**Results**

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

Formulas used**:**

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

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 99.14 (98.74) | 94.58 (99.77) | 99.70 (97.71) | 97.49 (97.75) | 0.99717 (0.99745) | 74.216 (239.13) | 74.503 (239.44) |
| **Quadratic SVM** | 99.31 (99.41) | 95.76 (100) | 99.74 (98.82) | 97.85 (98.82) | 0.99927 (0.99924) | 62.452 (164.11) | 62.727 (164.37) |
| **Cubic SVM** | 99.33 (99.55) | 96.26 (100) | 99.71 (99.11) | 97.57 (99.11) | 0.99955 (0.99948) | 69.663 (182.24) | 69.924 (182.50) |
| **Fine Gaussian SVM** | 98.95 (99.59) | 92.10 (99.92) | 99.79 (99.27) | 98.21 (99.27) | 0.99920 (0.99965) | 219.41 (348.90) | 219.67 (349.16) |
| **Medium Gaussian SVM** | 99.00 (99.75) | 92.69 (99.91) | 99.78 (99.58) | 98.09 (99.58) | 0.99995 (0.99990) | 206.84 (307.31) | 207.11 (307.57) |
| **Coarse Gaussian SVM** | 99.04 (99.78) | 93.41 (99.92) | 99.74 (99.64) | 97.76 (99.64) | 0.99997 (0.99995) | 183.14 (219.59) | 183.41 (219.85) |
| **kNN, k = 3** | 99.18 (99.48) | 96.05 (99.99) | 99.57 (98.97) | 96.46 (98.98) | 0.99993 (1.0000) | 47.919 (155.88) | 48.180 (156.14) |
| **kNN, k = 5** | 99.21 (99.32) | 95.93 (100) | 99.61 (98.66) | 96.78 (98.67) | 0.99982 (1.0000) | 47.543 (155.72) | 47.803 (155.98) |
| **kNN, k = 7** | 99.23 (99.18) | 95.63 (100) | 99.67 (98.36) | 97.31 (98.38) | 0.99974 (1.0000) | 48.146 (156.32) | 48.406 (156.57) |
| **kNN, k = 9** | 99.22 (99.05) | 95.30 (100) | 99.71 (98.11) | 97.55 (98.13) | 0.99969 (0.99999) | 47.687 (156.59) | 47.947 (156.85) |
| **RF, 5 Trees** | 93.48 (91.41) | 60.81 (98.16) | 97.49 (84.71) | 74.83 (86.44) | 0.90845 (0.92585) | 0.78645 (1.7941) | 1.0602 (2.0553) |
| **RF, 10 Trees** | 94.94 (93.17) | 65.73 (99.03) | 98.52 (87.35) | 84.55 (88.60) | 0.91955 (0.93726) | 0.98757 (2.1910) | 1.2570 (2.4480) |
| **RF, 20 Trees** | 96.92 (94.52) | 80.81 (99.29) | 98.90 (89.78) | 90.03 (90.61) | 0.96550 (0.94954) | 1.1795 (2.6046) | 1.4378 (2.8615) |
| **RF, 30 Trees** | 97.73 (95.34) | 84.29 (99.67) | 99.39 (91.03) | 94.40 (91.69) | 0.97315 (0.95742) | 1.4327 (2.9307) | 1.6914 (3.1977) |
| **RF, 40 Trees** | 98.08 (96.00) | 87.57 (99.46) | 99.37 (92.56) | 94.47 (93.00) | 0.98299 (0.96487) | 1.5781 (3.4709) | 1.8389 (3.7372) |
| **RF, 50 Trees** | 98.36 (96.49) | 89.25 (99.65) | 99.48 (93.35) | 95.51 (93.70) | 0.98626 (0.96956) | 1.5530 (3.5953) | 1.8183 (3.8583) |

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

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 98.83 (98.70) | 92.79 (99.99) | 99.59 (97.41) | 96.67 (97.47) | 0.99763 (0.99790) | 32.354 (83.028) | 32.662 (83.894) |
| **Quadratic SVM** | 99.03 (99.26) | 94.10 (100) | 99.66 (98.52) | 97.21 (98.54) | 0.99936 (0.99947) | 26.015 (71.776) | 26.280 (72.037) |
| **Cubic SVM** | 98.88 (99.48) | 94.35 (100) | 99.46 (98.96) | 95.68 (98.97) | 0.99981 (0.99969) | 27.696 (82.589) | 27.969 (82.852) |
| **Fine Gaussian SVM** | 98.15 (99.61) | 85.91 (99.95) | 99.70 (99.28) | 97.31 (99.28) | 0.99920 (0.99979) | 66.625 (125.72) | 66.928 (125.98) |
| **Medium Gaussian SVM** | 98.19 (99.72) | 86.73 (99.95) | 99.65 (99.49) | 96.89 (99.49) | 0.99999 (0.99992) | 60.298 (116.67) | 60.577 (116.94) |
| **Coarse Gaussian SVM** | 98.24 (99.75) | 87.31 (99.96) | 99.63 (99.54) | 96.73 (99.54) | 1.0000 (1.0000) | 58.323 (115.98) | 58.587 (116.25) |
| **kNN, k = 3** | 98.90 (99.01) | 94.68 (100) | 99.44 (98.02) | 95.54 (98.04) | 0.99979 (1.0000) | 11.262 (36.762) | 11.527 (37.030) |
| **kNN, k = 5** | 98.82 (98.64) | 94.19 (100) | 99.41 (97.29) | 95.28 (97.35) | 0.99962 (1.0000) | 11.754 (37.222) | 12.020 (37.482) |
| **kNN, k = 7** | 98.72 (98.26) | 94.02 (100) | 99.31 (96.52) | 94.56 (96.62) | 0.99939 (0.99998) | 11.883 (37.175) | 12.167 (37.436) |
| **kNN, k = 9** | 98.58 (97.92) | 93.53 (100) | 99.22 (95.84) | 93.84 (95.99) | 0.99915 (0.99998) | 11.845 (37.482) | 12.111 (37.746) |
| **RF, 5 Trees** | 90.06 (91.92) | 79.28 (98.15) | 91.43 (85.71) | 53.99 (87.24) | 0.92246 (0.91996) | 0.39696 (0.89256) | 0.66752 (1.1520) |
| **RF, 10 Trees** | 93.51 (93.65) | 83.95 (98.65) | 94.72 (88.67) | 66.86 (89.66) | 0.94586 (0.94127) | 0.50374 (1.1123) | 0.77103 (1.3756) |
| **RF, 20 Trees** | 95.55 (95.07) | 84.93 (98.96) | 96.89 (91.20) | 77.62 (91.80) | 0.97658 (0.95449) | 0.66505 (1.2722) | 0.93373 (1.5338) |
| **RF, 30 Trees** | 96.43 (96.28) | 86.73 (99.05) | 97.66 (93.52) | 82.48 (93.83) | 0.98283 (0.96488) | 0.72595 (1.4328) | 1.0068 (1.6950) |
| **RF, 40 Trees** | 97.03 (97.31) | 89.84 (99.31) | 97.94 (95.31) | 84.71 (95.47) | 0.98929 (0.97793) | 0.82244 (1.8500) | 1.0943 (2.1155) |
| **RF, 50 Trees** | 97.03 (97.76) | 89.84 (99.54) | 97.94 (95.98) | 84.71 (96.10) | 0.99413 (0.98480) | 0.88915 (2.2161) | 1.1568 (2.4783) |

**Segment size = 60 beats. Threshold 10%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.31 (98.16) | 84.82 (100) | 98.95 (96.32) | 91.43 (96.44) | 0.99346 (0.99363) | 5.9767 (17.247) | 6.3095 (17.525) |
| **Quadratic SVM** | 97.76 (98.71) | 88.67 (99.97) | 98.95 (97.46) | 91.77 (97.52) | 0.99941 (0.99970) | 5.8179 (18.105) | 6.0750 (18.355) |
| **Cubic SVM** | 97.34 (98.87) | 87.71 (99.90) | 98.60 (97.84) | 89.22 (97.88) | 0.99999 (1.0000) | 6.5110 (22.238) | 6.7675 (22.494) |
| **Fine Gaussian SVM** | 96.97 (99.19) | 79.28 (99.55) | 99.30 (98.83) | 93.73 (98.83) | 1.0000 (1.0000) | 9.5868 (25.823) | 9.8406 (26.094) |
| **Medium Gaussian SVM** | 96.86 (99.25) | 79.76 (99.59) | 99.11 (98.92) | 92.20 (98.93) | 1.0000 (1.0000) | 9.3694 (24.609) | 9.6364 (24.862) |
| **Coarse Gaussian SVM** | 96.94 (99.21) | 80.72 (99.55) | 99.08 (98.86) | 92.03 (98.86) | 1.0000 (1.0000) | 9.2407 (25.824) | 9.5103 (26.193) |
| **kNN, k = 3** | 97.81 (97.33) | 89.64 (99.97) | 98.89 (94.70) | 91.40 (94.96) | 0.99893 (0.99997) | 1.3297 (4.1208) | 1.5976 (4.3744) |
| **kNN, k = 5** | 97.36 (96.35) | 88.43 (100) | 98.54 (92.70) | 88.86 (93.19) | 0.99818 (0.99995) | 1.2936 (4.1932) | 1.5492 (4.4467) |
| **kNN, k = 7** | 97.22 (95.68) | 88.43 (100) | 98.38 (91.37) | 87.80 (92.04) | 0.99776 (0.99992) | 1.3212 (4.2542) | 1.5759 (4.5102) |
| **kNN, k = 9** | 97.08 (95.16) | 86.99 (100) | 98.41 (90.32) | 87.83 (91.16) | 0.99640 (0.99989) | 1.3537 (4.2558) | 1.6082 (4.5119) |
| **RF, 5 Trees** | 92.12 (92.88) | 73.49 (97.74) | 94.57 (88.04) | 64.08 (89.08) | 0.94444 (0.93747) | 0.12403 (0.28476) | 0.39304 (0.53775) |
| **RF, 10 Trees** | 94.17 (95.01) | 78.55 (99.17) | 96.22 (90.86) | 73.26 (91.55) | 0.97280 (0.95999) | 0.15785 (0.36466) | 0.41468 (0.62470) |
| **RF, 20 Trees** | 96.30 (96.66) | 82.17 (99.24) | 98.16 (94.10) | 85.46 (94.38) | 0.98869 (0.97513) | 0.19714 (0.49222) | 0.46237 (0.74550) |
| **RF, 30 Trees** | 96.44 (97.38) | 84.58 (98.89) | 98.00 (95.87) | 84.78 (95.99) | 0.99315 (0.98550) | 0.20439 (0.58022) | 0.46005 (0.83314) |
| **RF, 40 Trees** | 96.33 (97.82) | 84.58 (98.82) | 97.87 (96.83) | 83.97 (96.88) | 0.99964 (0.99034) | 0.22956 (0.72028) | 0.48758 (0.97388) |
| **RF, 50 Trees** | 96.33 (98.06) | 84.82 (98.41) | 97.84 (97.72) | 83.81 (97.73) | 0.99996 (0.99840) | 0.23692 (0.84487) | 0.49306 (1.1456) |

**Segment size = 128 beats. Threshold 10%**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** | **Time total (sec)** |
| **Linear SVM** | 97.31 (98.00) | 83.42 (100) | 99.17 (96.04) | 93.06 (96.13) | 0.99378 (0.99752) | 1.5084 (4.3014) | 1.8483 (4.6835) |
| **Quadratic SVM** | 97.80 (98.88) | 88.08 (100) | 99.10 (97.78) | 92.90 (97.79) | 0.99958 (1.0000) | 1.5681 (4.5611) | 1.8233 (4.8265) |
| **Cubic SVM** | 97.37 (98.95) | 88.60 (100) | 98.54 (97.92) | 89.06 (97.92) | 0.99999 (1.0000) | 1.6091 (4.9348) | 1.8604 (5.1936) |
| **Fine Gaussian SVM** | 96.33 (99.26) | 75.65 (99.50) | 99.10 (99.03) | 91.82 (99.01) | 1.0000 (1.0000) | 2.1088 (5.0352) | 1.8604 (5.3273) |
| **Medium Gaussian SVM** | 96.14 (99.30) | 75.65 (99.58) | 98.89 (99.03) | 90.12 (99.02) | 1.0000 (1.0000) | 2.0754 (5.1788) | 2.3488 (5.4379) |
| **Coarse Gaussian SVM** | 95.96 (99.23) | 74.09 (99.50) | 98.89 (98.96) | 89.94 (98.95) | 1.0000 (1.0000) | 2.1280 (5.1985) | 2.3839 (5.4574) |
| **kNN, k = 3** | 96.26 (95.37) | 86.53 (100) | 97.57 (90.83) | 82.67 (91.46) | 0.99833 (1.0000) | 0.32563 (0.93302) | 0.59987 (1.1908) |
| **kNN, k = 5** | 96.39 (94.78) | 86.01 (100) | 97.78 (89.65) | 83.84 (90.47) | 0.99678 (0.99998) | 0.32110 (0.93561) | 0.57365 (1.2027) |
| **kNN, k = 7** | 96.51 (94.15) | 84.97 (100) | 98.06 (88.40) | 85.42 (89.44) | 0.99492 (0.99996) | 0.32457 (0.97249) | 0.57169 (1.2298) |
| **kNN, k = 9** | 96.33 (93.80) | 82.38 (100) | 98.19 (87.71) | 85.95 (88.87) | 0.99491 (0.99995) | 0.33070 (0.93081) | 0.63371 (1.2018) |
| **RF, 5 Trees** | 93.51 (95.20) | 80.83 (99.72) | 95.21 (90.76) | 69.33 (91.38) | 0.97051 (0.95955) | 0.058146 (0.11755) | 0.30869 (0.37536) |
| **RF, 10 Trees** | 95.35 (97.13) | 83.94 (99.15) | 96.88 (95.14) | 78.26 (95.24) | 0.98934 (0.98121) | 0.068172 (0.15785) | 0.32040 (0.41520) |
| **RF, 20 Trees** | 95.53 (98.53) | 82.38 (99.36) | 97.29 (97.71) | 80.30 (97.71) | 0.99959 (0.99665) | 0.074409 (0.26003) | 0.36712 (0.51690) |
| **RF, 30 Trees** | 95.47 (98.56) | 81.35 (99.08) | 97.36 (98.06) | 80.52 (98.04) | 0.99959 (1.0000) | 0.075571 (0.31109) | 0.32224 (0.57008) |
| **RF, 40 Trees** | 95.47 (98.53) | 81.35 (99.01) | 97.36 (98.06) | 80.52 (98.04) | 0.99959 (1.0000) | 0.072577 (0.32392) | 0.38112 (0.58703) |
| **RF, 50 Trees** | 95.47 (98.53) | 81.35 (99.01) | 97.36 (98.06) | 80.52 (98.04) | 0.99959 (1.0000) | 0.078343 (0.30756) | 0.34071 (0.57088) |