|  |  |  |  |
| --- | --- | --- | --- |
| ufpe.jpg | **Universidade Federal de Pernambuco**  **Departamento de Engenharia Biomédica**  **Inteligência Artificial** | | |
| **Projeto de IA** | | |
| Alunos | Gabriel Galdino Gadelha  Gabriel Del  Roberto Leal | |
| Prof: | Wellington Pinheiro | Data: 16/06/2019 |

Base Conjunto:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 66.97 | 2.43 | 0.34 | 0.05 | 659.90 |
| RandomForest  20 árvores | 69.64 | 2.17 | 0.39 | 0.04 | 963.90 |
| RandomForest  60 árvores | 71.21 | 1.93 | 0.42 | 0.04 | 2885.80 |
| RandomForest  100 árvores | 71.52 | 1.95 | 0.43 | 0.04 | 4815.70 |
| RandomTree | 64.05 | 2.21 | 0.28 | 0.04 | 91.20 |
| SMO PolyKernel  E 1.0 C 0.01 | 56.04 | 1.04 | 0.12| | 0.02 | 64.10 |
| SMO PolyKernel  E1.0 C 1 | 56.76 | 1.04 | 0.14 | 0.02 | 342.30 |
| SMO PolyKernel  E 1.0 C 100 | 62.01 | 2.06 | 0.24 | 0.04 | 24028.50 |
| SMO  RBFKernel  C 0.01 | 55.61 | 1.14 | 0.11 | 0.02 | 255875.80 |
| SMO  RBFKernel  C 1 | 56.02 | 1.05 | 0.12 | 0.02 | 73541.00 |
| SMO RBFKernel  C 100 | 56.92 | 1.36 | 0.14 | 0.03 | 69026.60 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 54.11 | 2.78 | 0.08 | 0.06 | 395049.30 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 56.28 | 1.04 | 0.13 | 0.02 | 125354.00 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 63.54 | 2.29 | 0.27 | 0.05 | 92575.10 |

Paciente 2:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média por Fold** |
| J48 | 77.20 | 5.35 | 0.54 | 0.11 | 29.22 |
| RandomForest  20 árvores | 81.40 | 5.50 | 0.63 | 0.11 | 37.19 |
| RandomForest  60 árvores | 81.67 | 4.96 | 0.63 | 0.10 | 109.69 |
| RandomForest  100 árvores | 81.58 | 4.96 | 0.63 | 0.10 | 182.66 |
| RandomTree | 77.38 | 4.91 | 0.55 | 0.10 | 3.28 |
| SMO PolyKernel  E 1.0 C 0.01 | 50.88 | 2.62 | 0.02 | 0.05 | 5.00 |
| SMO PolyKernel  E1.0 C 1 | 68.08 | 5.53 | 0.36 | 0.11 | 7.19 |
| SMO PolyKernel  E 1.0 C 100 | 70.18 | 5.15 | 0.40 | 0.10 | 93.28 |
| SMO PolyKernel  E 2.0 C 0.01 | 59.22 | 4.04 | 0.18 | 0.08 | 88.91 |
| SMO PolyKernel  E2.0 C 1 | 70.47 | 5.47 | 0.41 | 0.11 | 107.81 |
| SMO PolyKernel  E 2.0 C 100 | 80.30 | 4.43 | 0.61 | 0.09 | 1750.31 |
| SMO  RBFKernel  C 0.01 | 50.35 | 0.76 | 0.01 | 0.02 | 185.63 |
| SMO  RBFKernel  C 1 | 50.65 | 1.18 | 0.01 | 0.02 | 169.84 |
| SMO RBFKernel  C 100 | 68.60 | 5.35 | 0.37 | 0.11 | 92.19 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 50.40 | 0.82 | 0.01 | 0.02 | 365.31 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 55.93 | 3.40 | 0.12 | 0.07 | 233.44 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 70.50 | 5.36 | 0.41 | 0.11 | 198.91 |

Paciente 3:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 84.90 | 4.41 | 0.70 | 0.09 | 21.56 |
| RandomForest  20 árvores | 87.77 | 4.08 | 0.76 | 0.08 | 32.81 |
| RandomForest  60 árvores | 88.38 | 3.99 | 0.77 | 0.08 | 98.91 |
| RandomForest  100 árvores | 88.25 | 4.02 | 0.77 | 0.08 | 164.84 |
| RandomTree | 83.72 | 4.57 | 0.67 | 0.09 | 3.28 |
| SMO PolyKernel  E 1.0 C 0.01 | 51.37 | 4.97 | 0.03 | 0.10 | 5.31 |
| SMO PolyKernel  E1.0 C 1 | 84.30 | 4.39 | 0.69 | 0.09 | 10.94 |
| SMO PolyKernel  E 1.0 C 100 | 86.10 | 4.74 | 0.72 | 0.09 | 197.34 |
| SMO PolyKernel  E 2.0 C 0.01 | 81.03 | 4.92 | 0.62 | 0.10 | 75.31 |
| SMO PolyKernel  E2.0 C 1 | 86.35 | 4.75 | 0.73 | 0.09 | 113.75 |
| SMO PolyKernel  E 2.0 C 100 | 86.67 | 4.90 | 0.73 | 0.10 | 2567.97 |
| SMO  RBFKernel  C 0.01 | 52.60 | 6.17 | 0.05 | 0.12 | 163.91 |
| SMO  RBFKernel  C 1 | 54.10 | 8.39 | 0.08 | 0.17 | 155.00 |
| SMO RBFKernel  C 100 | 84.82 | 4.61 | 0.70 | 0.09 | 91.25 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 53.47 | 8.54 | 0.07 | 0.17 | 354.06 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 81.03 | 4.68 | 0.62 | 0.09 | 229.22 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 86.55 | 4.79 | 0.73 | 0.10 | 189.53 |

Paciente 4:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 75.75 | 5.41 | 0.51 | 0.11 | 28.91 |
| RandomForest  20 árvores | 78.62 | 4.31 | 0.57 | 0.09 | 40.00 |
| RandomForest  60 árvores | 79.68 | 4.54 | 0.59 | 0.09 | 117.97 |
| RandomForest  100 árvores | 79.75 | 4.63 | 0.60 | 0.09 | 195.47 |
| RandomTree | 71.85 | 5.23 | 0.44 | 0.10 | 4.06 |
| SMO PolyKernel  E 1.0 C 0.01 | 61.13 | 4.54 | 0.22 | 0.09 | 5.78 |
| SMO PolyKernel  E1.0 C 1 | 76.43 | 5.29 | 0.53 | 0.11 | 15.16 |
| SMO PolyKernel  E 1.0 C 100 | 83.90 | 4.45 | 0.68 | 0.09 | 418.12 |
| SMO PolyKernel  E 2.0 C 0.01 | 69.60 | 5.95 | 0.39 | 0.12 | 74.06 |
| SMO PolyKernel  E2.0 C 1 | 83.32 | 4.23 | 0.67 | 0.08 | 188.91 |
| SMO PolyKernel  E 2.0 C 100 | 84.18 | 4.58 | 0.68 | 0.09 | 11762.19 |
| SMO  RBFKernel  C 0.01 | 52.92 | 3.54 | 0.06 | 0.07 | 185.63 |
| SMO  RBFKernel  C 1 | 64.63 | 5.53 | 0.29 | 0.11 | 127.97 |
| SMO RBFKernel  C 100 | 78.68 | 4.89 | 0.57 | 0.10 | 98.59 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 58.07 | 7.24 | 0.16 | 0.14 | 434.69 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 70.67 | 5.66 | 0.41 | 0.11 | 166.25 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 83.53 | 4.51 | 0.67 | 0.09 | 354.37 |

Paciente 5:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 63.13 | 6.30 | 0.26 | 0.13 | 31.09 |
| RandomForest  20 árvores | 69.80 | 5.52 | 0.40 | 0.11 | 42.81 |
| RandomForest  60 árvores | 71.57 | 5.52 | 0.43 | 0.11 | 135.78 |
| RandomForest  100 árvores | 72.05 | 5.70 | 0.44 | 0.11 | 226.41 |
| RandomTree | 62.88 | 6.17 | 0.26 | 0.12 | 3.75 |
| SMO PolyKernel  E 1.0 C 0.01 | 50.52 | 1.25 | 0.01 | 0.02 | 6.25 |
| SMO PolyKernel  E1.0 C 1 | 63.90 | 6.47 | 0.28 | 0.13 | 7.50 |
| SMO PolyKernel  E 1.0 C 100 | 68.67 | 5.83 | 0.37 | 0.12 | 225.62 |
| SMO PolyKernel  E 2.0 C 0.01 | 58.25 | 6.11 | 0.17 | 0.12 | 72.03 |
| SMO PolyKernel  E2.0 C 1 | 66.52 | 5.79 | 0.33 | 0.12 | 143.91 |
| SMO PolyKernel  E 2.0 C 100 | 70.32 | 6.12 | 0.41 | 0.12 | 5895.16 |
| SMO  RBFKernel  C 0.01 | 50.87 | 1.73 | 0.02 | 0.03 | 153.59 |
| SMO  RBFKernel  C 1 | 51.33 | 2.30 | 0.03 | 0.05 | 116.09 |
| SMO RBFKernel  C 100 | 63.63 | 6.59 | 0.27 | 0.13 | 94.06 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 51.10 | 2.81 | 0.02 | 0.06 | 246.88 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 58.15 | 5.87 | 0.16 | 0.12 | 199.22 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 66.65 | 5.84 | 0.33 | 0.12 | 251.09 |

Paciente 6:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 60.97 | 5.20 | 0.22 | 0.10 | 18.13 |
| RandomForest  20 árvores | 64.45 | 6.47 | 0.29 | 0.13 | 46.41 |
| RandomForest  60 árvores | 65.05 | 5.48 | 0.30 | 0.11 | 141.56 |
| RandomForest  100 árvores | 64.95 | 5.72 | 0.30 | 0.11 | 235.47 |
| RandomTree | 58.75 | 6.48 | 0.17 | 0.13 | 4.53 |
| SMO PolyKernel  E 1.0 C 0.01 | 59.70 | 4.96 | 0.19 | 0.10 | 6.09 |
| SMO PolyKernel  E1.0 C 1 | 62.15 | 4.96 | 0.24 | 0.10 | 10.78 |
| SMO PolyKernel  E 1.0 C 100 | 66.68 | 5.95 | 0.33 | 0.12 | 682.19 |
| SMO PolyKernel  E 2.0 C 0.01 | 60.67 | 5.28 | 0.21 | 0.11 | 76.09 |
| SMO PolyKernel  E2.0 C 1 | 66.03 | 5.34 | 0.32 | 0.11 | 228.44 |
| SMO PolyKernel  E 2.0 C 100 | 67.83 | 6.45 | 0.36 | 0.13 | 27087.19 |
| SMO  RBFKernel  C 0.01 | 58.05 | 5.08 | 0.16 | 0.10 | 186.25 |
| SMO  RBFKernel  C 1 | 60.20 | 5.52 | 0.20 | 0.11 | 138.12 |
| SMO RBFKernel  C 100 | 63.70 | 5.13 | 0.27 | 0.10 | 107.34 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 56.87 | 6.12 | 0.14 | 0.12 | 393.13 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 61.53 | 4.98 | 0.23 | 0.10 | 202.97 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 66.78 | 5.44 | 0.34 | 0.11 | 489.69 |

Paciente 7:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 66.40 | 5.78 | 0.33 | 0.12 | 20.00 |
| RandomForest  20 árvores | 67.43 | 5.75 | 0.35 | 0.12 | 43.75 |
| RandomForest  60 árvores | 68.78 | 6.19 | 0.38 | 0.12 | 132.19 |
| RandomForest  100 árvores | 69.10 | 6.34 | 0.38 | 0.13 | 226.56 |
| RandomTree | 62.57 | 6.43 | 0.25 | 0.13 | 4.06 |
| SMO PolyKernel  E 1.0 C 0.01 | 52.60 | 2.23 | 0.05 | 0.04 | 4.84 |
| SMO PolyKernel  E1.0 C 1 | 71.13 | 5.68 | 0.42 | 0.11 | 10.00 |
| SMO PolyKernel  E 1.0 C 100 | 69.35 | 6.22 | 0.39 | 0.12 | 313.91 |
| SMO PolyKernel  E 2.0 C 0.01 | 68.80 | 5.64 | 0.38 | 0.11 | 77.19 |
| SMO PolyKernel  E2.0 C 1 | 69.82 | 5.84 | 0.40 | 0.12 | 140.94 |
| SMO PolyKernel  E 2.0 C 100 | 71.17 | 6.07 | 0.42 | 0.12 | 7182.66 |
| SMO  RBFKernel  C 0.01 | 52.18 | 2.50 | 0.04 | 0.05 | 175.63 |
| SMO  RBFKernel  C 1 | 54.70 | 3.04 | 0.09 | 0.06 | 126.41 |
| SMO RBFKernel  C 100 | 70.35 | 6.00 | 0.41 | 0.12 | 93.59 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 51.68 | 3.27 | 0.03 | 0.07 | 331.88 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 68.68 | 5.73 | 0.37 | 0.11 | 218.28 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 69.63 | 6.10 | 0.39 | 0.12 | 345.00 |

Paciente 9:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 77.82 | 5.60 | 0.56 | 0.11 | 21.56 |
| RandomForest  20 árvores | 81.57 | 4.70 | 0.63 | 0.09 | 39.22 |
| RandomForest  60 árvores | 82.25 | 4.45 | 0.65 | 0.09 | 119.22 |
| RandomForest  100 árvores | 82.38 | 4.47 | 0.65 | 0.09 | 292.66 |
| RandomTree | 74.42 | 5.40 | 0.49 | 0.11 | 3.59 |
| SMO PolyKernel  E 1.0 C 0.01 | 67.47 | 8.06 | 0.35 | 0.16 | 6.09 |
| SMO PolyKernel  E1.0 C 1 | 78.40 | 4.99 | 0.57 | 0.10 | 11.09 |
| SMO PolyKernel  E 1.0 C 100 | 83.97 | 4.37 | 0.68 | 0.09 | 347.81 |
| SMO PolyKernel  E 2.0 C 0.01 | 78.38 | 4.96 | 0.57 | 0.10 | 69.69 |
| SMO PolyKernel  E2.0 C 1 | 83.38 | 4.53 | 0.67 | 0.09 | 137.50 |
| SMO PolyKernel  E 2.0 C 100 | 81.93 | 4.04 | 0.64 | 0.08 | 7082.03 |
| SMO  RBFKernel  C 0.01 | 69.48 | 7.43 | 0.39 | 0.15 | 184.84 v |
| SMO  RBFKernel  C 1 | 70.73 | 6.38 | 0.41 | 0.13 | 139.84 |
| SMO RBFKernel  C 100 | 80.42 | 4.52 | 0.61 | 0.09 | 85.31 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 58.97 | 11.56 | 0.18 | 0.23 | 362.03 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 79.62 | 4.70 | 0.59 | 0.09 | 160.62 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 84.50 | 4.02 | 0.69 | 0.08 | 398.28 |

Paciente 10:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Método** | **Acurácia** | | **Kappa** | | **Tempo de treinamento** |
| **Média** | **Desvio Padrão** | **Média** | **Desvio Padrão** | **Média** |
| J48 | 99.87 | 0.51 | 1.00 | 0.01 | 7.81 |
| RandomForest  20 árvores | 100.00 | 0.00 | 1.00 | 0.00 | 11.72 |
| RandomForest  60 árvores | 100.00 | 0.00 | 1.00 | 0.00 | 23.91 |
| RandomForest  100 árvores | 100.00 | 0.00 | 1.00 | 0.00 | 39.06 |
| RandomTree | 99.97 | 0.23 | 1.00 | 0.00 | 0.47 |
| SMO PolyKernel  E 1.0 C 0.01 | 99.68 | 0.74 | 0.99 | 0.01 | 5.16 |
| SMO PolyKernel  E1.0 C 1 | 100.00 | 0.00 | 1.00 | 0.00 | 4.06 |
| SMO PolyKernel  E 1.0 C 100 | 100.00 | 0.00 | 1.00 | 0.00 | 4.37 |
| SMO PolyKernel  E 2.0 C 0.01 | 100.00 | 0.00 | 1.00 | 0.00 | 11.87 |
| SMO PolyKernel  E2.0 C 1 | 100.00 | 0.00 | 1.00 | 0.00 | 6.88 |
| SMO PolyKernel  E 2.0 C 100 | 100.00 | 0.00 | 1.00 | 0.00 | 7.19 |
| SMO  RBFKernel  C 0.01 | 92.63 | 3.07 | 0.85 | 0.06 | 195.62 |
| SMO  RBFKernel  C 1 | 100.00 | 0.00 | 1.00 | 0.00 | 32.3 |
| SMO RBFKernel  C 100 | 100.00 | 0.00 | 1.00 | 0.00 | 7.19 |
| SMO NormalizedPolyKernel  E 2.0 C 0.01 | 99.50 | 1.02 | 0.99 | 0.02 | 199.53 |
| SMO  NormalizedPolyKernel  E2.0 C 1 | 100.00 | 0.00 | 1.00 | 0.00 | 13.44 |
| SMO NormalizedPolyKernel  E 2.0 C 100 | 100.00 | 0.00 | 1.00 | 0.00 | 7.97 |