) | 97.74 (99.24) | 0.99963 (0.99956) | 69.185 (273.57) | 69.442 (273.93) |
| **Fine Gaussian SVM** | 99.07 (99.65) | 93.07 (99.93) | 99.79 (99.37) | 98.14 (99.38) | 0.99954 (0.99983) | 224.16 (556.26) | 224.42 (556.59) |
| **Medium Gaussian SVM** | 99.11 (99.76) | 93.67 (99.92) | 99.76 (99.59) | 97.93 (99.59) | 0.99971 (0.99997) | 202.98 (504.45) | 203.24 (505.07) |
| **Coarse Gaussian SVM** | 99.04 (99.76) | 93.16 (99.92) | 99.75 (99.59) | 97.79 (99.59) | 1.0000 (0.99999) | 192.47 (412.96) | 192.73 (413.23) |
| **kNN, k = 3** | 99.31 (99.50) | 96.64 (99.99) | 99.63 (99.01) | 96.89 (99.03) | 0.99990 (1.0000) | 46.677 (683.84) | 46.947 (684.17) |
| **kNN, k = 5** | 99.35 (99.39) | 96.56 (100) | 99.69 (98.78) | 97.35 (98.79) | 0.99983 (1.0000) | 48.162 (688.78) | 48.455 (689.07) |
| **kNN, k = 7** | 99.38 (99.24) | 96.60 (100) | 99.72 (98.48) | 97.61 (98.51) | 0.99977 (1.0000) | 48.246 (702.80) | 48.538 (703.06) |
| **kNN, k = 9** | 99.39 (99.12) | 96.34 (100) | 99.75 (98.23) | 97.90 (98.27) | 0.99970 (1.0000) | 48.225 (680.17) | 48.487 (680.45) |
| **RF, 5 Trees** | 93.98 (91.25) | 60.76 (97.65) | 97.95 (84.82) | 77.97 (86.59) | 0.91024 (0.92350) | 0.77444 (6.5702) | 1.0362 (6.8466) |
| **RF, 10 Trees** | 95.32 (93.17) | 66.05 (97.85) | 98.82 (88.48) | 87.02 (89.50) | 0.92324 (0.94307) | 1.0093 (8.0756) | 1.2693 (8.3495) |
| **RF, 20 Trees** | 97.20 (94.96) | 81.67 (99.09) | 99.05 (90.82) | 91.16 (91.54) | 0.98079 (0.95506) | 1.2510 (9.9384) | 1.5137 (10.254) |
| **RF, 30 Trees** | 98.05 (95.87) | 86.32 (99.20) | 99.45 (92.54) | 94.94 (93.02) | 0.98737 (0.96451) | 1.3413 (10.899) | 1.5977 (11.214) |
| **RF, 40 Trees** | 98.29 (96.61) | 89.24 (99.38) | 99.37 (93.83) | 94.44 (94.17) | 0.98908 (0.97098) | 1.5236 (12.119) | 1.7796 (12.499) |
| **RF, 50 Trees** | 98.41 (96.84) | 90.15 (99.54) | 99.40 (94.14) | 94.75 (94.46) | 0.99125 (0.97183) | 1.4991 (12.220) | 1.7581 (12.531) |

**Segment size = 20 beats. Threshold 30%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 99.26 (98.88) | 96.29 (100) | 99.62 (97.77) | 96.79 (97.80) | 0.99785 (0.99884) | 32.344 (80.766) | 35.768 (83.588) |
| **Quadratic SVM** | 99.41 (99.50) | 96.72 (100) | 99.73 (99.01) | 97.73 (99.01) | 0.99946 (0.99978) | 25.876 (66.800) | 26.355 (67.294) |
| **Cubic SVM** | 99.25 (99.64) | 96.03 (100) | 99.64 (99.29) | 96.95 (99.29) | 0.99988 (0.99993) | 28.961 (77.461) | 29.302 (77.815) |
| **Fine Gaussian SVM** | 98.42 (99.79) | 86.80 (99.98) | 99.81 (99.60) | 98.24 (99.60) | 0.99998 (1.0000) | 69.480 (129.24) | 69.769 (129.54) |
| **Medium Gaussian SVM** | 98.49 (99.86) | 87.58 (99.99) | 99.79 (99.73) | 98.07 (99.73) | 1.0000 (1.0000) | 64.680 (119.23) | 65.104 (119.66) |
| **Coarse Gaussian SVM** | 98.38 (99.85) | 86.89 (99.98) | 99.75 (99.73) | 97.67 (99.73) | 1.0000 (1.0000) | 61.731 (111.45) | 61.991 (111.71) |
| **kNN, k = 3** | 99.27 (99.21) | 96.81 (100) | 99.57 (98.43) | 96.39 (98.44) | 0.99990 (1.0000) | 12.926 (40.603) | 13.189 (40.870) |
| **kNN, k = 5** | 99.29 (98.85) | 96.38 (100) | 99.64 (97.72) | 96.96 (97.75) | 0.99973 (1.0000) | 12.965 (42.072) | 13.220 (42.336) |
| **kNN, k = 7** | 99.12 (98.48) | 95.60 (100) | 99.55 (96.96) | 96.18 (97.03) | 0.99954 (1.0000) | 13.089 (41.881) | 13.342 (42.172) |
| **kNN, k = 9** | 98.98 (98.13) | 95.08 (100) | 99.44 (96.27) | 95.33 (96.37) | 0.99936 (0.99999) | 13.331 (41.757) | 13.586 (42.021) |
| **RF, 5 Trees** | 90.72 (92.12) | 81.02 (98.94) | 91.88 (85.37) | 54.43 (87.02) | 0.92741 (0.92355) | 0.42989 (0.95988) | 0.69102 (1.2205) |
| **RF, 10 Trees** | 94.02 (93.56) | 87.14 (99.07) | 94.85 (88.09) | 66.93 (89.19) | 0.95933 (0.93983) | 0.49849 (1.2430) | 0.76380 (1.4949) |
| **RF, 20 Trees** | 96.50 (95.78) | 84.56 (99.45) | 97.92 (92.14) | 82.98 (92.62) | 0.98496 (0.96285) | 0.70515 (1.6641) | 0.96853 (1.9294) |
| **RF, 30 Trees** | 97.77 (97.13) | 91.80 (99.51) | 98.48 (94.78) | 87.86 (94.97) | 0.98996 (0.97455) | 0.75410 (1.9755) | 1.0071 (2.2417) |
| **RF, 40 Trees** | 98.30 (97.70) | 92.67 (99.38) | 98.98 (96.05) | 91.56 (96.14) | 0.99458 (0.97784) | 0.87615 (2.1490) | 1.1304 (2.4047) |
| **RF, 50 Trees** | 98.62 (98.39) | 93.62 (99.43) | 99.22 (97.37) | 93.45 (97.40) | 0.99645 (0.99438) | 0.92564 (2.4572) | 1.1782 (2.7218) |

**Segment size = 60 beats. Threshold 30%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.92 (98.57) | 89.61 (99.97) | 98.93 (97.17) | 91.03 (97.24) | 0.99435 (0.99541) | 5.7513 (16.107) | 6.0541 (16.400) |
| **Quadratic SVM** | 98.23 (99.39) | 93.25 (100) | 98.84 (98.77) | 90.66 (98.79) | 0.99950 (1.0000) | 5.7062 (17.111) | 5.9716 (17.362) |
| **Cubic SVM** | 98.18 (99.35) | 91.69 (100) | 98.96 (98.71) | 91.45 (98.73) | 1.0000 (1.0000) | 6.3801 (19.127) | 6.6323 (19.382) |
| **Fine Gaussian SVM** | 97.50 (99.47) | 81.56 (99.62) | 99.43 (99.31) | 94.58 (99.31) | 1.0000 (1.0000) | 9.8447 (23.651) | 10.098 (23.903) |
| **Medium Gaussian SVM** | 97.50 (99.47) | 81.82 (99.62) | 99.40 (99.31) | 94.31 (99.31) | 1.0000 (1.0000) | 9.2969 (23.973) | 9.5518 (24.226) |
| **Coarse Gaussian SVM** | 97.53 (99.50) | 82.08 (99.69) | 99.40 (99.31) | 94.33 (99.31) | 1.0000 (1.0000) | 9.2081 (23.574) | 9.4632 (23.825) |
| **kNN, k = 3** | 98.01 (97.70) | 91.43 (99.97) | 98.81 (95.44) | 90.26 (95.63) | 0.99913 (0.99998) | 1.3535 (4.2498) | 1.6046 (4.5133) |
| **kNN, k = 5** | 98.07 (96.74) | 91.43 (99.97) | 98.87 (93.52) | 90.72 (93.91) | 0.99869 (0.99996) | 1.4293 (4.1447) | 1.6824 (4.3963) |
| **kNN, k = 7** | 97.67 (95.89) | 90.13 (99.97) | 98.59 (91.83) | 88.52 (92.43) | 0.99801 (0.99994) | 1.4182 (4.1716) | 1.6713 (4.4230) |
| **kNN, k = 9** | 97.42 (95.48) | 89.09 (99.97) | 98.43 (91.01) | 87.28 (91.73) | 0.99717 (0.99991) | 1.3805 (4.2675) | 1.6418 (4.5295) |
| **RF, 5 Trees** | 92.18 (92.18) | 78.70 (97.51) | 93.81 (86.86) | 60.60 (88.10) | 0.94570 (0.93630) | 0.12539 (0.27138) | 0.39239 (0.53021) |
| **RF, 10 Trees** | 94.50 (94.12) | 78.44 (96.88) | 96.45 (91.35) | 72.77 (91.79) | 0.96863 (0.96850) | 0.15223 (0.35398) | 0.40509 (0.60994) |
| **RF, 20 Trees** | 96.41 (96.71) | 84.16 (99.02) | 97.89 (94.40) | 82.86 (94.64) | 0.98290 (0.98368) | 0.19729 (0.42593) | 0.45476 (0.67933) |
| **RF, 30 Trees** | 96.83 (97.91) | 86.75 (99.21) | 98.05 (96.60) | 84.34 (96.69) | 0.99722 (0.98979) | 0.22766 (0.49575) | 0.48075 (0.75028) |
| **RF, 40 Trees** | 96.78 (98.25) | 86.49 (98.93) | 98.02 (97.58) | 84.09 (97.61) | 0.99912 (0.99529) | 0.22212 (0.66666) | 0.47285 (0.97701) |
| **RF, 50 Trees** | 96.75 (98.19) | 86.23 (98.58) | 98.02 (97.80) | 84.05 (97.81) | 0.99912 (0.99721) | 0.21401 (0.86067) | 0.46519 (1.1178) |

**Segment size = 128 beats. Threshold 30%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.24 (98.42) | 84.83 (100) | 98.76 (96.84) | 89.35 (96.93) | 0.99367 (0.99619) | 1.3844 (4.0866) | 2.2087 (6.9234) |
| **Quadratic SVM** | 97.92 (99.04) | 90.45 (99.93) | 98.83 (98.14) | 90.45 (98.17) | 0.99974 (1.0000) | 1.3717 (4.4135) | 1.6286 (4.9098) |
| **Cubic SVM** | 97.55 (99.07) | 88.76 (99.93) | 98.63 (98.21) | 88.76 (98.24) | 1.0000 (1.0000) | 1.5025 (4.9753) | 1.7534 (5.3223) |
| **Fine Gaussian SVM** | 96.33 (99.48) | 73.03 (99.79) | 99.18 (99.18) | 91.55 (99.18) | 1.0000 (1.0000) | 1.9911 (5.3988) | 2.2438 (5.7600) |
| **Medium Gaussian SVM** | 96.33 (99.52) | 74.72 (99.86) | 98.97 (99.18) | 89.86 (99.18) | 1.0000 (1.0000) | 1.9465 (5.4549) | 2.2046 (5.8956) |
| **Coarse Gaussian SVM** | 96.26 (99.52) | 73.03 (99.86) | 99.11 (99.18) | 90.91 (99.18) | 1.0000 (1.0000) | 1.9497 (5.4812) | 2.2107 (5.7490) |
| **kNN, k = 3** | 96.75 (95.70) | 85.39 (100) | 98.14 (91.41) | 84.92 (92.07) | 0.99760 (0.99998) | 0.30911 (0.94757) | 0.62706 (1.2409) |
| **kNN, k = 5** | 96.75 (95.01) | 84.27 (100) | 98.28 (90.03) | 85.71 (90.91) | 0.99692 (0.99996) | 0.30733 (0.92609) | 0.56209 (1.1840) |
| **kNN, k = 7** | 96.33 (94.29) | 82.02 (100) | 98.08 (88.59) | 83.91 (89.73) | 0.99575 (0.99991) | 0.30890 (0.99341) | 0.56639 (1.3049) |
| **kNN, k = 9** | 96.45 (93.60) | 83.71 (100) | 98.01 (87.22) | 83.71 (88.64) | 0.99415 (0.99989) | 0.31026 (0.97626) | 0.56876 (1.2415) |
| **RF, 5 Trees** | 94.12 (94.87) | 87.08 (96.69) | 94.98 (93.06) | 67.98 (93.28) | 0.98182 (0.96655) | 0.051338 (0.12168) | 0.30572 (0.39241) |
| **RF, 10 Trees** | 96.14 (96.46) | 84.27 (99.10) | 97.59 (93.81) | 81.08 (94.11) | 0.99341 (0.98372) | 0.057022 (0.14219) | 0.32017 (0.41255) |
| **RF, 20 Trees** | 96.51 (98.55) | 87.08 (99.38) | 97.66 (97.73) | 82.01 (97.76) | 0.99916 (0.99560) | 0.061205 (0.20316) | 0.32128 (0.47261) |
| **RF, 30 Trees** | 96.57 (98.55) | 87.64 (99.10) | 97.66 (98.00) | 82.11 (98.02) | 0.99916 (0.99963) | 0.063755 (0.29895) | 0.32300 (0.56827) |
| **RF, 40 Trees** | 96.57 (98.55) | 87.64 (99.10) | 97.66 (98.00) | 82.11 (98.02) | 0.99916 (1.0000) | 0.063209 (0.30436) | 0.32041 (0.56146) |
| **RF, 50 Trees** | 96.57 (98.55) | 87.64 (99.10) | 97.66 (98.00) | 82.11 (98.02) | 0.99916 (1.0000) | 0.061005 (0.31852) | 0.32153 (0.58395) |