|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Table A-1. ANOVA pairwise Test to show the significant difference between general results of the seven selection algorithms* | | | | | | |
| Dependent Variable | (I) V1 (first method) | (J) V1 (second method) | Mean Difference (I-J) | Sig. | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| **Availability** | NSGAII | SPEAII | -.0251593\* | .001 | -.0447220 | -.0055966 |
| MOGWO | .2355100\* | .000 | .2087011 | .2623189 |
| PBMOA step 1 | .0151417 | .458 | -.0055527 | .0358363 |
| PBMOA step 2 | -.0272837\* | .000 | -.0467654 | -.0078021 |
| PBMOA step 3 | -.1234915\* | .000 | -.1429731 | -.1040098 |
| MOGWO-V20 | .2719818\* | .000 | .2448901 | .2990734 |
| MOGWO+GA-V21 | .2125154\* | .000 | .1894354 | .2355954 |
| Whale+Eagle-V22 | .2045413\* | .000 | .1673673 | .2417153 |
| SPEAII | NSGAII | .0251593\* | .001 | .0055966 | .0447220 |
| MOGWO | .2606693\* | .000 | .2339166 | .2874221 |
| PBMOA step 1 | .0403011\* | .000 | .0196793 | .0609229 |
| PBMOA step 2 | -.0021244 | 1.000 | -.0215287 | .0172798 |
| PBMOA step 3 | -.0983321\* | .000 | -.1177364 | -.0789278 |
| MOGWO-V20 | .2971411\* | .000 | .2701050 | .3241773 |
| MOGWO+GA-V21 | .2376747\* | .000 | .2146600 | .2606895 |
| Whale+Eagle-V22 | .2297007\* | .000 | .1925671 | .2668342 |
| MOGWO | NSGAII | -.2355100\* | .000 | -.2623189 | -.2087011 |
| SPEAII | -.2606693\* | .000 | -.2874221 | -.2339166 |
| PBMOA step 1 | -.2203682\* | .000 | -.2479594 | -.1927769 |
| PBMOA step 2 | -.2627937\* | .000 | -.2894873 | -.2361002 |
| PBMOA step 3 | -.3590015\* | .000 | -.3856951 | -.3323080 |
| MOGWO-V20 | .0364717\* | .011 | .0038072 | .0691363 |
| MOGWO+GA-V21 | -.0229945 | .343 | -.0524173 | .0064281 |
| Whale+Eagle-V22 | -.0309686 | .420 | -.0723802 | .0104429 |
| PBMOA step 1 | NSGAII | -.0151417 | .458 | -.0358363 | .0055527 |
| SPEAII | -.0403011\* | .000 | -.0609229 | -.0196793 |
| MOGWO | .2203682\* | .000 | .1927769 | .2479594 |
| PBMOA step 2 | -.0424255\* | .000 | -.0629704 | -.0218806 |
| PBMOA step 3 | -.1386333\* | .000 | -.1591782 | -.1180884 |
| MOGWO-V20 | .2568400\* | .000 | .2289739 | .2847060 |
| MOGWO+GA-V21 | .1973736\* | .000 | .1733893 | .2213578 |
| Whale+Eagle-V22 | .1893995\* | .000 | .1516574 | .2271416 |
| PBMOA step 2 | NSGAII | .0272837\* | .000 | .0078021 | .0467654 |
| SPEAII | .0021244 | 1.000 | -.0172798 | .0215287 |
| MOGWO | .2627937\* | .000 | .2361002 | .2894873 |
| PBMOA step 1 | .0424255\* | .000 | .0218806 | .0629704 |
| PBMOA step 3 | -.0962077\* | .000 | -.1155303 | -.0768851 |
| MOGWO-V20 | .2992655\* | .000 | .2722880 | .3262431 |
| MOGWO+GA-V21 | .2397991\* | .000 | .2168532 | .2627451 |
| Whale+Eagle-V22 | .2318251\* | .000 | .1947342 | .2689160 |
| PBMOA step 3 | NSGAII | .1234915\* | .000 | .1040098 | .1429731 |
| SPEAII | .0983321\* | .000 | .0789278 | .1177364 |
| MOGWO | .3590015\* | .000 | .3323080 | .3856951 |
| PBMOA step 1 | .1386333\* | .000 | .1180884 | .1591782 |
| PBMOA step 2 | .0962077\* | .000 | .0768851 | .1155303 |
| MOGWO-V20 | .3954733\* | .000 | .3684958 | .4224508 |
| MOGWO+GA-V21 | .3360069\* | .000 | .3130610 | .3589528 |
| Whale+Eagle-V22 | .3280329\* | .000 | .2909419 | .3651238 |
| MOGWO-V20 | NSGAII | -.2719818\* | .000 | -.2990734 | -.2448901 |
| SPEAII | -.2971411\* | .000 | -.3241773 | -.2701050 |
| MOGWO | -.0364717\* | .011 | -.0691363 | -.0038072 |
| PBMOA step 1 | -.2568400\* | .000 | -.2847060 | -.2289739 |
| PBMOA step 2 | -.2992655\* | .000 | -.3262431 | -.2722880 |
| PBMOA step 3 | -.3954733\* | .000 | -.4224508 | -.3684958 |
| MOGWO+GA-V21 | -.0594663\* | .000 | -.0891470 | -.0297857 |
| Whale+Eagle-V22 | -.0674404\* | .000 | -.1090356 | -.0258452 |
| MOGWO+GA-V21 | NSGAII | -.2125154\* | .000 | -.2355954 | -.1894354 |
| SPEAII | -.2376747\* | .000 | -.2606895 | -.2146600 |
| MOGWO | .0229945 | .343 | -.0064281 | .0524173 |
| PBMOA step 1 | -.1973736\* | .000 | -.2213578 | -.1733893 |
| PBMOA step 2 | -.2397991\* | .000 | -.2627451 | -.2168532 |
| PBMOA step 3 | -.3360069\* | .000 | -.3589528 | -.3130610 |
| MOGWO-V20 | .0594663\* | .000 | .0297857 | .0891470 |
| Whale+Eagle-V22 | -.0079740 | 1.000 | -.0470750 | .0311269 |
| Whale+Eagle-V22 | NSGAII | -.2045413\* | .000 | -.2417153 | -.1673673 |
| SPEAII | -.2297007\* | .000 | -.2668342 | -.1925671 |
| MOGWO | .0309686 | .420 | -.0104429 | .0723802 |
| PBMOA step 1 | -.1893995\* | .000 | -.2271416 | -.1516574 |
| PBMOA step 2 | -.2318251\* | .000 | -.2689160 | -.1947342 |
| PBMOA step 3 | -.3280329\* | .000 | -.3651238 | -.2909419 |
| MOGWO-V20 | .0674404\* | .000 | .0258452 | .1090356 |
| MOGWO+GA-V21 | .0079740 | 1.000 | -.0311269 | .0470750 |
| **Response Time** | NSGAII | SPEAII | .0018801 | 1.000 | -.0143154 | .0180757 |
| MOGWO | -.1173333\* | .000 | -.1395279 | -.0951387 |
| PBMOA step 1 | .0212860\* | .002 | .0041533 | .0384186 |
| PBMOA step 2 | .0271476\* | .000 | .0110191 | .0432761 |
| PBMOA step 3 | .0246140\* | .000 | .0084855 | .0407425 |
| MOGWO-V20 | -.1028086\* | .000 | -.1252373 | -.0803799 |
| MOGWO+GA-V21 | -.1906519\* | .000 | -.2097594 | -.1715444 |
| Whale+Eagle-V22 | -.0641450\* | .000 | -.0949207 | -.0333693 |
| SPEAII | NSGAII | -.0018801 | 1.000 | -.0180757 | .0143154 |
| MOGWO | -.1192135\* | .000 | -.1413616 | -.0970654 |
| PBMOA step 1 | .0194058\* | .009 | .0023334 | .0364782 |
| PBMOA step 2 | .0252674\* | .000 | .0092029 | .0413319 |
| PBMOA step 3 | .0227339\* | .000 | .0066694 | .0387984 |
| MOGWO-V20 | -.1046887\* | .000 | -.1270715 | -.0823060 |
| MOGWO+GA-V21 | -.1925321\* | .000 | -.2115856 | -.1734786 |
| Whale+Eagle-V22 | -.0660251\* | .000 | -.0967673 | -.0352829 |
| MOGWO | NSGAII | .1173333\* | .000 | .0951387 | .1395279 |
| SPEAII | .1192135\* | .000 | .0970654 | .1413616 |
| PBMOA step 1 | .1386194\* | .000 | .1157771 | .1614617 |
| PBMOA step 2 | .1444810\* | .000 | .1223818 | .1665801 |
| PBMOA step 3 | .1419474\* | .000 | .1198483 | .1640465 |
| MOGWO-V20 | .0145247 | .871 | -.0125176 | .0415671 |
| MOGWO+GA-V21 | -.073318\* | .000 | -.0976771 | -.048960 |
| Whale+Eagle-V22 | .053188\* | .000 | .0189044 | .0874722 |
| PBMOA step 1 | NSGAII | -.0212860\* | .002 | -.0384186 | -.0041533 |
| SPEAII | -.0194058\* | .009 | -.0364782 | -.0023334 |
| MOGWO | -.1386194\* | .000 | -.1614617 | -.1157771 |
| PBMOA step 2 | .0058615 | .995 | -.0111471 | .0228703 |
| PBMOA step 3 | .0033280 | 1.000 | -.0136807 | .0203368 |
| MOGWO-V20 | -.1240946\* | .000 | -.1471645 | -.1010248 |
| MOGWO+GA-V21 | -.2119380\* | .000 | -.2317941 | -.1920818 |
| Whale+Eagle-V22 | -.0854310\* | .000 | -.1166770 | -.0541850 |
| PBMOA step 2 | NSGAII | -.0271476\* | .000 | -.0432761 | -.0110191 |
| SPEAII | -.0252674\* | .000 | -.0413319 | -.0092029 |
| MOGWO | -.1444810\* | .000 | -.1665801 | -.1223818 |
| PBMOA step 1 | -.0058615 | .995 | -.0228703 | .0111471 |
| PBMOA step 3 | -.0025335 | 1.000 | -.0185303 | .0134633 |
| MOGWO-V20 | -.1299562\* | .000 | -.1522904 | -.1076220 |
| MOGWO+GA-V21 | -.2177995\* | .000 | -.2367961 | -.1988030 |
| Whale+Eagle-V22 | -.0912926\* | .000 | -.1219995 | -.0605857 |
| PBMOA step 3 | NSGAII | -.0246140\* | .000 | -.0407425 | -.0084855 |
| SPEAII | -.0227339\* | .000 | -.0387984 | -.0066694 |
| MOGWO | -.1419474\* | .000 | -.1640465 | -.1198483 |
| PBMOA step 1 | -.0033280 | 1.000 | -.0203368 | .0136807 |
| PBMOA step 2 | .0025335 | 1.000 | -.0134633 | .0185303 |
| MOGWO-V20 | -.1274227\* | .000 | -.1497569 | -.1050884 |
| MOGWO+GA-V21 | -.2152660\* | .000 | -.2342625 | -.1962695 |
| Whale+Eagle-V22 | -.08875910\* | .000 | -.1194660 | -.0580521 |
| MOGWO-V20 | NSGAII | .1028086\* | .000 | .0803799 | .1252373 |
| SPEAII | .1046887\* | .000 | .0823060 | .1270715 |
| MOGWO | -.0145247 | .871 | -.0415671 | .0125176 |
| PBMOA step 1 | .1240946\* | .000 | .1010248 | .1471645 |
| PBMOA step 2 | .1299562\* | .000 | .1076220 | .1522904 |
| PBMOA step 3 | .1274227\* | .000 | .1050884 | .1497569 |
| MOGWO+GA-V21 | -.0878433\* | .000 | -.1124153 | -.0632712 |
| Whale+Eagle-V22 | .0386636\* | .010 | .0042276 | .0730995 |
| MOGWO+GA-V21 | NSGAII | .1906519\* | .000 | .1715444 | .2097594 |
| SPEAII | .1925321\* | .000 | .1734786 | .2115856 |
| MOGWO | .0733185\* | .000 | .0489600 | .0976771 |
| PBMOA step 1 | .2119380\* | .000 | .1920818 | .2317941 |
| PBMOA step 2 | .2177995\* | .000 | .1988030 | .2367961 |
| PBMOA step 3 | .2152660\* | .000 | .1962695 | .2342625 |
| MOGWO-V20 | .0878433\* | .000 | .0632712 | .1124153 |
| Whale+Eagle-V22 | .1265069\* | .000 | .0941359 | .1588779 |
| Whale+Eagle-V22 | NSGAII | .0641450\* | .000 | .0333693 | .0949207 |
| SPEAII | .0660251\* | .000 | .0352829 | .0967673 |
| MOGWO | -.0531883\* | .000 | -.0874722 | -.0189044 |
| PBMOA step 1 | .0854310\* | .000 | .0541850 | .1166770 |
| PBMOA step 2 | .0912926\* | .000 | .0605857 | .1219995 |
| PBMOA step 3 | .0887591\* | .000 | .0580521 | .1194660 |
| MOGWO-V20 | -.0386636\* | .010 | -.0730995 | -.0042276 |
| MOGWO+GA-V21 | -.1265069\* | .000 | -.1588779 | -.0941359 |
| **Cost** | NSGAII | SPEAII | .0003815 | 1.000 | -.0027806 | .0035437 |
| MOGWO | -.0172131\* | .000 | -.0215466 | -.0128796 |
| PBMOA step 1 | .0014235 | .973 | -.0019216 | .0047686 |
| PBMOA step 2 | .0013847 | .966 | -.0017643 | .0045338 |
| PBMOA step 3 | .0019651 | .713 | -.0011839 | .0051142 |
| MOGWO-V20 | -.0197092\* | .000 | -.0240884 | -.0153300 |
| MOGWO+GA-V21 | -.0226221\* | .000 | -.0263528 | -.0188913 |
| Whale+Eagle-V22 | -.0140734\* | .000 | -.0200823 | -.0080644 |
| SPEAII | NSGAII | -.0003815 | 1.000 | -.0035437 | .0027806 |
| MOGWO | -.0175947\* | .000 | -.0219191 | -.0132702 |
| PBMOA step 1 | .0010419 | .998 | -.0022913 | .0043753 |
| PBMOA step 2 | .0010032 | .997 | -.0021333 | .0041398 |
| PBMOA step 3 | .0015835 | .912 | -.0015529 | .0047201 |
| MOGWO-V20 | -.0200907\* | .000 | -.0244610 | -.0157205 |
| MOGWO+GA-V21 | -.0230036\* | .000 | -.0267238 | -.0192834 |
| Whale+Eagle-V22 | -.0144549\* | .000 | -.0204573 | -.0084525 |
| MOGWO | NSGAII | .0172131\* | .000 | .0128796 | .0215466 |
| SPEAII | .0175947\* | .000 | .0132702 | .0219191 |
| PBMOA step 1 | .0186366\* | .000 | .0141767 | .0230966 |
| PBMOA step 2 | .0185979\* | .000 | .0142830 | .0229128 |
| PBMOA step 3 | .0191783\* | .000 | .0148634 | .0234931 |
| MOGWO-V20 | -.0024960 | .943 | -.0077760 | .0027839 |
| MOGWO+GA-V21 | -.0054089\* | .009 | -.0101649 | -.0006529 |
| Whale+Eagle-V22 | .0031397 | .946 | -.0035541 | .0098337 |
| PBMOA step 1 | NSGAII | -.0014235 | .973 | -.0047686 | .0019216 |
| SPEAII | -.0010419 | .998 | -.0043753 | .0022913 |
| MOGWO | -.0186366\* | .000 | -.0230966 | -.0141767 |
| PBMOA step 2 | -.0000387 | 1.000 | -.0033597 | .0032822 |
| PBMOA step 3 | .0005416 | 1.000 | -.0027793 | .0038625 |
| MOGWO-V20 | -.0211327\* | .000 | -.0256371 | -.0166283 |
| MOGWO+GA-V21 | -.0240456\* | .000 | -.0279225 | -.0201687 |
| Whale+Eagle-V22 | -.0154969\* | .000 | -.0215977 | -.0093961 |
| PBMOA step 2 | NSGAII | -.0013847 | .966 | -.0045338 | .0017643 |
| SPEAII | -.0010032 | .997 | -.0041398 | .0021333 |
| MOGWO | -.0185979\* | .000 | -.0229128 | -.0142830 |
| PBMOA step 1 | .0000387 | 1.000 | -.0032822 | .0033597 |
| PBMOA step 3 | .0005803 | 1.000 | -.0025430 | .0037037 |
| MOGWO-V20 | -.0210940\* | .000 | -.0254547 | -.0167332 |
| MOGWO+GA-V21 | -.0240069\* | .000 | -.0277159 | -.0202978 |
| Whale+Eagle-V22 | -.0154581\* | .000 | -.0214537 | -.0094626 |
| PBMOA step 3 | NSGAII | -.0019651 | .713 | -.0051142 | .0011839 |
| SPEAII | -.0015835 | .912 | -.0047201 | .0015529 |
| MOGWO | -.0191783\* | .000 | -.0234931 | -.0148634 |
| PBMOA step 1 | -.0005416 | 1.000 | -.0038625 | .0027793 |
| PBMOA step 2 | -.0005803 | 1.000 | -.0037037 | .0025430 |
| MOGWO-V20 | -.0216743\* | .000 | -.0260351 | -.0173136 |
| MOGWO+GA-V21 | -.0245872\* | .000 | -.0282963 | -.0208781 |
| Whale+Eagle-V22 | -.0160385\* | .000 | -.0220340 | -.0100430 |
| MOGWO-V20 | NSGAII | .0197092\* | .000 | .0153300 | .0240884 |
| SPEAII | .0200907\* | .000 | .0157205 | .0244610 |
| MOGWO | .0024960 | .943 | -.0027839 | .0077760 |
| PBMOA step 1 | .0211327\* | .000 | .0166283 | .0256371 |
| PBMOA step 2 | .0210940\* | .000 | .0167332 | .0254547 |
| PBMOA step 3 | .0216743\* | .000 | .0173136 | .0260351 |
| MOGWO+GA-V21 | -.0029128 | .749 | -.0077105 | .0018848 |
| Whale+Eagle-V22 | .0056358 | .231 | -.0010877 | .0123594 |
| MOGWO+GA-V21 | NSGAII | .0226221\* | .000 | .0188913 | .0263528 |
| SPEAII | .0230036\* | .000 | .0192834 | .0267238 |
| MOGWO | .0054089\* | .009 | .0006529 | .0101649 |
| PBMOA step 1 | .0240456\* | .000 | .0201687 | .0279225 |
| PBMOA step 2 | .0240069\* | .000 | .0202978 | .0277159 |
| PBMOA step 3 | .0245872\* | .000 | .0208781 | .0282963 |
| MOGWO-V20 | .0029128 | .749 | -.0018848 | .0077105 |
| Whale+Eagle-V22 | .0085487\* | .000 | .0022282 | .0148691 |
| Whale+Eagle-V22 | NSGAII | .0140734\* | .000 | .0080644 | .0200823 |
| SPEAII | .0144549\* | .000 | .0084525 | .0204573 |
| MOGWO | -.0031397 | .946 | -.0098337 | .0035541 |
| PBMOA step 1 | .0154969\* | .000 | .0093961 | .0215977 |
| PBMOA step 2 | .0154581\* | .000 | .0094626 | .0214537 |
| PBMOA step 3 | .0160385\* | .000 | .0100430 | .0220340 |
| MOGWO-V20 | -.0056358 | .231 | -.0123594 | .0010877 |
| MOGWO+GA-V21 | -.0085487\* | .000 | -.0148691 | -.0022282 |