**Results**

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

Formulas used**:**

**Segment size = 10 beats. Majority voting**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** |
| **Linear SVM** | 99.23 (99.17) | 96.85 (99.88) | 99.50 (98.45) | 95.65 (98.47) | 0.99745 (0.99790) | 8.6342 (20.413) |
| **Quadratic SVM** | 99.43 (99.60) | 97.57 (99.97) | 99.64 (99.23) | 96.87 (99.24) | 0.99919 (0.99917) | 7.3116 (15.942) |
| **Cubic SVM** | 99.39 (99.67) | 97.12 (99.98) | 99.65 (99.36) | 96.90 (99.36) | 0.99980 (0.99960) | 8.7245 (18.528) |
| **Fine Gaussian SVM** | 99.01 (99.66) | 93.03 (99.89) | 99.69 (99.43) | 97.13 (99.43) | 0.99972 (0.99987) | 25.643 (45.610) |
| **Medium Gaussian SVM** | 99.05 (99.73) | 93.48 (99.91) | 99.69 (99.54) | 97.15 (99.55) | 0.99999 (1.000) | 24.451 (36.756) |
| **Coarse Gaussian SVM** | 99.08 (99.75) | 93.79 (99.90) | 99.68 (99.60) | 97.07 (99.60) | 1.0000 (1.000) | 21.203 (33.631) |
| **kNN, k = 3** | 99.34 (99.54) | 97.39 (100) | 99.56 (99.08) | 96.18 (99.09) | 0.99990 (1.000) | 6.1838 (18.073) |
| **kNN, k = 5** | 99.32 (99.40) | 97.08 (100) | 99.57 (98.79) | 96.30 (98.81) | 0.99982 (1.000) | 5.8582 (18.431) |
| **kNN, k = 7** | 99.32 (99.28) | 97.26 (100) | 99.56 (98.56) | 96.17 (98.58) | 0.99974 (1.000) | 6.1750 (18.370) |
| **kNN, k = 9** | 99.31 (99.18) | 97.08 (100) | 99.56 (98.36) | 96.21 (98.39) | 0.99968 (0.99999) | 6.0109 (17.936) |
| **RF, 5 Trees** | 94.07 (91.21) | 60.64 (97.86) | 97.87 (84.56) | 76.42 (86.38) | 0.90846 (0.91611) | 0.86932 (2.1077) |
| **RF, 10 Trees** | 95.34 (92.98) | 64.96 (95.50) | 98.79 (90.47) | 85.95 (90.93) | 0.92411 (0.94665) | 1.0844 (2.3559) |
| **RF, 20 Trees** | 96.95 (95.23) | 82.77 (98.74) | 98.57 (91.71) | 86.79 (92.25) | 0.96669 (0.96035) | 1.3437 (2.7351) |
| **RF, 30 Trees** | 97.80 (96.43) | 86.95 (99.03) | 99.03 (93.82) | 91.09 (94.13) | 0.97465 (0.97412) | 1.4851 (3.5107) |
| **RF, 40 Trees** | 98.12 (97.12) | 87.99 (99.34) | 99.27 (94.90) | 93.19 (95.12) | 0.97972 (0.97554) | 1.7002 (3.4085) |
| **RF, 50 Trees** | 98.28 (97.66) | 89.07 (99.50) | 99.32 (95.81) | 93.75 (95.96) | 0.98085 (0.98095) | 1.8794 (3.7482) |

**Segment size = 20 beats. Majority voting**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** |
| **Linear SVM** | 99.17 (99.28) | 96.17 (100) | 99.52 (98.56) | 95.83 (98.58) | 0.99887 (0.99859) | 3.4241 (8.6835) |
| **Quadratic SVM** | 99.36 (99.61) | 97.24 (100) | 99.61 (99.22) | 96.64 (99.22) | 0.99981 (0.99990) | 2.9105 (7.5887) |
| **Cubic SVM** | 99.23 (99.70) | 96.71 (100) | 99.53 (99.39) | 95.94 (99.39) | 0.99992 (0.99995) | 3.1519 (8.1869) |
| **Fine Gaussian SVM** | 98.47 (99.76) | 87.37 (99.98) | 99.75 (99.54) | 97.61 (99.54) | 0.99999 (0.99998) | 8.3856 (13.132) |
| **Medium Gaussian SVM** | 98.45 (99.82) | 87.28 (99.97) | 99.74 (99.68) | 97.51 (99.68) | 1.0000 (1.0000) | 7.0396 (13.145) |
| **Coarse Gaussian SVM** | 98.45 (99.82) | 87.10 (99.96) | 99.76 (99.69) | 97.70 (99.69) | 1.0000 (1.0000) | 6.8558 (10.249) |
| **kNN, k = 3** | 99.23 (99.23) | 96.62 (100) | 99.54 (98.46) | 96.02 (98.47) | 0.99987 (1.0000) | 1.4963 (4.7535) |
| **kNN, k = 5** | 99.29 (98.90) | 96.53 (100) | 99.61 (97.81) | 96.62 (97.85) | 0.99979 (0.99999) | 1.4149 (4.7634) |
| **kNN, k = 7** | 99.17 (98.58) | 96.44 (100) | 99.49 (97.16) | 95.59 (97.23) | 0.99962 (0.99999) | 1.4432 (4.7958) |
| **kNN, k = 9** | 99.11 (98.34) | 95.73 (100) | 99.50 (96.68) | 95.64 (96.77) | 0.99946 (0.99998) | 1.4474 (4.8123) |
| **RF, 5 Trees** | 90.67 (92.23) | 81.67 (98.59) | 91.71 (85.90) | 53.25 (87.44) | 0.92523 (0.92441) | 0.39197 (0.95293) |
| **RF, 10 Trees** | 93.82 (94.03) | 85.05 (98.66) | 94.84 (89.42) | 65.57 (90.29) | 0.94755 (0.94467) | 0.49343 (1.1320) |
| **RF, 20 Trees** | 96.74 (95.42) | 86.65 (99.48) | 97.91 (91.37) | 82.75 (91.99) | 0.98164 (0.95763) | 0.70151 (1.3315) |
| **RF, 30 Trees** | 97.89 (97.11) | 91.10 (99.36) | 98.67 (94.88) | 88.81 (95.08) | 0.98966 (0.97508) | 0.72771 (1.6769) |
| **RF, 40 Trees** | 98.51 (97.68) | 92.88 (99.63) | 99.16 (95.74) | 92.72 (95.89) | 0.99423 (0.97965) | 0.78124 (1.9557) |
| **RF, 50 Trees** | 98.64 (98.47) | 93.42 (99.60) | 99.24 (97.35) | 93.42 (97.39) | 0.99798 (0.98863) | 0.77728 (2.2461) |

**Segment size = 60 beats. Majority voting**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** |
| **Linear SVM** | 97.92 (99.06) | 90.84 (99.97) | 98.75 (98.15) | 89.39 (98.18) | 0.99560 (0.99532) | 0.62561 (1.6998) |
| **Quadratic SVM** | 98.12 (99.29) | 92.18 (99.97) | 98.81 (98.62) | 90.00 (98.64) | 0.99985 (1.0000) | 0.57812 (2.0042) |
| **Cubic SVM** | 98.12 (99.25) | 92.18 (99.97) | 98.81 (98.53) | 90.00 (98.55) | 1.0000 (1.0000) | 0.64066 (2.1053) |
| **Fine Gaussian SVM** | 97.45 (99.48) | 81.13 (99.59) | 99.34 (99.37) | 93.48 (99.37) | 1.0000 (1.0000) | 1.20420 (2.8936) |
| **Medium Gaussian SVM** | 97.42 (99.50) | 80.59 (99.62) | 99.37 (99.37) | 93.73 (99.37) | 1.0000 (1.0000) | 1.16570 (2.4716) |
| **Coarse Gaussian SVM** | 97.45 (99.50) | 80.86 (99.62) | 99.37 (99.37) | 93.75 (99.37) | 1.0000 (1.0000) | 1.16870 (2.3597) |
| **kNN, k = 3** | 98.15 (97.79) | 91.11 (99.94) | 98.97 (95.65) | 91.11 (95.82) | 0.99936 (0.99998) | 0.24983 (0.63427) |
| **kNN, k = 5** | 97.92 (97.08) | 90.03 (99.94) | 98.84 (94.24) | 90.03 (94.54) | 0.99873 (0.99997) | 0.24988 (0.64963) |
| **kNN, k = 7** | 97.64 (96.30) | 90.03 (99.94) | 98.53 (92.68) | 87.66 (93.15) | 0.99822 (0.99994) | 0.23378 (0.66278) |
| **kNN, k = 9** | 97.45 (95.80) | 88.68 (100) | 98.47 (91.61) | 87.04 (92.24) | 0.99717 (0.99991) | 0.26069 (0.73928) |
| **RF, 5 Trees** | 92.15 (93.17) | 79.78 (96.70) | 93.58 (89.64) | 59.08 (90.30) | 0.94860 (0.94453) | 0.13205 (0.31888) |
| **RF, 10 Trees** | 94.53 (95.49) | 79.51 (98.34) | 96.28 (92.64) | 71.26 (93.02) | 0.97083 (0.96522) | 0.15704 (0.35851) |
| **RF, 20 Trees** | 96.41 (97.26) | 84.10 (99.22) | 97.84 (95.31) | 81.89 (95.47) | 0.99100 (0.98064) | 0.20349 (0.45172) |
| **RF, 30 Trees** | 96.52 (97.87) | 85.44 (99.22) | 97.81 (96.53) | 81.91 (96.61) | 0.99633 (0.99333) | 0.22542 (0.57253) |
| **RF, 40 Trees** | 96.72 (98.28) | 84.64 (99.12) | 98.12 (97.43) | 83.96 (97.47) | 0.99820 (0.99717) | 0.24530 (0.75623) |
| **RF, 50 Trees** | 96.69 (98.28) | 84.37 (98.90) | 98.12 (97.65) | 83.91 (97.67) | 0.99820 (0.99797) | 0.21834 (0.90279) |

**Segment size = 128 beats. Majority voting**

**No ADASYN (ADASYN)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Accuracy (%)** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **AUC** | **Time (sec)** |
| **Linear SVM** | 97.55 (98.90) | 87.57 (99.59) | 98.70 (98.22) | 88.62 (98.24) | 0.99312 (0.99505) | 0.16246 (0.40652) |
| **Quadratic SVM** | 97.86 (99.18) | 91.72 (100) | 98.57 (98.36) | 88.07 (98.38) | 0.99994 (0.99998) | 0.19362 (0.48594) |
| **Cubic SVM** | 97.67 (99.18) | 91.12 (99.93) | 98.43 (98.43) | 87.01 (98.44) | 1.0000 (1.0000) | 0.17419 (0.48921) |
| **Fine Gaussian SVM** | 96.20 (99.42) | 72.78 (99.79) | 98.91 (99.04) | 88.49 (99.04) | 1.0000 (1.0000) | 0.39655 (0.66363) |
| **Medium Gaussian SVM** | 96.08 (99.31) | 71.60 (99.66) | 98.91 (98.98) | 88.32 (98.98) | 1.0000 (1.0000) | 0.25060 (0.65874) |
| **Coarse Gaussian SVM** | 96.20 (99.31) | 72.78 (99.66) | 98.91 (98.98) | 88.49 (98.98) | 1.0000 (1.0000) | 0.28006 (0.61120) |
| **kNN, k = 3** | 97.31 (96.09) | 90.53 (100) | 98.09 (92.21) | 84.53 (92.73) | 0.99766 (1.0000) | 0.091791 (0.19034) |
| **kNN, k = 5** | 97.49 (95.51) | 88.76 (100) | 98.50 (91.05) | 87.21 (91.74) | 0.99691 (0.99999) | 0.088651 (0.18474) |
| **kNN, k = 7** | 97.31 (94.83) | 87.57 (100) | 98.43 (89.69) | 86.55 (90.59) | 0.99483 (0.99997) | 0.090682 (0.18368) |
| **kNN, k = 9** | 96.82 (94.21) | 84.62 (100) | 98.22 (88.46) | 84.62 (89.59) | 0.99392 (0.99990) | 0.090797 (0.18112) |
| **RF, 5 Trees** | 95.28 (97.33) | 83.43 (98.83) | 96.65 (95.83) | 74.21 (95.93) | 0.98022 (0.97983) | 0.063164 (0.12294) |
| **RF, 10 Trees** | 96.75 (98.42) | 88.17 (99.24) | 97.75 (97.61) | 81.87 (97.63) | 0.99183 (0.99092) | 0.059157 (0.14913) |
| **RF, 20 Trees** | 96.82 (98.59) | 85.21 (99.11) | 98.16 (98.09) | 84.21 (98.09) | 0.99999 (0.99850) | 0.073687 (0.23206) |
| **RF, 30 Trees** | 96.82 (98.59) | 85.21 (99.11) | 98.16 (98.09) | 84.21 (98.09) | 0.99999 (0.99962) | 0.063517 (0.26209) |
| **RF, 40 Trees** | 96.82 (98.59) | 85.21 (99.11) | 98.16 (98.09) | 84.21 (98.09) | 0.99999 (0.99962) | 0.082349 (0.28928) |
| **RF, 50 Trees** | 96.82 (98.59) | 85.21 (99.11) | 98.16 (98.09) | 84.21 (98.09) | 0.99999 (0.99962) | 0.081668 (0.27230) |