```matlab
%%%%%%%% Simple comparison of both algorithms with Wilcoxon Rank Sum test


clear all
clc

SearchAgents_no = 50; % Number of search solutions
Max_iteration = 100;    % Maximum number of iterations

% Pre-allocate arrays for storing results
results_matrix = zeros(30, 2); % 30 functions, 2 algorithms (AOA, MAOA)
p_values = zeros(1, 30);% Stores p-values from Wilcoxon Rank Sum test
summary_matrix = zeros(30, 3);

for i = 1:30 % Loop over each function from F1 to F30
    if i==2
        continue;
    end
    F_name = ['F', num2str(i)]; % Name of the test function
    [lb,ub,dim,fobj]=CEC2014(F_name);
    C3=2;
    C4=0.5;

    % Run multiple times and store best scores for each algorithm
    aoa_scores = zeros(1, 30);
    maoa_scores = zeros(1, 30);
    for run = 1:30
        SearchAgents_no=randi([45, 49]);
        [aoa_score, ~ , ~] = WOA(50, Max_iteration, lb, ub , dim , fobj);
        [maoa_score, ~ , ~] = womaa(SearchAgents_no, Max_iteration, lb, ub , dim , fobj);
        aoa_scores(run) = aoa_score;
        maoa_scores(run) = maoa_score;
    end

    % Calculate Wilcoxon Rank Sum test and store p-value
    [p_values(i), ~, ~] = ranksum(aoa_scores, maoa_scores);

    % Update results matrix with best score for each run
    results_matrix(i, 1) = min(aoa_scores); % Assuming lower score is better
    results_matrix(i, 2) = min(maoa_scores); % Assuming lower score is better


    summary_matrix(i, 1) = mean(aoa_scores);
    summary_matrix(i, 2) = mean(maoa_scores);
    summary_matrix(i, 3) = p_values(i);

    % Display results (modify as needed)
    disp(['For function ', F_name, ':']);
    disp(['Best score by AOA (average of 30 runs): ', num2str(mean(aoa_scores))]);
    disp(['Best score by MAOA (average of 30 runs): ', num2str(mean(maoa_scores))]);
    disp(['p-value (Wilcoxon Rank Sum): ', num2str(p_values(i))]);
    disp('\n');
end

% Display or further process the results matrix and p-values
disp('Results Matrix:');
disp(results_matrix);
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disp('p-values:');
disp(p_values);
```

For function F1:
Best score by AOA (average of 30 runs): 283663.6322
Best score by MAOA (average of 30 runs): 469488.5572
p-value (Wilcoxon Rank Sum): 0.05746
\n
For function F3:
Best score by AOA (average of 30 runs): 1123.4263
Best score by MAOA (average of 30 runs): 1319.0846
p-value (Wilcoxon Rank Sum): 0.53951
\n
For function F4:
Best score by AOA (average of 30 runs): 422.6406
Best score by MAOA (average of 30 runs): 437.514
p-value (Wilcoxon Rank Sum): 0.033874
\n
For function F5:
Best score by AOA (average of 30 runs): 520.4231
Best score by MAOA (average of 30 runs): 520.1709
p-value (Wilcoxon Rank Sum): 0.85338
\n
For function F6:
Best score by AOA (average of 30 runs): 604.2933
Best score by MAOA (average of 30 runs): 604.4411
p-value (Wilcoxon Rank Sum): 0.64142
\n
For function F7:
Best score by AOA (average of 30 runs): 700.3718
Best score by MAOA (average of 30 runs): 700.3329
p-value (Wilcoxon Rank Sum): 0.34783
\n
For function F8:
Best score by AOA (average of 30 runs): 823.4199
Best score by MAOA (average of 30 runs): 820.5509
p-value (Wilcoxon Rank Sum): 0.20621
\n
For function F9:
Best score by AOA (average of 30 runs): 925.8359
Best score by MAOA (average of 30 runs): 923.1416
p-value (Wilcoxon Rank Sum): 0.28378
\n
For function F10:
Best score by AOA (average of 30 runs): 1494.0725
Best score by MAOA (average of 30 runs): 1445.9569
p-value (Wilcoxon Rank Sum): 0.54933
\n
For function F11:
Best score by AOA (average of 30 runs): 1866.793
Best score by MAOA (average of 30 runs): 1876.512
p-value (Wilcoxon Rank Sum): 0.63088
\n
For function F12:
Best score by AOA (average of 30 runs): 1200.7346
Best score by MAOA (average of 30 runs): 1200.8505
p-value (Wilcoxon Rank Sum): 0.17613

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For function F13:
Best score by AOA (average of 30 runs): 1300.3927
Best score by MAOA (average of 30 runs): 1300.3372
p-value (Wilcoxon Rank Sum): 0.072446
\n

For function F14:
Best score by AOA (average of 30 runs): 1400.3339
Best score by MAOA (average of 30 runs): 1400.3452
p-value (Wilcoxon Rank Sum): 0.6204
\n

For function F15:
Best score by AOA (average of 30 runs): 1502.308
Best score by MAOA (average of 30 runs): 1502.417
p-value (Wilcoxon Rank Sum): 0.94696
\n

For function F16:
Best score by AOA (average of 30 runs): 1602.8801
Best score by MAOA (average of 30 runs): 1602.7911
p-value (Wilcoxon Rank Sum): 0.12597
\n

For function F17:
Best score by AOA (average of 30 runs): 2221.6982
Best score by MAOA (average of 30 runs): 2252.0067
p-value (Wilcoxon Rank Sum): 0.49178
\n

For function F18:
Best score by AOA (average of 30 runs): 1891.2278
Best score by MAOA (average of 30 runs): 1900.6661
p-value (Wilcoxon Rank Sum): 0.61001
\n

For function F19:
Best score by AOA (average of 30 runs): 1903.3799
Best score by MAOA (average of 30 runs): 1903.2525
p-value (Wilcoxon Rank Sum): 0.76183
\n

For function F20:
Best score by AOA (average of 30 runs): 2081.2291
Best score by MAOA (average of 30 runs): 2058.2161
p-value (Wilcoxon Rank Sum): 0.0069724
\n

For function F21:
Best score by AOA (average of 30 runs): 2303.9085
Best score by MAOA (average of 30 runs): 2447.7362
p-value (Wilcoxon Rank Sum): 0.00049818
\n

For function F22:
Best score by AOA (average of 30 runs): 2291.9076
Best score by MAOA (average of 30 runs): 2272.7732
p-value (Wilcoxon Rank Sum): 0.66273
\n

For function F23:
Best score by AOA (average of 30 runs): 2500
Best score by MAOA (average of 30 runs): 2500
p-value (Wilcoxon Rank Sum): NaN
\n

For function F24:
Best score by AOA (average of 30 runs): 2557.8187

Best score by MAOA (average of 30 runs): 2549.9909
p-value (Wilcoxon Rank Sum): 0.25805
\n
For function F25:
Best score by AOA (average of 30 runs): 2692.8726
Best score by MAOA (average of 30 runs): 2692.9279
p-value (Wilcoxon Rank Sum): 0.78934
\n
For function F26:
Best score by AOA (average of 30 runs): 2700.2411
Best score by MAOA (average of 30 runs): 2700.2576
p-value (Wilcoxon Rank Sum): 0.33285
\n
For function F27:
Best score by AOA (average of 30 runs): 2881.1825
Best score by MAOA (average of 30 runs): 2876.2003
p-value (Wilcoxon Rank Sum): 0.093204
\n
For function F28:
Best score by AOA (average of 30 runs): 3000.0001
Best score by MAOA (average of 30 runs): 3000.0001
p-value (Wilcoxon Rank Sum): 0.0041035
\n
For function F29:
Best score by AOA (average of 30 runs): 3289.8877
Best score by MAOA (average of 30 runs): 118361.9206
p-value (Wilcoxon Rank Sum): 0.0018575
\n
For function F30:
Best score by AOA (average of 30 runs): 4237.3327
Best score by MAOA (average of 30 runs): 3988.4525
p-value (Wilcoxon Rank Sum): 0.023243
\n
Results Matrix:
   1.0e+04 *

   0.2651   2.6286
        0   0
   0.0424   0.0328
   0.0400   0.0400
   0.0520   0.0512
   0.0600   0.0602
   0.0700   0.0700
   0.0805   0.0807
   0.0909   0.0908
   0.1142   0.1037
   0.1447   0.1104
   0.1200   0.1200
   0.1300   0.1300
   0.1400   0.1400
   0.1501   0.1501
   0.1602   0.1602
   0.1826   0.1731
   0.1811   0.1828
   0.1901   0.1902
   0.2015   0.2016
   0.2119   0.2145
   0.2220   0.2223

```
    0.2500    0.2500
    0.2524    0.2520
    0.2631    0.2650
    0.2700    0.2700
    0.2703    0.2705
    0.3000    0.3000
    0.3123    0.3102
    0.3663    0.3498
```

p-values:
  Columns 1 through 7

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    0.0575         0    0.5395    0.0339    0.8534    0.6414    0.3478
```

  Columns 8 through 14

```
    0.2062    0.2838    0.5493    0.6309    0.1761    0.0724    0.6204
```

  Columns 15 through 21

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    0.9470    0.1260    0.4918    0.6100    0.7618    0.0070    0.0005
```

  Columns 22 through 28

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    0.6627       NaN    0.2581    0.7893    0.3329    0.0932    0.0041
```

  Columns 29 through 30

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    0.0019    0.0232
```