This document contains tables and description about the Genetic-based Incremental Local Outlier Factor Algorithm for Efficient Data Stream Processing paper.  It represents the performance results of GILOF, GILOF\_NS, DILOF and DILOF\_NS based on certain window sizes. For GILOF and GILOF\_NS, each table shows the experiment’s performance results with different hyperparameters. The non- parametric test tables and memory consumption tables are provided too.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 77.3 | 72.3 | 70.8 | 73.4 | 70.1 | 70.6 | 71.8 | 71.6 | 74 | 73.5 | 72.54 | |
| ***W* 120** | 80.4 | 83.4 | 83.4 | 81.7 | 82.5 | 80 | 79.2 | 79.6 | 81.8 | 80.6 | 81.26 | |
| ***W* 140** | 87.8 | 86.7 | 85.3 | 84 | 85.1 | 85.3 | 87.2 | 85.5 | 85.7 | 87.6 | 86.02 | |
| ***W* 160** | 87.4 | 86.1 | 88.1 | 87.3 | 87.2 | 88.2 | 88 | 88.8 | 88.6 | 87.6 | 87.73 | |
| ***W* 180** | 89.7 | 89.7 | 88.6 | 89.7 | 90.1 | 89.8 | 89.4 | 90.5 | 89.6 | 89.1 | 89.62 | |
| ***W* 200** | 90.8 | 90.7 | 91.2 | 90.5 | 90.7 | 91.5 | 89.8 | 90 | 90.2 | 91.1 | 90.65 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.074 | 0.076 | 0.071 | 0.074 | 0.074 | 0.073 | 0.073 | 0.073 | 0.073 | 0.071 | 0.0729 | 0.729 |
| **W 120** | 0.082 | 0.085 | 0.082 | 0.081 | 0.084 | 0.082 | 0.082 | 0.083 | 0.082 | 0.084 | 0.0829 | 0.829 |
| **W 140** | 0.093 | 0.092 | 0.096 | 0.092 | 0.093 | 0.089 | 0.089 | 0.09 | 0.09 | 0.092 | 0.0917 | 0.917 |
| **W 160** | 0.107 | 0.103 | 0.106 | 0.105 | 0.106 | 0.103 | 0.103 | 0.104 | 0.103 | 0.104 | 0.1045 | 1.045 |
| **W 180** | 0.118 | 0.117 | 0.118 | 0.117 | 0.115 | 0.114 | 0.114 | 0.117 | 0.115 | 0.114 | 0.116 | 1.16 |
| **W 200** | 0.129 | 0.124 | 0.129 | 0.127 | 0.128 | 0.124 | 0.124 | 0.124 | 0.124 | 0.123 | 0.1258 | 1.258 |

**Table 1: GILOF Performance for Normalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 72.8 | 75.1 | 74.9 | 74.1 | 76.5 | 73.1 | 74.7 | 72.1 | 75.4 | 73.4 | 74.21 | |
| ***W* 120** | 83.6 | 84.2 | 82.3 | 84.4 | 84.2 | 82.1 | 83.2 | 80.8 | 82.8 | 82 | 82.96 | |
| ***W* 140** | 87.4 | 86 | 87.3 | 85.9 | 86.1 | 87.8 | 85.6 | 85.6 | 87.3 | 83.3 | 86.23 | |
| ***W* 160** | 88.3 | 87.5 | 85.9 | 87.4 | 86.8 | 86.6 | 86.9 | 86.2 | 86.7 | 88.3 | 87.06 | |
| ***W* 180** | 90 | 89.4 | 89.8 | 88.9 | 88.8 | 88.6 | 90.1 | 89.3 | 89.7 | 90.1 | 89.47 | |
| ***W* 200** | 89.9 | 89.2 | 89.1 | 89.5 | 90.6 | 90.1 | 89.7 | 89.2 | 89.2 | 89.3 | 89.58 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.074 | 0.073 | 0.073 | 0.069 | 0.071 | 0.073 | 0.074 | 0.068 | 0.073 | 0.073 | 0.0721 | 0.721 |
| **W 120** | 0.085 | 0.082 | 0.079 | 0.08 | 0.083 | 0.082 | 0.082 | 0.082 | 0.084 | 0.081 | 0.082 | 0.82 |
| **W 140** | 0.092 | 0.092 | 0.092 | 0.092 | 0.091 | 0.092 | 0.092 | 0.092 | 0.9 | 0.093 | 0.1728 | 1.728 |
| **W 160** | 0.104 | 0.106 | 0.104 | 0.103 | 0.104 | 0.102 | 0.103 | 0.104 | 0.105 | 0.104 | 0.1039 | 1.039 |
| **W 180** | 0.117 | 0.115 | 0.117 | 0.115 | 0.117 | 0.116 | 0.115 | 0.115 | 0.115 | 0.115 | 0.1157 | 1.157 |
| **W 200** | 0.129 | 0.124 | 0.125 | 0.135 | 0.126 | 0.124 | 0.126 | 0.124 | 0.124 | 0.126 | 0.1263 | 1.263 |

**Table 2: GILOF Performance for Unnormalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | |
| PS=2. NG=4. One Point Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 75.2 | 74.9 | 72.7 | 76.5 | 73.9 | 72 | 72.6 | 75.7 | 74.4 | 76.5 | 74.44 | |
| ***W* 120** | 83.3 | 81.3 | 81.5 | 82.7 | 84.2 | 83.5 | 82.2 | 82.1 | 82.9 | 82.4 | 82.61 | |
| ***W* 140** | 87.4 | 86.7 | 84.8 | 88.6 | 84.7 | 87.8 | 88 | 86.4 | 86.9 | 86.3 | 86.76 | |
| ***W* 160** | 87.6 | 88 | 87.5 | 88.1 | 87.9 | 88.3 | 88.1 | 87.6 | 88.1 | 87.8 | 87.9 | |
| ***W* 180** | 91.2 | 90.7 | 90.8 | 91.1 | 89.8 | 91.3 | 90.3 | 90 | 90 | 90.9 | 90.61 | |
| ***W* 200** | 92.1 | 92.2 | 92.5 | 92.5 | 92.5 | 92.1 | 93 | 92.9 | 91.3 | 92.4 | 92.35 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.082 | 0.081 | 0.079 | 0.079 | 0.078 | 0.079 | 0.079 | 0.078 | 0.08 | 0.081 | 0.0796 | 0.796 |
| **W 120** | 0.095 | 0.09 | 0.09 | 0.09 | 0.09 | 0.089 | 0.092 | 0.089 | 0.09 | 0.089 | 0.0904 | 0.904 |
| **W 140** | 0.101 | 0.1 | 0.099 | 0.099 | 0.099 | 0.099 | 0.101 | 0.099 | 0.098 | 0.099 | 0.0994 | 0.994 |
| **W 160** | 0.115 | 0.111 | 0.11 | 0.112 | 0.114 | 0.112 | 0.112 | 0.112 | 0.114 | 0.114 | 0.1126 | 1.126 |
| **W 180** | 0.124 | 0.124 | 0.126 | 0.124 | 0.124 | 0.124 | 0.124 | 0.124 | 0.124 | 0.126 | 0.1244 | 1.244 |
| **W 200** | 0.14 | 0.135 | 0.137 | 0.139 | 0.137 | 0.137 | 0.139 | 0.137 | 0.145 | 0.135 | 0.1381 | 1.381 |

**Table 3: GILOF\_NS Performance for Normalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | |
| PS=2. NG=4. One Point Crossover=0.7. BDM Mutation=0.07. Selection= TNT. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 76.9 | 75.3 | 77 | 75.7 | 73.9 | 76.2 | 73.7 | 73.1 | 75.4 | 75.7 | 75.29 | |
| ***W* 120** | 82.9 | 81.6 | 82.1 | 82.6 | 83.5 | 82.7 | 82.2 | 84.1 | 80.6 | 81.1 | 82.34 | |
| ***W* 140** | 87.2 | 88.6 | 86.4 | 86.9 | 86.5 | 87.2 | 87.3 | 86 | 86 | 87.6 | 86.97 | |
| ***W* 160** | 88.1 | 87.4 | 87.3 | 87.5 | 88.3 | 87.8 | 87.9 | 87.9 | 87.4 | 87.5 | 87.71 | |
| ***W* 180** | 90.4 | 90 | 90.3 | 90.6 | 90.1 | 90.2 | 91.1 | 90.3 | 91 | 90.2 | 90.42 | |
| ***W* 200** | 91.9 | 92 | 91.8 | 92.2 | 91.9 | 91.8 | 91.7 | 91.8 | 91.8 | 92.1 | 91.9 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.084 | 0.081 | 0.081 | 0.079 | 0.081 | 0.081 | 0.081 | 0.081 | 0.081 | 0.081 | 0.0811 | 0.811 |
| **W 120** | 0.092 | 0.09 | 0.09 | 0.092 | 0.09 | 0.092 | 0.089 | 0.09 | 0.09 | 0.092 | 0.0907 | 0.907 |
| **W 140** | 0.101 | 0.101 | 0.101 | 0.103 | 0.101 | 0.101 | 0.098 | 0.101 | 0.101 | 0.101 | 0.1009 | 1.009 |
| **W 160** | 0.115 | 0.115 | 0.114 | 0.115 | 0.114 | 0.114 | 0.114 | 0.115 | 0.114 | 0.112 | 0.1142 | 1.142 |
| **W 180** | 0.128 | 0.127 | 0.126 | 0.124 | 0.123 | 0.126 | 0.124 | 0.126 | 0.128 | 0.124 | 0.1256 | 1.256 |
| **W 200** | 0.139 | 0.14 | 0.139 | 0.139 | 0.137 | 0.135 | 0.139 | 0.137 | 0.137 | 0.137 | 0.1379 | 1.379 |

**Table 4: GILOF\_NS Performance for Unnormalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 69.1 | 70 | 73.7 | 72.8 | 65.9 | 67.7 | 68.8 | 68 | 70 | 69.1 | 69.51 | |
| ***W* 120** | 77.2 | 79.4 | 83.5 | 81.6 | 78.8 | 76.9 | 80.7 | 75.2 | 76.9 | 77 | 78.72 | |
| ***W* 140** | 83.4 | 85.5 | 84.8 | 85.7 | 83 | 84.4 | 83.3 | 84.8 | 84.6 | 84.5 | 84.4 | |
| ***W* 160** | 85.5 | 86.8 | 85.1 | 88.7 | 87.2 | 85.8 | 85.6 | 84.8 | 85.1 | 84.2 | 85.88 | |
| ***W* 180** | 88.5 | 87.3 | 88.3 | 90.1 | 88.4 | 88.4 | 89 | 89.3 | 89 | 89.9 | 88.82 | |
| ***W* 200** | 89.6 | 89.9 | 91.2 | 90.3 | 88.9 | 89.9 | 89.2 | 89.1 | 89.4 | 87.9 | 89.54 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.074 | 0.075 | 0.073 | 0.073 | 0.073 | 0.067 | 0.066 | 0.071 | 0.07 | 0.071 | 0.0713 | 0.713 |
| **W 120** | 0.082 | 0.084 | 0.085 | 0.084 | 0.083 | 0.08 | 0.081 | 0.083 | 0.081 | 0.08 | 0.0823 | 0.823 |
| **W 140** | 0.095 | 0.09 | 0.093 | 0.093 | 0.091 | 0.09 | 0.092 | 0.091 | 0.092 | 0.092 | 0.0919 | 0.919 |
| **W 160** | 0.1 | 0.104 | 0.104 | 0.104 | 0.101 | 0.102 | 0.099 | 0.101 | 0.103 | 0.103 | 0.1021 | 1.021 |
| **W 180** | 0.11 | 0.118 | 0.115 | 0.115 | 0.117 | 0.114 | 0.115 | 0.114 | 0.116 | 0.115 | 0.1149 | 1.149 |
| **W 200** | 0.12 | 0.13 | 0.13 | 0.13 | 0.129 | 0.126 | 0.128 | 0.124 | 0.126 | 0.128 | 0.1271 | 1.271 |

**Table 5: DILOF Performance for Normalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 67.5 | 68.1 | 67.6 | 69.2 | 72.9 | 66.8 | 68.6 | 69.8 | 70.1 | 71.5 | 69.21 | |
| ***W* 120** | 73.1 | 71.8 | 77.8 | 71.8 | 80.2 | 77 | 77.3 | 73.7 | 74.4 | 78.1 | 75.52 | |
| ***W* 140** | 82.5 | 83.4 | 84.1 | 81.4 | 86.2 | 85.7 | 85 | 82.9 | 84.7 | 83.6 | 83.95 | |
| ***W* 160** | 85.1 | 85.8 | 84.2 | 84.8 | 87.5 | 85.1 | 85.2 | 86 | 85.7 | 85.7 | 85.51 | |
| ***W* 180** | 88.8 | 87.9 | 88.3 | 88.6 | 88.4 | 88.9 | 88.7 | 88.7 | 88.2 | 88.1 | 88.46 | |
| ***W* 200** | 88.6 | 88.9 | 88.2 | 88.7 | 90.2 | 89.1 | 88.6 | 88.3 | 88.6 | 88.2 | 88.74 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.07 | 0.075 | 0.075 | 0.0751 | 0.073 | 0.074 | 0.07 | 0.07 | 0.07 | 0.068 | 0.07201 | 0.7201 |
| **W 120** | 0.08 | 0.085 | 0.082 | 0.087 | 0.085 | 0.082 | 0.079 | 0.079 | 0.081 | 0.082 | 0.0822 | 0.822 |
| **W 140** | 0.09 | 0.095 | 0.092 | 0.094 | 0.093 | 0.093 | 0.093 | 0.092 | 0.09 | 0.09 | 0.0922 | 0.922 |
| **W 160** | 0.1 | 0.104 | 0.103 | 0.112 | 0.104 | 0.104 | 0.104 | 0.104 | 0.103 | 0.103 | 0.1041 | 1.041 |
| **W 180** | 0.11 | 0.118 | 0.118 | 0.12 | 0.114 | 0.115 | 0.117 | 0.114 | 0.115 | 0.115 | 0.1156 | 1.156 |
| **W 200** | 0.12 | 0.131 | 0.128 | 0.133 | 0.127 | 0.128 | 0.126 | 0.131 | 0.125 | 0.126 | 0.1275 | 1.275 |

**Table 6: DILOF Performance for Unnormalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 71.3 | 75.1 | 68.8 | 72.5 | 71.4 | 67.1 | 68.9 | 69.3 | 72.4 | 69.8 | 70.66 | |
| ***W* 120** | 81.6 | 83 | 81.9 | 83.5 | 80.7 | 82.4 | 81.9 | 81.1 | 81.7 | 81.7 | 81.95 | |
| ***W* 140** | 84.5 | 87.2 | 86.6 | 87.1 | 83.9 | 85.5 | 86.5 | 83.9 | 85.8 | 84.7 | 85.57 | |
| ***W* 160** | 86.1 | 88.2 | 85.5 | 88.6 | 86.9 | 87.5 | 86.6 | 86.5 | 87.5 | 86.3 | 86.97 | |
| ***W* 180** | 88.9 | 90 | 88.9 | 89.1 | 89.9 | 88.3 | 88.9 | 87.6 | 88.3 | 89 | 88.89 | |
| ***W* 200** | 91.3 | 92 | 90.4 | 91.5 | 90.4 | 91.3 | 90.4 | 91.1 | 91.2 | 92 | 91.16 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.074 | 0.075 | 0.073 | 0.073 | 0.073 | 0.067 | 0.066 | 0.071 | 0.07 | 0.071 | 0.0713 | 0.713 |
| **W 120** | 0.082 | 0.084 | 0.085 | 0.084 | 0.083 | 0.08 | 0.081 | 0.083 | 0.081 | 0.08 | 0.0823 | 0.823 |
| **W 140** | 0.095 | 0.09 | 0.093 | 0.093 | 0.091 | 0.09 | 0.092 | 0.091 | 0.092 | 0.092 | 0.0919 | 0.919 |
| **W 160** | 0.1 | 0.104 | 0.104 | 0.104 | 0.101 | 0.102 | 0.099 | 0.101 | 0.103 | 0.103 | 0.1021 | 1.021 |
| **W 180** | 0.11 | 0.118 | 0.115 | 0.115 | 0.117 | 0.114 | 0.115 | 0.114 | 0.116 | 0.115 | 0.1149 | 1.149 |
| **W 200** | 0.12 | 0.13 | 0.13 | 0.13 | 0.129 | 0.126 | 0.128 | 0.124 | 0.126 | 0.128 | 0.1271 | 1.271 |

**Table 7: DILOF\_NS Performance for Normalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 74.3 | 73.9 | 73.7 | 70.8 | 73.9 | 72.8 | 69.9 | 71.7 | 69.6 | 70.3 | 72.09 | |
| ***W* 120** | 82.9 | 82.8 | 80.6 | 80.2 | 80.3 | 81.2 | 81.4 | 80.3 | 80.6 | 81.3 | 81.16 | |
| ***W* 140** | 85.1 | 85.6 | 87.5 | 86.5 | 84.8 | 83.4 | 85.6 | 83.4 | 84.8 | 84 | 85.07 | |
| ***W* 160** | 86.5 | 87.9 | 84.7 | 87 | 86.5 | 86.4 | 87.1 | 85.7 | 86.8 | 86.1 | 86.47 | |
| ***W* 180** | 89.7 | 88.9 | 90 | 89.1 | 89 | 89.3 | 89.7 | 89.3 | 88.9 | 88.8 | 89.27 | |
| ***W* 200** | 91.1 | 90.9 | 92.6 | 91.2 | 90.5 | 90.9 | 90.9 | 90.6 | 91.3 | 91.1 | 91.11 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.082 | 0.08 | 0.081 | 0.081 | 0.082 | 0.082 | 0.074 | 0.074 | 0.076 | 0.074 | 0.0786 | 0.786 |
| **W 120** | 0.093 | 0.092 | 0.091 | 0.092 | 0.091 | 0.09 | 0.089 | 0.087 | 0.089 | 0.089 | 0.0903 | 0.903 |
| **W 140** | 0.103 | 0.103 | 0.102 | 0.102 | 0.102 | 0.099 | 0.098 | 0.101 | 0.099 | 0.098 | 0.1007 | 1.007 |
| **W 160** | 0.114 | 0.113 | 0.114 | 0.114 | 0.114 | 0.11 | 0.112 | 0.11 | 0.109 | 0.112 | 0.1122 | 1.122 |
| **W 180** | 0.128 | 0.128 | 0.126 | 0.128 | 0.128 | 0.124 | 0.124 | 0.124 | 0.124 | 0.126 | 0.126 | 1.26 |
| **W 200** | 0.142 | 0.142 | 0.141 | 0.143 | 0.143 | 0.14 | 0.139 | 0.14 | 0.137 | 0.139 | 0.1406 | 1.406 |

**Table 8: DILOF\_NS Performance for Unnormalized UCI Vowel Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Pendgit Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= TNT. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 95.9 | 95.1 | 95.2 | 95.4 | 95.6 | 95.6 | 95.9 | 95.5 | 95.3 | 95.1 | 95.46 | |
| ***W* 120** | 97.6 | 97.1 | 97.6 | 97.5 | 97.5 | 97.4 | 97.7 | 97.4 | 97.8 | 97.6 | 97.52 | |
| ***W* 140** | 97.9 | 98.2 | 98 | 98 | 98.1 | 98 | 98.1 | 98.2 | 98.1 | 97.9 | 98.05 | |
| ***W* 160** | 98.7 | 98.8 | 98.6 | 98.7 | 98.5 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.67 | |
| ***W* 180** | 99 | 98.9 | 98.8 | 99 | 98.9 | 98.8 | 98.9 | 98.8 | 98.9 | 98.8 | 98.88 | |
| ***W* 200** | 98.3 | 98.5 | 98.4 | 98.5 | 98.4 | 98.1 | 98.5 | 98.5 | 98.4 | 98.6 | 98.42 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.198 | 0.194 | 0.195 | 0.195 | 0.196 | 0.196 | 0.194 | 0.192 | 0.195 | 0.193 | 0.1948 | 1.95 |
| **W 120** | 0.225 | 0.222 | 0.223 | 0.223 | 0.223 | 0.223 | 0.224 | 0.223 | 0.223 | 0.224 | 0.2233 | 2.23 |
| **W 140** | 0.249 | 0.247 | 0.248 | 0.247 | 0.248 | 0.249 | 0.247 | 0.248 | 0.247 | 0.248 | 0.2478 | 2.47 |
| **W 160** | 0.282 | 0.281 | 0.282 | 0.282 | 0.282 | 0.281 | 0.282 | 0.283 | 0.283 | 0.285 | 0.2823 | 2.82 |
| **W 180** | 0.316 | 0.315 | 0.317 | 0.316 | 0.317 | 0.317 | 0.314 | 0.315 | 0.315 | 0.315 | 0.3157 | 3.15 |
| **W 200** | 0.349 | 0.348 | 0.35 | 0.348 | 0.347 | 0.346 | 0.35 | 0.346 | 0.346 | 0.347 | 0.3477 | 3.47 |

**Table 9: GILOF Performance for Normalized UCI Pendigit Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized UCI Pendgit Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 51.4 | 52.1 | 50.1 | 49.6 | 51.8 | 51.8 | 50.1 | 51.2 | 50.1 | 50.4 | 50.86 | |
| ***W* 120** | 49.7 | 49.2 | 49.8 | 47.6 | 49.1 | 50 | 49.7 | 51.2 | 50.3 | 50.9 | 49.75 | |
| ***W* 140** | 51.2 | 51.7 | 50.4 | 50.9 | 49.8 | 50.5 | 50.4 | 51.1 | 50.3 | 50 | 50.63 | |
| ***W* 160** | 49.9 | 50.9 | 51 | 51.3 | 51 | 51.9 | 50.7 | 51.9 | 50.3 | 49.2 | 50.81 | |
| ***W* 180** | 51.1 | 50.9 | 51.8 | 49.5 | 50.4 | 51 | 49.9 | 52.4 | 49.1 | 50.3 | 50.64 | |
| ***W* 200** | 52.9 | 54.1 | 53 | 52.4 | 51.5 | 52.7 | 53 | 53.2 | 52.7 | 53.1 | 52.86 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.199 | 0.193 | 0.193 | 0.194 | 0.201 | 0.195 | 0.194 | 0.193 | 0.193 | 0.194 | 0.1949 | 1.949 |
| **W 120** | 0.224 | 0.221 | 0.221 | 0.222 | 0.228 | 0.222 | 0.221 | 0.222 | 0.221 | 0.222 | 0.2224 | 2.224 |
| **W 140** | 0.242 | 0.242 | 0.243 | 0.249 | 0.251 | 0.246 | 0.246 | 0.247 | 0.245 | 0.246 | 0.2457 | 2.45 |
| **W 160** | 0.282 | 0.283 | 0.282 | 0.281 | 0.282 | 0.282 | 0.282 | 0.282 | 0.281 | 0.281 | 0.2818 | 2.81 |
| **W 180** | 0.315 | 0.317 | 0.32 | 0.314 | 0.315 | 0.314 | 0.312 | 0.312 | 0.313 | 0.313 | 0.3145 | 3.14 |
| **W 200** | 0.348 | 0.348 | 0.35 | 0.349 | 0.347 | 0.343 | 0.345 | 0.343 | 0.344 | 0.344 | 0.3461 | 3.46 |

**Table 10: GILOF Performance for Unnormalized UCI Pendigit Dataset**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Memory consumption for KDD Cup 99 http Dataset | | | | | Memory consumption for KDD Cup 99 smtp Dataset | | | |
| *W* Size | GILOF | GILOF\_NS | DILOF | DILOF\_NS | GILOF | GILOF\_NS | DILOF | DILOF\_NS |
| *W* 100 | 47.5 MB | 47.5 MB | 47.7 MB | 47.7 MB | 11.2 MB | 11.2 MB | 11.3MB | 11.3MB |
| *W* 200 | 50 MB | 50 MB | 49.5 MB | 49.5 MB | 12.6 MB | 12.6 MB | 12.5 MB | 12.5MB |
| *W* 300 | 51.7 MB | 51.7 MB | 51.2 MB | 51.2 MB | 15.1 MB | 15.1 MB | 14.8 MB | 14.8 MB |
| *W* 400 | 52.6 MB | 52.6 MB | 52.8 MB | 52.8 MB | 16.6 MB | 16.6 MB | 16.4 MB | 16.4 MB |
| *W* 1000 | 69.2 MB | 69.2 MB | 69.2 MB | 69.2 MB | 35.6 MB | 35.6 MB | 35.6 MB | 35.6 MB |

**Table 11: Memory Consumption for KDD Cup99 http and smtp datasets.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized UCI Pendgit Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 95.8 | 95.2 | 95.3 | 95.7 | 95.6 | 95.6 | 96.2 | 95.7 | 95.4 | 95.1 | 95.56 | |
| ***W* 120** | 97.5 | 97.6 | 97.6 | 97.1 | 97.8 | 97.5 | 97.1 | 97.8 | 97.2 | 97.5 | 97.47 | |
| ***W* 140** | 98.3 | 98.1 | 98.4 | 98 | 98.3 | 97.9 | 98 | 98 | 98.2 | 98.3 | 98.15 | |
| ***W* 160** | 98.5 | 98.9 | 98.7 | 98.7 | 98.6 | 98.7 | 98.7 | 98.6 | 98.8 | 98.7 | 98.69 | |
| ***W* 180** | 98.9 | 98.9 | 99 | 99 | 98.8 | 98.8 | 98.8 | 98.9 | 98.7 | 98.9 | 98.87 | |
| ***W* 200** | 98.3 | 98.4 | 98.3 | 98.6 | 98.5 | 98.4 | 98.4 | 98.2 | 98.4 | 98.6 | 98.41 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.199 | 0.195 | 0.195 | 0.195 | 0.196 | 0.193 | 0.193 | 0.193 | 0.197 | 0.195 | 0.1951 | 1.95 |
| **W 120** | 0.22 | 0.221 | 0.225 | 0.223 | 0.217 | 0.223 | 0.224 | 0.223 | 0.225 | 0.22 | 0.2221 | 2.23 |
| **W 140** | 0.247 | 0.248 | 0.252 | 0.243 | 0.248 | 0.246 | 0.248 | 0.246 | 0.248 | 0.248 | 0.2474 | 2.47 |
| **W 160** | 0.284 | 0.281 | 0.282 | 0.281 | 0.279 | 0.281 | 0.281 | 0.282 | 0.282 | 0.281 | 0.2814 | 2.81 |
| **W 180** | 0.315 | 0.313 | 0.321 | 0.312 | 0.313 | 0.313 | 0.313 | 0.312 | 0.315 | 0.312 | 0.3139 | 3.13 |
| **W 200** | 0.345 | 0.348 | 0.346 | 0.345 | 0.343 | 0.345 | 0.345 | 0.343 | 0.343 | 0.343 | 0.3446 | 3.44 |

**Table 12: GILOF\_NS Performance for Normalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized UCI Pendgit Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 50.1 | 49.6 | 49.9 | 51.6 | 49.7 | 49.9 | 50 | 51 | 50.1 | 50.2 | 50.21 | |
| ***W* 120** | 50.5 | 50.5 | 49.1 | 50.7 | 50.7 | 48.6 | 51 | 51 | 48.8 | 49.7 | 50.06 | |
| ***W* 140** | 50.3 | 50.5 | 51.3 | 51.4 | 50.1 | 50.9 | 50.6 | 51.6 | 50.4 | 50.6 | 50.77 | |
| ***W* 160** | 52.4 | 51.3 | 50.2 | 50.8 | 52.4 | 49.5 | 51.9 | 52 | 51.2 | 51 | 51.27 | |
| ***W* 180** | 52 | 51.4 | 52.4 | 50.9 | 50.6 | 52.8 | 52.4 | 51.9 | 51.7 | 50.8 | 51.69 | |
| ***W* 200** | 52.2 | 52 | 51.2 | 51.8 | 52.9 | 51 | 53.3 | 51.4 | 51.6 | 52.3 | 51.97 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.199 | 0.195 | 0.194 | 0.194 | 0.195 | 0.195 | 0.194 | 0.195 | 0.199 | 0.195 | 0.1955 | 1.95 |
| **W 120** | 0.226 | 0.223 | 0.222 | 0.222 | 0.226 | 0.223 | 0.222 | 0.223 | 0.227 | 0.222 | 0.2236 | 2.23 |
| **W 140** | 0.247 | 0.245 | 0.246 | 0.246 | 0.243 | 0.253 | 0.247 | 0.248 | 0.247 | 0.246 | 0.2468 | 2.46 |
| **W 160** | 0.282 | 0.283 | 0.281 | 0.276 | 0.279 | 0.286 | 0.281 | 0.285 | 0.282 | 0.283 | 0.2818 | 2.81 |
| **W 180** | 0.315 | 0.315 | 0.313 | 0.317 | 0.312 | 0.313 | 0.314 | 0.314 | 0.314 | 0.315 | 0.3142 | 3.14 |
| **W 200** | 0.345 | 0.356 | 0.346 | 0.345 | 0.342 | 0.345 | 0.344 | 0.345 | 0.345 | 0.345 | 0.3458 | 3.45 |

**Table 13: GILOF\_NS Performance for Unnormalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Normalized UCI Pendigit Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 94.5 | 94.8 | 95.4 | 94.5 | 94.3 | 94.2 | 94.3 | 94.5 | 94.8 | 94.6 | 94.59 | |
| ***W* 120** | 95.9 | 96.2 | 97.4 | 96.2 | 95.3 | 96 | 96.3 | 95.7 | 95.6 | 95.9 | 96.05 | |
| ***W* 140** | 96.3 | 96.1 | 98 | 96.6 | 96.5 | 97 | 96.6 | 96.3 | 96.5 | 96.7 | 96.66 | |
| ***W* 160** | 97.6 | 97.6 | 98.7 | 97.7 | 97.5 | 97.6 | 97.5 | 97.1 | 97.4 | 97.4 | 97.61 | |
| ***W* 180** | 98.1 | 98.1 | 99 | 97.5 | 98.1 | 97.6 | 98.1 | 98.1 | 97.5 | 97.7 | 97.98 | |
| ***W* 200** | 97.1 | 97.1 | 98.7 | 97 | 97.8 | 97.3 | 96.9 | 97.5 | 97.5 | 97.7 | 97.46 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.19 | 0.192 | 0.193 | 0.192 | 0.189 | 0.193 | 0.187 | 0.185 | 0.194 | 0.184 | 0.1899 | 1.899 |
| **W 120** | 0.218 | 0.219 | 0.22 | 0.218 | 0.216 | 0.218 | 0.221 | 0.22 | 0.218 | 0.218 | 0.2186 | 2.186 |
| **W 140** | 0.249 | 0.256 | 0.251 | 0.25 | 0.252 | 0.248 | 0.244 | 0.248 | 0.248 | 0.246 | 0.2492 | 2.492 |
| **W 160** | 0.282 | 0.291 | 0.287 | 0.285 | 0.282 | 0.282 | 0.281 | 0.274 | 0.281 | 0.277 | 0.2822 | 2.822 |
| **W 180** | 0.315 | 0.321 | 0.317 | 0.315 | 0.316 | 0.315 | 0.311 | 0.31 | 0.312 | 0.313 | 0.3145 | 3.145 |
| **W 200** | 0.353 | 0.353 | 0.355 | 0.347 | 0.35 | 0.345 | 0.349 | 0.346 | 0.348 | 0.348 | 0.3494 | 3.494 |

**Table 14: DILOF Performance for Normalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Memory Consumption for UCI Pendigit Dataset | | | | | | Memory Consumption for UCI Vowel Dataset | | | | |
| *W* Size | GILOF | GILOF\_NS | DILOF | DILOF\_NS | ILOF | GILOF | GILOF\_NS | DILOF | DILOF\_NS | ILOF |
| *W* 100 | 4.3 MB | 4.3 MB | 4.3 MB | 4.3 MB | 202 MB | 3.8 MB | 3.8 MB | 3.7 MB | 3.7 MB | 36.7 MB |
| *W* 120 | 4.7 MB | 4.7 MB | 4.6 MB | 4.6 MB | 4.1 MB | 4.1 MB | 4.2 MB | 4.2 MB |
| *W* 140 | 5.1 MB | 5.1 MB | 4.9 MB | 4.9 MB | 4.8 MB | 4.8 MB | 4.6 MB | 4.6 MB |
| *W* 160 | 5.4 MB | 5.4 MB | 5.4 MB | 5.4 MB | 5 MB | 5 MB | 4.9 MB | 4.9 MB |
| *W* 180 | 5.7 MB | 5.7 MB | 5.7 MB | 5.7 MB | 5.1 MB | 5.1 MB | 5.1 MB | 5.1 MB |
| *W* 200 | 5.9 MB | 5.9 MB | 6 MB | 6 MB | 5.2 MB | 5.2 MB | 5.2 MB | 5.2 MB |
| *W* 1000 | 26.4 MB | 26.4 MB | 26.5 MB | 26.5 MB | 23.8 MB | 23.8 MB | 23.8 MB | 23.8 MB |

**Table 15: Memory Consumption for UCI Pendigit and Vowel Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Unnormalized UCI Pendigit Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 49.8 | 50 | 51.2 | 50.3 | 51.1 | 52.4 | 50.9 | 51.8 | 50.4 | 51.7 | 50.96 | |
| ***W* 120** | 52.8 | 50.2 | 50.7 | 51.8 | 53.7 | 49.5 | 50.7 | 49.9 | 50.2 | 50.5 | 51 | |
| ***W* 140** | 51.8 | 52 | 53.4 | 53.5 | 54.3 | 52.5 | 51.7 | 51.1 | 49.5 | 52.9 | 52.27 | |
| ***W* 160** | 54.2 | 54.1 | 54.7 | 53.7 | 54.6 | 48.9 | 50.9 | 50.5 | 50.6 | 51.1 | 52.33 | |
| ***W* 180** | 52.2 | 54.4 | 54.5 | 53.3 | 53.4 | 50.6 | 50 | 51.6 | 50.8 | 50.9 | 52.17 | |
| ***W* 200** | 54.7 | 54 | 53 | 53.1 | 53.9 | 50.4 | 52.9 | 51.9 | 52.2 | 52.4 | 52.85 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.19 | 0.185 | 0.186 | 0.187 | 0.183 | 0.192 | 0.185 | 0.187 | 0.191 | 0.188 | 0.1874 | 1.874 |
| **W 120** | 0.212 | 0.218 | 0.2 | 0.193 | 0.19 | 0.221 | 0.217 | 0.218 | 0.216 | 0.217 | 0.2102 | 2.102 |
| **W 140** | 0.247 | 0.235 | 0.234 | 0.245 | 0.246 | 0.249 | 0.242 | 0.24 | 0.242 | 0.242 | 0.2422 | 2.422 |
| **W 160** | 0.283 | 0.284 | 0.274 | 0.284 | 0.284 | 0.282 | 0.277 | 0.276 | 0.283 | 0.282 | 0.2809 | 2.809 |
| **W 180** | 0.291 | 0.32 | 0.318 | 0.318 | 0.316 | 0.318 | 0.312 | 0.313 | 0.31 | 0.314 | 0.313 | 3.13 |
| **W 200** | 0.38 | 0.342 | 0.345 | 0.344 | 0.342 | 0.348 | 0.345 | 0.345 | 0.346 | 0.348 | 0.3485 | 3.485 |

**Table 16: DILOF Performance for Unnormalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Normalized UCI Pendigit Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 95.1 | 93.9 | 95.2 | 94.6 | 94 | 94.4 | 94.6 | 94.8 | 94.8 | 93.9 | 94.53 | |
| ***W* 120** | 95.8 | 95.9 | 97 | 95.7 | 95.6 | 96 | 95.8 | 95.5 | 96.6 | 95.9 | 95.98 | |
| ***W* 140** | 96.8 | 96.3 | 97.9 | 97.2 | 96 | 96.6 | 96.9 | 96.7 | 96.7 | 96.9 | 96.8 | |
| ***W* 160** | 97.5 | 97.2 | 98.5 | 97.4 | 96.9 | 97.6 | 97.9 | 97.3 | 97.5 | 97.9 | 97.57 | |
| ***W* 180** | 97.5 | 98 | 98.2 | 97.7 | 97.1 | 97.4 | 98.2 | 98 | 97.9 | 97.4 | 97.74 | |
| ***W* 200** | 96.8 | 97.6 | 98.7 | 97.1 | 96.4 | 97.3 | 97.3 | 97.3 | 97.1 | 97.2 | 97.28 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.19 | 0.192 | 0.19 | 0.192 | 0.194 | 0.185 | 0.19 | 0.193 | 0.188 | 0.19 | 0.1904 | 1.904 |
| **W 120** | 0.221 | 0.222 | 0.221 | 0.221 | 0.22 | 0.219 | 0.222 | 0.223 | 0.218 | 0.218 | 0.2205 | 2.205 |
| **W 140** | 0.251 | 0.25 | 0.253 | 0.252 | 0.247 | 0.249 | 0.249 | 0.248 | 0.246 | 0.246 | 0.2491 | 2.491 |
| **W 160** | 0.284 | 0.286 | 0.284 | 0.285 | 0.284 | 0.282 | 0.28 | 0.279 | 0.271 | 0.277 | 0.2812 | 2.812 |
| **W 180** | 0.317 | 0.322 | 0.315 | 0.317 | 0.316 | 0.309 | 0.313 | 0.31 | 0.31 | 0.306 | 0.3135 | 3.135 |
| **W 200** | 0.353 | 0.367 | 0.354 | 0.352 | 0.352 | 0.349 | 0.346 | 0.346 | 0.346 | 0.348 | 0.3513 | 3.513 |

**Table 17: DILOF\_NS Performance for Normalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Unnormalized UCI Pendigit Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 51.2 | 49.7 | 51.4 | 50.6 | 50.6 | 50.6 | 50.6 | 51.8 | 50.3 | 49.8 | 50.66 | |
| ***W* 120** | 52.4 | 53.4 | 51.2 | 55.2 | 52.6 | 49 | 51.3 | 50.5 | 50.6 | 51.6 | 51.78 | |
| ***W* 140** | 51.7 | 49.8 | 52.2 | 52.2 | 51.3 | 49.3 | 50.9 | 50.5 | 52.6 | 50.6 | 51.11 | |
| ***W* 160** | 55.2 | 54.7 | 53.9 | 54.8 | 53.3 | 51.3 | 49.6 | 50.8 | 50.5 | 50.3 | 52.44 | |
| ***W* 180** | 53.2 | 54 | 54.3 | 54.9 | 55.9 | 49.5 | 52.8 | 51.7 | 50.9 | 51.5 | 52.87 | |
| ***W* 200** | 54 | 55.2 | 53.9 | 53.9 | 53.7 | 52.1 | 52.1 | 51.5 | 49.7 | 50.1 | 52.62 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| **W 100** | 0.187 | 0.186 | 0.185 | 0.19 | 0.192 | 0.189 | 0.184 | 0.182 | 0.187 | 0.186 | 0.1868 | 1.868 |
| **W 120** | 0.217 | 0.213 | 0.21 | 0.219 | 0.217 | 0.218 | 0.22 | 0.219 | 0.217 | 0.218 | 0.2168 | 2.168 |
| **W 140** | 0.243 | 0.241 | 0.24 | 0.247 | 0.247 | 0.243 | 0.24 | 0.249 | 0.237 | 0.245 | 0.2432 | 2.432 |
| **W 160** | 0.275 | 0.273 | 0.275 | 0.277 | 0.274 | 0.28 | 0.278 | 0.276 | 0.277 | 0.278 | 0.2763 | 2.763 |
| **W 180** | 0.313 | 0.313 | 0.317 | 0.316 | 0.323 | 0.313 | 0.316 | 0.312 | 0.312 | 0.313 | 0.3148 | 3.148 |
| **W 200** | 0.344 | 0.346 | 0.347 | 0.346 | 0.344 | 0.342 | 0.346 | 0.345 | 0.346 | 0.347 | 0.3453 | 3.453 |

**Table18: DILOF\_NS Performance for Unnormalized UCI Pendigit Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 83.5 | 85.4 | 85.4 | 86.4 | 85.4 | 85.4 | 85.5 | 88 | 86.6 | 85.4 | 85.7 | |
| ***W* 200** | 83.6 | 83.7 | 85.2 | 86.8 | 84.8 | 88.8 | 80 | 86.1 | 84 | 85.8 | 84.88 | |
| ***W* 300** | 88.6 | 86.6 | 85.8 | 85.9 | 86 | 84.9 | 86.5 | 85.9 | 88.6 | 86 | 86.48 | |
| ***W* 400** | 85 | 82.5 | 88 | 87.4 | 83 | 88.7 | 84.1 | 86.1 | 88.2 | 85.2 | 85.82 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.57 | 4.66 | 4.66 | 4.6 | 4.65 | 4.66 | 4.67 | 4.66 | 4.66 | 4.66 | 4.645 | 46.45 |
| ***W* 200** | 8.58 | 8.1 | 8.1 | 8.06 | 8.08 | 8.06 | 8.14 | 8.07 | 8.11 | 8.06 | 8.136 | 81.36 |
| ***W* 300** | 12.53 | 12.45 | 12.4 | 12.45 | 12.44 | 12.44 | 12.43 | 12.39 | 12.44 | 12.45 | 12.442 | 124.42 |
| ***W* 400** | 17.38 | 17.3 | 17.33 | 17.4 | 17.36 | 17.43 | 17.28 | 17.39 | 17.4 | 17.25 | 17.352 | 173.52 |

**Table 19: GILOF Performance for Normalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Uniform Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 86.6 | 84.2 | 85.7 | 80.5 | 82.9 | 83 | 79 | 83.6 | 85.5 | 79.6 | 83.06 | |
| ***W* 200** | 89.2 | 84.5 | 85.1 | 84.5 | 83.8 | 87.3 | 82.9 | 85.6 | 87.8 | 84.5 | 85.52 | |
| ***W* 300** | 87.3 | 85.4 | 82.9 | 86.6 | 86 | 86.6 | 86.5 | 85.8 | 84.4 | 85.7 | 85.72 | |
| ***W* 400** | 86 | 87 | 84.6 | 86.5 | 85.4 | 87.8 | 88.4 | 84.8 | 89 | 88 | 86.75 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.6 | 4.58 | 4.58 | 4.46 | 4.58 | 4.52 | 4.62 | 4.58 | 4.59 | 4.58 | 4.569 | 45.69 |
| ***W* 200** | 8.43 | 8.22 | 8.17 | 9.06 | 8.5 | 8.17 | 8.26 | 8.25 | 8.14 | 8.19 | 8.339 | 83.39 |
| ***W* 300** | 12.81 | 12.55 | 12.5 | 12.86 | 12.52 | 12.56 | 12.46 | 12.49 | 12.47 | 12.61 | 12.583 | 125.83 |
| ***W* 400** | 17.99 | 17.48 | 17.74 | 17.64 | 18.41 | 17.44 | 17.48 | 17.53 | 17.51 | 17.62 | 17.684 | 176.84 |

**Table 20: GILOF Performance for Unnormalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 81.3 | 82.3 | 80.3 | 81.4 | 81 | 81.3 | 81.2 | 81.1 | 80.7 | 81.2 | 81.18 | |
| ***W* 200** | 83.9 | 85.4 | 86.5 | 82.5 | 86.5 | 85 | 86.2 | 86.2 | 82 | 87 | 85.12 | |
| ***W* 300** | 86.9 | 87.6 | 84.8 | 85.7 | 88 | 87.8 | 84.9 | 85.7 | 87.3 | 86.6 | 86.53 | |
| ***W* 400** | 86.6 | 84.8 | 86.3 | 86 | 84.6 | 83.9 | 84.9 | 84.6 | 87.5 | 85 | 85.42 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.66 | 4.71 | 4.71 | 4.7 | 4.7 | 4.71 | 4.7 | 4.71 | 4.66 | 4.7 | 4.696 | 46.96 |
| ***W* 200** | 8.16 | 8.16 | 8.16 | 8.17 | 8.16 | 8.18 | 8.16 | 8.15 | 8.17 | 8.15 | 8.162 | 81.62 |
| ***W* 300** | 12.59 | 12.57 | 12.53 | 12.53 | 12.56 | 12.58 | 12.55 | 12.51 | 12.54 | 12.55 | 12.551 | 125.51 |
| ***W* 400** | 17.61 | 17.5 | 17.45 | 17.47 | 17.5 | 17.55 | 17.54 | 17.42 | 17.57 | 17.49 | 17.51 | 175.1 |

**Table 21: GILOF\_NS Performance for Normalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= TNT. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 82.4 | 81.1 | 81.3 | 80.8 | 81.1 | 80.1 | 81.1 | 81.3 | 80.4 | 81.2 | 81.08 | |
| ***W* 200** | 84.3 | 88.1 | 87.8 | 86.3 | 84.1 | 84.4 | 87.1 | 84.1 | 88.2 | 88.2 | 86.26 | |
| ***W* 300** | 86.5 | 85.6 | 85.7 | 86.2 | 88.2 | 86.6 | 89.1 | 85.2 | 86 | 85.4 | 86.45 | |
| ***W* 400** | 87.4 | 85.8 | 84.9 | 85.1 | 86.6 | 83.6 | 87.5 | 86.1 | 86.9 | 88.2 | 86.21 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.22 | 4.19 | 4.27 | 4.18 | 4.2 | 4.2 | 4.29 | 4.27 | 2.36 | 4.27 | 4.045 | 40.45 |
| ***W* 200** | 8.05 | 8.05 | 8.28 | 8.02 | 7.97 | 8.32 | 7.96 | 7.88 | 7.84 | 8.31 | 8.068 | 80.68 |
| ***W* 300** | 12.28 | 12.29 | 12.46 | 12.37 | 12.32 | 12.57 | 12.49 | 12.44 | 12.19 | 12.29 | 12.37 | 123.7 |
| ***W* 400** | 17.23 | 17.34 | 17.58 | 17.33 | 17.22 | 17.25 | 17.32 | 17.41 | 17.07 | 17.76 | 17.351 | 173.51 |

**Table 22: GILOF\_NS Performance for Unnormalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 83.6 | 83.5 | 86.7 | 85.2 | 85.8 | 83.3 | 80.5 | 82.2 | 80 | 84.9 | 83.57 | |
| ***W* 200** | 89.5 | 85.6 | 84.3 | 85 | 85.5 | 89.2 | 86.1 | 85.8 | 86.6 | 87.2 | 86.48 | |
| ***W* 300** | 82.2 | 85.4 | 88.9 | 86.7 | 82.9 | 79 | 86 | 82.4 | 84.2 | 88 | 84.57 | |
| ***W* 400** | 83.9 | 82.7 | 82.9 | 80.4 | 81.9 | 82.4 | 85.7 | 81.1 | 82.5 | 82.4 | 82.59 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.31 | 4.31 | 4.3 | 4.34 | 4.28 | 4.34 | 4.28 | 4.29 | 4.29 | 4.31 | 4.305 | 43.05 |
| ***W* 200** | 8.37 | 8.35 | 9.66 | 8.63 | 8.4 | 9.08 | 8.26 | 8.32 | 8.66 | 8.22 | 8.595 | 85.95 |
| ***W* 300** | 13.02 | 13.01 | 14.27 | 13.27 | 13.12 | 12.81 | 13.17 | 12.66 | 12.63 | 12.66 | 13.062 | 130.62 |
| ***W* 400** | 17.84 | 18.12 | 19.03 | 18.48 | 18.79 | 18.68 | 17.84 | 17.96 | 17.78 | 18.08 | 18.26 | 182.6 |

**Table 23: DILOF Performance for Normalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Unnormalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 83.3 | 83.5 | 81.2 | 87.2 | 86.5 | 77.6 | 84.2 | 85.6 | 82.2 | 83.2 | 83.45 | |
| ***W* 200** | 86.2 | 87 | 87.6 | 82.2 | 85.7 | 88.1 | 87.3 | 85.6 | 85.2 | 85.9 | 86.08 | |
|  |  |  |  |  |  |  |  |  |  |  |  | |
| ***W* 300** | 81.8 | 86.5 | 83.3 | 84.3 | 84.3 | 84.9 | 82.2 | 80.8 | 82.1 | 81.7 | 83.19 | |
| ***W* 400** | 81.2 | 87.9 | 83.1 | 79.6 | 84.3 | 84.3 | 81 | 79.3 | 81.8 | 85.9 | 82.84 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.33 | 4.28 | 4.28 | 4.29 | 4.28 | 4.28 | 4.32 | 4.28 | 4.26 | 4.27 | 4.287 | 42.87 |
| ***W* 200** | 8.33 | 8.2 | 8.21 | 8.21 | 8.23 | 8.21 | 8.21 | 8.16 | 8.13 | 8.14 | 8.203 | 82.03 |
| ***W* 300** | 12.75 | 12.58 | 12.62 | 12.56 | 12.6 | 12.57 | 12.64 | 12.6 | 12.7 | 12.62 | 12.624 | 126.24 |
| ***W* 400** | 17.81 | 17.83 | 17.82 | 17.72 | 17.61 | 17.97 | 18.24 | 17.86 | 18.17 | 17.69 | 17.872 | 178.72 |

**Table 24: DILOF Performance for Unnormalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 81.7 | 81.6 | 80.4 | 81.6 | 79.7 | 81.9 | 81.6 | 80.7 | 81.7 | 82.6 | 81.35 | |
| ***W* 200** | 88.4 | 89.8 | 87.7 | 88.2 | 88.1 | 82.8 | 87.7 | 86.4 | 87.9 | 83 | 87 | |
| ***W* 300** | 87 | 88.4 | 88.7 | 87.7 | 88.5 | 88.2 | 86.9 | 86.9 | 88.4 | 89.5 | 88.02 | |
| ***W* 400** | 86.2 | 85.3 | 88.5 | 86.7 | 89.2 | 85.1 | 88 | 87.5 | 85.3 | 89.6 | 87.14 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.41 | 4.36 | 4.33 | 4.31 | 4.43 | 4.37 | 4.38 | 4.37 | 4.37 | 4.37 | 4.37 | 43.7 |
| ***W* 200** | 8.83 | 8.72 | 8.57 | 8.38 | 8.77 | 8.28 | 8.3 | 8.29 | 8.28 | 8.3 | 8.472 | 84.72 |
| ***W* 300** | 13.1 | 13.74 | 13.21 | 13.19 | 13.14 | 12.74 | 12.75 | 12.76 | 14.67 | 12.81 | 13.211 | 132.11 |
| ***W* 400** | 18.88 | 18.65 | 18.93 | 18.18 | 19.12 | 17.85 | 17.81 | 17.96 | 18.05 | 17.78 | 18.321 | 183.21 |

**Table 25: DILOF\_NS Performance for Normalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Unnormalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 79.6 | 81.1 | 82 | 79.9 | 81.4 | 83.7 | 81.7 | 81.5 | 80 | 81.3 | 81.22 | |
| ***W* 200** | 82.9 | 88.6 | 83.3 | 88.7 | 88.1 | 86.5 | 83.3 | 82.2 | 85.5 | 86.9 | 85.6 | |
| ***W* 300** | 90 | 87.8 | 87.1 | 88.3 | 87.6 | 86.2 | 89.8 | 87.7 | 88.2 | 86.5 | 87.92 | |
| ***W* 400** | 86.8 | 84.3 | 83.1 | 85 | 83 | 88.4 | 83.7 | 88.5 | 86.7 | 85.6 | 85.51 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 4.38 | 4.37 | 4.38 | 4.38 | 4.38 | 4.35 | 4.35 | 4.36 | 4.36 | 4.37 | 4.368 | 43.68 |
| ***W* 200** | 8.23 | 8.26 | 8.27 | 8.26 | 8.25 | 8.24 | 8.25 | 8.25 | 8.24 | 8.26 | 8.251 | 82.51 |
| ***W* 300** | 12.68 | 12.74 | 12.63 | 12.57 | 12.69 | 12.73 | 12.63 | 12.68 | 12.66 | 12.68 | 12.669 | 126.69 |
| ***W* 400** | 17.78 | 17.99 | 17.82 | 17.81 | 17.67 | 17.8 | 17.6 | 17.66 | 17.79 | 17.71 | 17.763 | 177.63 |

**Table 26: DILOF\_NS Performance for Unnormalized KDD Cup99 SMTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 90.6 | 90.6 | 88.7 | 90.6 | 89.4 | 86.7 | 89 | 90.6 | 90 | 90.6 | 89.68 | |
| ***W* 200** | 91.7 | 91.5 | 91.4 | 92 | 91.5 | 91.2 | 91.4 | 91.5 | 91 | 91.6 | 91.48 | |
| ***W* 300** | 91.3 | 89.8 | 90 | 90.7 | 90.8 | 90.2 | 90.6 | 90 | 90.3 | 91.1 | 90.48 | |
| ***W* 400** | 89.6 | 90.1 | 90.5 | 89.3 | 90.3 | 90.8 | 90.9 | 90.6 | 89.6 | 90.7 | 90.24 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 26.53 | 26.47 | 26.41 | 26.61 | 26.347 | 26.46 | 27.48 | 26.46 | 26.68 | 26.43 | 26.5877 | 265.877 |
| ***W* 200** | 47.81 | 47.42 | 47.19 | 47.16 | 47.31 | 47.11 | 47.68 | 47.28 | 47.6 | 47.28 | 47.384 | 473.84 |
| ***W* 300** | 73.8 | 72.84 | 73.09 | 73.08 | 72.79 | 72.85 | 73.41 | 72.53 | 76.49 | 72.65 | 73.353 | 733.53 |
| ***W* 400** | 103.57 | 102.21 | 103.83 | 103.75 | 102.22 | 102.2 | 103.7 | 102.37 | 103.44 | 101.23 | 102.852 | 1028.52 |

**Table 27: GILOF Performance for Normalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 73.8 | 75.3 | 75.4 | 74.1 | 76.8 | 76.1 | 75.1 | 76 | 76.8 | 76.8 | 75.62 | |
| ***W* 200** | 76.8 | 75.5 | 76.3 | 76.3 | 76.4 | 75.2 | 75.8 | 76.3 | 75.6 | 76.6 | 76.08 | |
| ***W* 300** | 77.6 | 78.2 | 76.3 | 76.8 | 76.4 | 78.1 | 76.4 | 76.4 | 76.7 | 76 | 76.89 | |
| ***W* 400** | 77.7 | 76.5 | 76 | 75.2 | 76.7 | 78.4 | 77.2 | 77.6 | 76.5 | 77.3 | 76.91 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 26.59 | 26.56 | 26.76 | 26.41 | 26.64 | 26.47 | 26.7 | 27.52 | 26.72 | 26.74 | 26.711 | 267.11 |
| ***W* 200** | 47.57 | 47.71 | 48.94 | 47.79 | 47.54 | 48.61 | 48.13 | 47.42 | 47.78 | 47.76 | 47.925 | 479.25 |
| ***W* 300** | 73.26 | 73.3 | 73.06 | 73.44 | 75.26 | 73.92 | 75.98 | 73.37 | 73.28 | 73.5 | 73.837 | 738.37 |
| ***W* 400** | 103.63 | 101.73 | 102.41 | 102.5 | 103.93 | 101.75 | 103.57 | 103.1 | 102.35 | 101.73 | 102.67 | 1026.7 |

**Table 28: GILOF Performance for Unnormalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 67.5 | 68.8 | 67.9 | 67.5 | 67.7 | 69.9 | 68.2 | 67.5 | 67.9 | 68.8 | 68.17 | |
| ***W* 200** | 78.8 | 78.9 | 78.6 | 78 | 78.5 | 77.8 | 77.7 | 78.3 | 78 | 79.3 | 78.39 | |
| ***W* 300** | 80.4 | 80.1 | 80.3 | 81 | 80.9 | 80.7 | 81.6 | 80.8 | 80.9 | 81.1 | 80.78 | |
| ***W* 400** | 79 | 79.6 | 79.2 | 79.4 | 79.9 | 79.8 | 79.4 | 79.6 | 79.5 | 79.3 | 79.47 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 27.86 | 27.62 | 27.47 | 27.71 | 27.79 | 27.63 | 27.6 | 27.63 | 27.54 | 27.65 | 27.65 | 276.5 |
| ***W* 200** | 48.73 | 48.64 | 48.51 | 48.8 | 48.47 | 51.34 | 48.69 | 48.6 | 49.17 | 48.94 | 48.989 | 489.89 |
| ***W* 300** | 74.85 | 74.59 | 74.65 | 74.91 | 75.39 | 77.5 | 75.22 | 74.79 | 75.87 | 75.42 | 75.319 | 753.19 |
| ***W* 400** | 105.12 | 104.99 | 104.78 | 104.88 | 105.15 | 108.74 | 108.06 | 105.35 | 106.63 | 105.61 | 105.931 | 1059.31 |

**Table 29: GILOF\_NS Performance for Normalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 34.8 | 34.5 | 34.8 | 35 | 34.5 | 34.8 | 36.7 | 34.8 | 35.1 | 33.9 | 34.89 | |
| ***W* 200** | 39.2 | 42.4 | 40.1 | 41.4 | 41.3 | 39.7 | 41.3 | 41.5 | 41.6 | 40.9 | 40.94 | |
| ***W* 300** | 44.3 | 42.7 | 44.6 | 47 | 46.1 | 46.1 | 44.7 | 49.6 | 46.4 | 45.9 | 45.74 | |
| ***W* 400** | 53.7 | 52 | 53.6 | 53.2 | 52.4 | 52.1 | 53.2 | 51.5 | 52.2 | 52 | 52.59 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 27.86 | 27.74 | 27.7 | 27.9 | 27.62 | 27.74 | 27.76 | 27.78 | 27.96 | 27.83 | 27.789 | 277.89 |
| ***W* 200** | 48.9 | 48.92 | 48.7 | 48.72 | 48.64 | 48.81 | 48.67 | 48.71 | 48.79 | 49.1 | 48.796 | 487.96 |
| ***W* 300** | 74.83 | 74.72 | 75.69 | 74.92 | 74.59 | 74.45 | 75.02 | 74.93 | 74.89 | 74.95 | 74.899 | 748.99 |
| ***W* 400** | 104.53 | 104.62 | 104.02 | 105.66 | 104.54 | 104.51 | 104.44 | 104.94 | 104.29 | 104.48 | 104.603 | 1046.03 |

**Table 30: GILOF\_NS Performance for Unnormalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 89.7 | 91 | 89.5 | 90.1 | 91.5 | 90.2 | 88.6 | 90.1 | 90.4 | 90 | 90.11 | |
| ***W* 200** | 92.6 | 93.3 | 92.9 | 93 | 93.2 | 92.3 | 92.2 | 92.7 | 92.3 | 92.7 | 92.72 | |
| ***W* 300** | 91.3 | 91.9 | 92 | 92.2 | 91.8 | 91.7 | 92.1 | 91.8 | 91.7 | 93.1 | 91.96 | |
| ***W* 400** | 90.3 | 90.6 | 90.4 | 91.2 | 91.4 | 89.7 | 91.3 | 90.3 | 90.7 | 91 | 90.69 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 24.8 | 25.37 | 25.19 | 25.62 | 25.54 | 25.51 | 25.34 | 25.57 | 25.56 | 25.38 | 25.388 | 253.88 |
| ***W* 200** | 48.5 | 49.94 | 49.32 | 49.39 | 49.26 | 50.92 | 49.45 | 49.09 | 49.35 | 49.4 | 49.462 | 494.62 |
| ***W* 300** | 75.7 | 75.78 | 75.02 | 75.4 | 75.52 | 77.97 | 77.3 | 75.4 | 75.26 | 75.11 | 75.846 | 758.46 |
| ***W* 400** | 109.6 | 106.93 | 109.63 | 104.84 | 108.86 | 107.66 | 106.13 | 106.55 | 106.57 | 106.23 | 107.3 | 1073 |

**Table 31: DILOF Performance Normalized for KDD Cup99 HTTP Dataset**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 76.4 | 76.3 | 77.9 | 78.8 | 77 | 79.3 | 77.3 | 79.1 | 77.5 | 77.9 | 77.75 | |
| ***W* 200** | 78.7 | 80.2 | 79.7 | 81.1 | 80 | 79.5 | 79.6 | 79.5 | 80.2 | 79.8 | 79.83 | |
| ***W* 300** | 77.6 | 77.2 | 77.5 | 79.1 | 77.8 | 77.7 | 77.5 | 78.8 | 78.9 | 78.1 | 78.02 | |
| ***W* 400** | 79.7 | 76.4 | 77.3 | 77.3 | 76.1 | 75.6 | 76.4 | 77 | 76.6 | 77.4 | 76.98 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 26.6 | 24.89 | 24.89 | 25.68 | 25.04 | 25.85 | 25.57 | 26.38 | 26.04 | 25.44 | 25.638 | 256.38 |
| ***W* 200** | 48.7 | 48.63 | 48.9 | 50.34 | 49.24 | 49.46 | 49.78 | 49.32 | 48.8 | 49.78 | 49.295 | 492.95 |
| ***W* 300** | 77.8 | 75.04 | 74.95 | 75.27 | 76.11 | 75.29 | 75.56 | 79.98 | 75.16 | 75.57 | 76.073 | 760.73 |
| ***W* 400** | 106.1 | 105.5 | 105.66 | 108.34 | 108.32 | 105.93 | 106.72 | 105.95 | 106.21 | 106.07 | 106.48 | 1064.8 |

**Table 32: DILOF Performance for Unnormalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| ***W Size*** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 71 | 71.1 | 70.7 | 66.6 | 67.9 | 66.6 | 66 | 70.6 | 66.9 | 67.3 | 68.47 | |
| ***W* 200** | 79.7 | 79.8 | 79.1 | 80.3 | 80 | 79.7 | 79.7 | 80.4 | 80 | 79.4 | 79.81 | |
| ***W* 300** | 82.1 | 82.3 | 81.9 | 81.9 | 82.8 | 82.7 | 82.3 | 81.6 | 82.7 | 81.4 | 82.17 | |
| ***W* 400** | 79.7 | 80 | 79.5 | 80.3 | 80.6 | 80.5 | 80.3 | 79.9 | 80.5 | 80.1 | 80.14 | |
| ***W Size*** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 26.4 | 26.97 | 27.32 | 27.12 | 27.05 | 27.01 | 26.92 | 26.93 | 28.11 | 27.58 | 27.141 | 271.41 |
| ***W* 200** | 50.8 | 51.48 | 51.45 | 51.45 | 51.47 | 51.36 | 51.65 | 51.6 | 51.63 | 51.38 | 51.427 | 514.27 |
| ***W* 300** | 79.2 | 77.86 | 78.17 | 84.38 | 77.94 | 77.79 | 77.96 | 78.17 | 78.08 | 78.34 | 78.789 | 787.89 |
| ***W* 400** | 108.3 | 108.37 | 108.05 | 108.52 | 108.71 | 108.86 | 109.22 | 108.82 | 107.75 | 107.53 | 108.413 | 1084.13 |

**Table 33: DILOF\_NS Performance for Normalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DILOF\_NS Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AUC** | **AVG of AUC** | |
| ***W* 100** | 35.3 | 34.4 | 34.4 | 35 | 34.4 | 34.3 | 35.1 | 34.8 | 36 | 34.5 | 34.82 | |
| ***W* 200** | 39.9 | 39.6 | 40 | 40 | 39.9 | 39.9 | 37.2 | 38.6 | 39.9 | 40.1 | 39.51 | |
| ***W* 300** | 45.6 | 47.2 | 49.3 | 45.4 | 46.9 | 46.9 | 46.3 | 47.23 | 43.9 | 46.9 | 46.563 | |
| ***W* 400** | 50.6 | 48.8 | 48.6 | 50.3 | 48.4 | 48.7 | 48.3 | 48.7 | 51.6 | 50.2 | 49.42 | |
| ***W* Size** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **Time** | **AVG of Time** | **Total Time** |
| ***W* 100** | 28.1 | 26.32 | 26.53 | 32.32 | 26.4 | 26.74 | 26.57 | 26.81 | 26.69 | 26.46 | 27.294 | 272.94 |
| ***W* 200** | 53.7 | 50.84 | 51.05 | 52.67 | 50.73 | 51.22 | 50.68 | 52.42 | 51.54 | 51.87 | 51.672 | 516.72 |
| ***W* 300** | 84.3 | 77.95 | 77.89 | 85.15 | 76.97 | 81.9 | 80.86 | 79.82 | 80.26 | 81.45 | 80.655 | 806.55 |
| ***W* 400** | 122.7 | 109.3 | 115.29 | 108.91 | 107.94 | 109.32 | 109.86 | 111.93 | 114.73 | 108.82 | 111.88 | 1118.8 |

**Table 34: DILOF\_NS Performance for Unnormalized KDD Cup99 HTTP Dataset.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | | |
| *PS*=5. *NG*=10. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RSP. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 35.5 | 46.64 | 35 | 46.42 | 34.3 | 46.53 | 35.7 | 46.11 | 35.9 | 46.39 | 35.28 | 46.418 | 464.18 |
| ***W* 200** | 41.4 | 63.71 | 40.3 | 64.89 | 42.2 | 63.47 | 44.4 | 60.86 | 41.4 | 62.44 | 41.94 | 63.074 | 630.74 |
| ***W* 300** | 47.5 | 86.73 | 46.8 | 85.82 | 47 | 85.66 | 43.5 | 85.08 | 45.2 | 85.75 | 46 | 85.808 | 858.08 |
| ***W* 400** | 53.46 | 115.46 | 54.1 | 114.84 | 53.6 | 114.72 | 53.9 | 114.8 | 52.7 | 114.91 | 53.552 | 114.946 | 1149.46 |

**Table 35: GILOF\_NS Performance for KDD Cup99 HTTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | | |
| *PS*=5. *NG*=10. Two Points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 69 | 45.85 | 70 | 45.67 | 67.6 | 46.27 | 69 | 46.34 | 68.3 | 46.53 | 68.78 | 46.132 | 461.32 |
| ***W* 200** | 78.9 | 60.9 | 79.5 | 60.83 | 79.3 | 61.7 | 79.5 | 60.94 | 78.3 | 60.646 | 79.1 | 61.0032 | 610.032 |
| ***W* 300** | 81.2 | 85.23 | 80.8 | 85.35 | 81.6 | 85.33 | 81.7 | 85.1 | 81.4 | 85.37 | 81.34 | 85.276 | 852.76 |
| ***W* 400** | 79.5 | 114.91 | 78.6 | 115.17 | 79.8 | 115.2 | 79.1 | 115.45 | 79.5 | 115.23 | 79.3 | 115.192 | 1151.92 |

**Table 36: GILOF\_NS Performance for KDD Cup99 HTTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.7. BDM Mutation=0.05. Selection= RNK. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 76.6 | 26.69 | 76 | 26.72 | 75.4 | 26.61 | 76.5 | 26.72 | 75.6 | 26.62 | 76.02 | 26.672 | 266.72 |
| ***W* 200** | 76.4 | 47.57 | 75.5 | 47.45 | 76.6 | 47.65 | 75.9 | 47.38 | 75.3 | 47.44 | 75.94 | 47.498 | 474.98 |
| ***W* 300** | 76.1 | 76.02 | 75.6 | 73.16 | 76.8 | 72.96 | 76.9 | 73.47 | 76.5 | 73.31 | 76.38 | 73.784 | 737.84 |
| ***W* 400** | 76.4 | 104.39 | 74.9 | 103.88 | 75.6 | 103.29 | 74.7 | 103 | 76.6 | 103.56 | 75.64 | 103.624 | 1036.24 |

**Table 37: GILOF Performance for KDD Cup99 HTTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized KDD CUP99 HTTP Dataset | | | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Two Points Crossover=0.8. Uniform Mutation=0.07. Selection= SUS. | | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 88.5 | 26.69 | 89.7 | 26.42 | 89.5 | 26.5 | 89.1 | 26.94 | 89.3 | 26.6 | 89.22 | 26.63 | 266.3 |
| ***W* 200** | 91.9 | 47.21 | 91 | 48.59 | 92 | 47 | 91.4 | 48.67 | 91.9 | 47.04 | 91.64 | 47.702 | 477.02 |
| ***W* 300** | 90.9 | 72.92 | 90.1 | 73.59 | 91 | 72.62 | 90.8 | 72.49 | 91 | 72.71 | 90.76 | 72.866 | 728.66 |
| ***W* 400** | 90.3 | 102.26 | 90.3 | 102.34 | 90.1 | 101.98 | 90 | 102.51 | 90.4 | 102.24 | 90.22 | 102.266 | 1022.66 |

**Table 38: GILOF Performance for KDD Cup99 HTTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | | |
| *PS*=4. *NG*=8. One Point Crossover=0.5. BDM Mutation=0.07. Selection= SUS. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 85.6 | 6.27 | 85.1 | 6.32 | 83.2 | 6.31 | 87 | 6.32 | 86.2 | 6.3 | 85.42 | 6.304 | 63.04 |
| ***W* 200** | 82.6 | 9.31 | 85.8 | 9.11 | 84.3 | 9.15 | 85.1 | 9.2 | 84.1 | 9.19 | 84.38 | 9.192 | 91.92 |
| ***W* 300** | 83.9 | 14.89 | 86.8 | 13.38 | 85.8 | 13.4 | 87.1 | 13.39 | 85.4 | 13.45 | 85.8 | 13.702 | 137.02 |
| ***W* 400** | 82.7 | 19.93 | 86.2 | 18.47 | 84.2 | 18.43 | 83.6 | 19.43 | 84.3 | 18.53 | 84.2 | 18.958 | 189.58 |

**Table 39: GILOF Performance for KDD Cup99 SMTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | | |
| *PS*=5. *NG*=10. One Point Crossover=0.5. Uniform Mutation=0.07. Selection= TNT. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 82.2 | 7.65 | 85.8 | 7.75 | 84.7 | 7.46 | 85.9 | 7.65 | 83.3 | 7.67 | 84.38 | 7.636 | 76.36 |
| ***W* 200** | 82.6 | 10.18 | 84.4 | 10.47 | 86 | 10.05 | 85.5 | 10.22 | 88.3 | 10.13 | 85.36 | 10.21 | 102.1 |
| ***W* 300** | 86.5 | 14.22 | 87.1 | 14.48 | 86 | 14.12 | 86.1 | 14.1 | 85.3 | 14.56 | 86.2 | 14.296 | 142.96 |
| ***W* 400** | 84.8 | 19.18 | 84.5 | 19.55 | 88.8 | 19.2 | 84.7 | 19.43 | 88.6 | 19.48 | 86.28 | 19.368 | 193.68 |

**Table 40: GILOF Performance for KDD Cup99 SMTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=6. Uniform Crossover=0.7. Uniform Mutation=0.07. Selection= RNK. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 85.1 | 4.81 | 82.4 | 4.79 | 82.9 | 4.8 | 83.2 | 4.8 | 83.5 | 4.8 | 83.42 | 4.8 | 48 |
| ***W* 200** | 86.4 | 8.41 | 84.6 | 8.27 | 87.1 | 8.22 | 85.1 | 8.24 | 84.4 | 8.22 | 85.52 | 8.272 | 82.72 |
| ***W* 300** | 85.5 | 12.86 | 85.5 | 12.53 | 87.3 | 12.59 | 86.2 | 12.55 | 87.6 | 12.52 | 86.42 | 12.61 | 126.1 |
| ***W* 400** | 87.3 | 17.7 | 84.5 | 17.49 | 84.4 | 17.55 | 85.4 | 17.5 | 84.4 | 17.42 | 85.2 | 17.532 | 175.32 |

**Table 41: GILOF\_NS Performance for KDD Cup99 SMTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized KDD CUP99 SMTP Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=4. One Point Crossover=0.7. Uniform Mutation=0.07. Selection= TNT. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 83.2 | 4.58 | 83.8 | 4.61 | 82.5 | 4.68 | 82.1 | 4.68 | 86.5 | 4.67 | 83.62 | 4.644 | 46.44 |
| ***W* 200** | 84 | 8.21 | 85.8 | 8.1 | 88 | 8.12 | 84.4 | 8.21 | 83.3 | 8.13 | 85.1 | 8.154 | 81.54 |
| ***W* 300** | 86.5 | 12.53 | 86 | 12.4 | 87.3 | 12.43 | 86.2 | 12.51 | 86.6 | 12.41 | 86.52 | 12.456 | 124.56 |
| ***W* 400** | 86 | 17.52 | 86.4 | 17.36 | 82.2 | 17.44 | 85.8 | 17.42 | 89.3 | 17.31 | 85.94 | 17.41 | 174.1 |

**Table 42: GILOF Performance for KDD Cup99 SMTP Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized UCI Pendgit Dataset | | | | | | | | | | | | | |
| *PS*=5. *NG*=10. One Point Crossover=0.6. BDM Mutation=0.07. Selection= TNT. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 52.6 | 0.309 | 51.5 | 0.299 | 51.1 | 0.302 | 52.5 | 0.301 | 51.7 | 0.301 | 51.88 | 0.3024 | 3.024 |
| ***W* 120** | 50.7 | 0.321 | 49.7 | 0.315 | 51.8 | 0.316 | 49.9 | 0.312 | 50.5 | 0.312 | 50.52 | 0.3152 | 3.152 |
| ***W* 140** | 51.2 | 0.335 | 50.7 | 0.335 | 50.2 | 0.332 | 50.2 | 0.329 | 51.8 | 0.328 | 50.82 | 0.3318 | 3.318 |
| ***W* 160** | 50.4 | 0.363 | 50.5 | 0.371 | 49.5 | 0.37 | 50.8 | 0.357 | 49.7 | 0.36 | 50.18 | 0.3642 | 3.642 |
| ***W* 180** | 52 | 0.385 | 52.4 | 0.415 | 51.3 | 0.388 | 51.7 | 0.385 | 50.6 | 0.462 | 51.6 | 0.407 | 4.07 |
| ***W* 200** | 51.9 | 0.417 | 51.6 | 0.427 | 51.7 | 0.426 | 52.3 | 0.413 | 52 | 0.44 | 51.9 | 0.4246 | 4.246 |

**Table 43: GILOF Performance for UCI Pendgit Dataset with different hyperparameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized UCI Pendgit Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=5. Two Points Crossover=0.8 Uniform Mutation=0.08. Selection= SUS. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 50.5 | 0.202 | 49.1 | 0.199 | 50 | 0.198 | 50.8 | 0.198 | 50.4 | 0.198 | 50.16 | 0.199 | 1.99 |
| ***W* 120** | 49.9 | 0.228 | 49.8 | 0.226 | 49.8 | 0.226 | 50 | 0.226 | 50.7 | 0.226 | 50.04 | 0.2264 | 2.264 |
| ***W* 140** | 50 | 0.249 | 50.2 | 0.249 | 51.6 | 0.25 | 51 | 0.249 | 50.2 | 0.249 | 50.6 | 0.2492 | 2.492 |
| ***W* 160** | 51 | 0.283 | 52.2 | 0.283 | 52.2 | 0.283 | 53 | 0.283 | 51.4 | 0.283 | 51.96 | 0.283 | 2.83 |
| ***W* 180** | 51.1 | 0.315 | 51.8 | 0.315 | 52.1 | 0.315 | 52.4 | 0.315 | 50.8 | 0.315 | 51.64 | 0.315 | 3.15 |
| ***W* 200** | 51.3 | 0.348 | 53.1 | 0.354 | 52.4 | 0.347 | 50.6 | 0.347 | 52.1 | 0.356 | 51.9 | 0.3504 | 3.504 |

**Table 44: GILOF\_NS Performance for UCI Pendgit Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Pendgit Dataset | | | | | | | | | | | | | | |
| *PS*=7. *NG*=14. One Point Crossover=0.5. Uniform Mutation=0.07. Selection= RNK. | | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 95.5 | 0.431 | 95.4 | 0.424 | 95.3 | 0.425 | 95.1 | 0.424 | 95.9 | 0.424 | 95.44 | 0.4256 | 4.256 |
| ***W* 120** | 97.1 | 0.43 | 97.5 | 0.424 | 97.3 | 0.425 | 97.1 | 0.424 | 97.5 | 0.424 | 97.3 | 0.4254 | 4.254 |
| ***W* 140** | 98.4 | 0.432 | 98.1 | 0.428 | 98.4 | 0.427 | 98.2 | 0.429 | 98.3 | 0.427 | 98.28 | 0.4286 | 4.286 |
| ***W* 160** | 98.5 | 0.456 | 98.6 | 0.452 | 98.7 | 0.459 | 98.5 | 0.451 | 98.7 | 0.45 | 98.6 | 0.4536 | 4.536 |
| ***W* 180** | 98.9 | 0.472 | 98.9 | 0.427 | 98.8 | 0.474 | 99 | 0.472 | 98.7 | 0.472 | 98.86 | 0.4634 | 4.634 |
| ***W* 200** | 98.4 | 0.497 | 98.2 | 0.496 | 98.4 | 0.498 | 98.4 | 0.497 | 98.4 | 0.498 | 98.36 | 0.4972 | 4.972 |

**Table 45: GILOF Performance for UCI Pendgit Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Pendgit Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=4. Uniform Crossover=0.6. Uniform Mutation=0.08. Selection= RSP. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 95.7 | 0.206 | 95.6 | 0.201 | 95.6 | 0.201 | 95.5 | 0.201 | 95.3 | 0.202 | 95.54 | 0.2022 | 2.022 |
| ***W* 120** | 97.8 | 0.232 | 96.9 | 0.23 | 97.4 | 0.23 | 97.2 | 0.229 | 97.3 | 0.23 | 97.32 | 0.2302 | 2.302 |
| ***W* 140** | 98.3 | 0.256 | 98.1 | 0.255 | 98.2 | 0.255 | 98.1 | 0.254 | 98.3 | 0.254 | 98.2 | 0.2548 | 2.548 |
| ***W* 160** | 98.7 | 0.291 | 98.5 | 0.29 | 98.8 | 0.291 | 98.6 | 0.29 | 98.7 | 0.29 | 98.66 | 0.2904 | 2.904 |
| ***W* 180** | 98.8 | 0.324 | 98.8 | 0.326 | 98.8 | 0.325 | 98.9 | 0.324 | 98.8 | 0.323 | 98.82 | 0.3244 | 3.244 |
| ***W* 200** | 98.5 | 0.357 | 98.3 | 0.358 | 98.1 | 0.356 | 98.2 | 0.357 | 98.3 | 0.355 | 98.28 | 0.3566 | 3.566 |

**Table 46: GILOF Performance for UCI Pendgit Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | | |
| *PS*=2. *NG*=4. One Point Crossover=0.7. BDM Mutation=0.07. Selection= RSP. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 73.5 | 0.078 | 76.1 | 0.073 | 75.1 | 0.073 | 74.1 | 0.074 | 73.9 | 0.073 | 74.54 | 0.0742 | 0.742 |
| ***W* 120** | 79.3 | 0.085 | 84.5 | 0.082 | 83.6 | 0.084 | 84.4 | 0.084 | 82.4 | 0.082 | 82.84 | 0.0834 | 0.834 |
| ***W* 140** | 85.3 | 0.095 | 85.7 | 0.093 | 85.7 | 0.095 | 85.2 | 0.094 | 84.1 | 0.095 | 85.2 | 0.0944 | 0.944 |
| ***W* 160** | 86.9 | 0.107 | 86.4 | 0.106 | 87.9 | 0.104 | 88.5 | 0.103 | 88.6 | 0.104 | 87.66 | 0.1048 | 1.048 |
| ***W* 180** | 88.9 | 0.118 | 90 | 0.117 | 89.6 | 0.115 | 89.8 | 0.118 | 90.4 | 0.115 | 89.74 | 0.1166 | 1.166 |
| ***W* 200** | 88.9 | 0.128 | 89.4 | 0.129 | 89.2 | 0.129 | 90.5 | 0.128 | 89.9 | 0.128 | 89.58 | 0.1284 | 1.284 |

**Table 47: GILOF Performance for UCI Vowel Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF\_NS Performance in Unnormalized UCI Vowel Dataset | | | | | | | | | | | | | | |
| *PS*=2. *NG*=6. Uniform Crossover=0.5. BDM Mutation=0.05. Selection= RWS. | | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **TIME** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 73.8 | 0.859 | 74.5 | 0.082 | 74.2 | 0.816 | 75.8 | 0.082 | 76.4 | 0.082 | 74.94 | 0.3842 | 3.842 |
| ***W* 120** | 84.2 | 0.842 | 81.5 | 0.093 | 83.5 | 0.906 | 82.8 | 0.095 | 80.1 | 0.095 | 82.42 | 0.4062 | 4.062 |
| ***W* 140** | 86.9 | 0.101 | 86.5 | 0.104 | 85.4 | 0.104 | 87.7 | 0.103 | 87.8 | 0.104 | 86.86 | 0.1032 | 1.032 |
| ***W* 160** | 87.2 | 0.117 | 87.7 | 0.113 | 88.2 | 0.115 | 88.3 | 0.114 | 87.7 | 0.118 | 87.82 | 0.1154 | 1.154 |
| ***W* 180** | 90.1 | 0.129 | 89.8 | 0.129 | 90 | 0.131 | 90.7 | 0.128 | 91 | 0.129 | 90.32 | 0.1292 | 1.292 |
| ***W* 200** | 91.8 | 0.142 | 92.6 | 0.139 | 91.9 | 0.145 | 92.3 | 0.14 | 91.8 | 0.14 | 92.08 | 0.1412 | 1.412 |

**Table 48: GILOF\_NS Performance for UCI Vowel Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | | | |
| *PS*=3. *NG*=6. One Point Crossover=0.7. BDM Mutation=0.07. Selection= TNT. | | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 74.8 | 0.087 | 71.4 | 0.082 | 75.5 | 0.079 | 74.3 | 0.082 | 76.5 | 0.082 | 74.5 | 0.0824 | 0.824 |
| ***W* 120** | 78.1 | 0.092 | 83.1 | 0.09 | 80.7 | 0.09 | 79.9 | 0.092 | 81.5 | 0.095 | 80.66 | 0.0918 | 0.918 |
| ***W* 140** | 84.8 | 0.101 | 87.6 | 0.098 | 86.6 | 0.098 | 87.2 | 0.099 | 84 | 0.098 | 86.04 | 0.0988 | 0.988 |
| ***W* 160** | 89.1 | 0.112 | 87.7 | 0.112 | 89 | 0.112 | 88.8 | 0.109 | 89.8 | 0.11 | 88.88 | 0.111 | 1.11 |
| ***W* 180** | 89.7 | 0.123 | 89.5 | 0.121 | 90.1 | 0.121 | 89.6 | 0.121 | 90.2 | 0.124 | 89.82 | 0.122 | 1.22 |
| ***W* 200** | 91.2 | 0.134 | 91 | 0.132 | 90.3 | 0.132 | 91 | 0.132 | 91.3 | 0.137 | 90.96 | 0.1334 | 1.334 |

**Table 49:** **GILOF Performance for UCI Vowel Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| GILOF Performance in Normalized UCI Vowel Dataset | | | | | | | | | | | | | |
| *PS*=100. *NG*=200. Two points Crossover=0.7. BDM Mutation=0.07. Selection= RWS. | | | | | | | | | | | | | |
| ***W* Size** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AUC** | **Time** | **AVG - AUC** | **AVG - Time** | **Total - Time** |
| ***W* 100** | 73 | 18.86 | 73.3 | 22.15 | 70.8 | 17.49 | 72.5 | 17.48 | 74.1 | 17.52 | 72.74 | 18.7 | 187 |
| ***W* 120** | 79.9 | 15.99 | 80 | 19.4 | 80.3 | 15.17 | 80 | 15.11 | 81.5 | 15.13 | 80.34 | 16.16 | 161.6 |
| ***W* 140** | 86.5 | 14.9 | 84.3 | 15.38 | 87.4 | 13.56 | 85.9 | 13.61 | 88.9 | 13.54 | 86.6 | 14.198 | 141.98 |
| ***W* 160** | 88.6 | 13.28 | 90.7 | 12.61 | 90.9 | 12.49 | 89.8 | 12.42 | 90.3 | 12.34 | 90.06 | 12.628 | 126.28 |
| ***W* 180** | 90.3 | 11.9 | 91.4 | 11.56 | 90.9 | 11.54 | 90.2 | 11.45 | 89.4 | 11.55 | 90.44 | 11.6 | 116 |
| ***W* 200** | 91.8 | 11.72 | 90.9 | 10.83 | 89.9 | 10.88 | 90.5 | 10.79 | 91.5 | 10.79 | 90.92 | 11.002 | 110.02 |

**Table 50. GILOF Performance for UCI Vowel Dataset with different hyperparameters.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***W* Size** | Normalize UCI Vowel Dataset | | | Unnormalize UCI Vowel Dataset | | |
| *H-*Value | DF | *P-*Value | *H-*Value | DF | *P-*Value |
| ***W* 100** | 15.86 | 3 | 0.001 | 23.25 | 3 | 0.000 |
| ***W* 120** | 15.32 | 3 | 0.002 | 28.03 | 3 | 0.000 |
| ***W* 140** | 15.74 | 3 | 0.002 | 17.10 | 3 | 0.001 |
| ***W* 160** | 13.18 | 3 | 0.004 | 19.60 | 3 | 0.000 |
| ***W* 180** | 17.88 | 3 | 0.000 | 26.10 | 3 | 0.000 |
| ***W* 200** | 29.83 | 3 | 0.000 | 34.12 | 3 | 0.000 |
| ***W* 1000** | 25.54 | 3 | 0.000 | 20.72 | 3 | 0.000 |

**Table 51. The Kruskal Wallis test results for** **UCI Vowel dataset.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***W* Size** | Normalize UCI Pendigit Dataset | | | Unnormalize UCI Pendigit Dataset | | |
| *H-*Value | DF | *P-*Value | *H-*Value | DF | *P-*Value |
| ***W* 100** | 27.20 | 3 | 0.000 | 5.75 | 3 | 0.124 |
| ***W* 120** | 27.23 | 3 | 0.000 | 10.59 | 3 | 0.014 |
| ***W* 140** | 28.39 | 3 | 0.000 | 11.40 | 3 | 0.010 |
| ***W* 160** | 25.64 | 3 | 0.000 | 3.33 | 3 | 0.343 |
| ***W* 180** | 25.30 | 3 | 0.000 | 8.85 | 3 | 0.031 |
| ***W* 200** | 19.00 | 3 | 0.000 | 5.93 | 3 | 0.146 |
| ***W* 1000** | 30.85 | 3 | 0.000 | 6.18 | 3 | 0.103 |

**Table 6. The Kruskal Wallis test results for UCI Pendigit dataset.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***W* Size** | Normalize KDD Cup 99 SMTP Dataset | | | Unnormalize KDD Cup 99 SMTP Dataset | | |
| *H-*Value | DF | *P-*Value | *H-*Value | DF | *P-*Value |
| ***W* 100** | 23.14 | 3 | 0.000 | 7.44 | 3 | 0.059 |
| ***W* 200** | 7.08 | 3 | 0.069 | 3.93 | 3 | 0.269 |
| ***W* 300** | 12.65 | 3 | 0.005 | 23.81 | 3 | 0.000 |
| ***W* 400** | 20.53 | 3 | 0.000 | 9.50 | 3 | 0.023 |
| ***W* 1000** | 13.06 | 3 | 0.005 | 28.93 | 3 | 0.000 |

**Table 6. The Kruskal Wallis test results for** **KDD Cup 99 smtp dataset.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***W* Size** | Normalize KDD Cup 99 HTTP Dataset | | | Unnormalize KDD Cup 99 HTTP Dataset | | |
| *H-*Value | DF | *P-*Value | *H-*Value | DF | *P-*Value |
| ***W* 100** | 29.32 | 3 | 0.000 | 32.14 | 3 | 0.000 |
| ***W* 200** | 36.44 | 3 | 0.000 | 34.67 | 3 | 0.000 |
| ***W* 300** | 36.30 | 3 | 0.000 | 31.28 | 3 | 0.000 |
| ***W* 400** | 32.62 | 3 | 0.000 | 32.81 | 3 | 0.000 |
| ***W* 1000** | 30.68 | 3 | 0.000 | 33.95 | 3 | 0.000 |

**Table 6. The Kruskal Wallis test results for KDD Cup 99 http dataset.**