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| --- | --- |
| **Tester** | Tah Wen Zhong |
| **Test type** | Integration |
| **Component** | Main program |
| **Number of test suites** | 8 |
| **Number of test cases** | 4 |
| **Status** | Complete |
| **Test file** | main\_program\_test.py |
| **Date of completion** | 12/9/2021 |

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Testing the functionality of the Main program

# Description

The table below describes the steps within the main program:

|  |  |  |
| --- | --- | --- |
| **Step** | **Description** | **External algorithms used** |
| 1 | Read and process data | - |
| 2 | Feature selection + Pre-processing | Pre-process algorithm, Feature selection algorithm |
| 3 | Model creation | All base and ensemble predictor algorithms |
| 4 | Evaluation | All evaluation algorithms |
| 5 | Output CSV | - |

For testing:

* Test suite (1-5) are dedicated towards testing the individual steps as described in the table above
* Test suite 6 will test the overall process

This document keeps track of the state of the algorithm throughout testing. If a test suite fails, the information of the bug fixes will be documented, and the test will be performed once more with the same test suite.

* Yellow highlight indicates failed test cases
* Purple encoded text indicates test cases that can run but results were affected by a failed test case
* Red encoded text indicates test cases that cannot run due to another failed test case

# Test suite 1: Read and process data (10/9/2021)

## First run (Fail)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case ID | Test case description | Test data/setup | Expected Result | Actual Result | Pass/Fail |
| 1.1 | Check if the data is extracted correctly from read function | test1.arff.txt | Data is extracted correctly  (An array containing values for each row) | Data is extracted correctly  (An array containing values for each row) | Pass |
| 1.2 | Test process which separates the labels and metrics | test1.arff.txt | Correctly identify the metrics and labels | Failed to extract the labels | Fail |
| 1.3 | Check correctness of label conversion function | test1.arff.txt | Labels converted from Boolean/string to integer (0,1) | - | - |
| 1.4 | Test run with actual dataset | test2.arff.txt  (KC dataset) | Extracted data with labels successfully processed | - | - |
| Bug description | | | * The data extraction function extracts data column with “Defective” as the column name. | | |
| Bug fix | | | * Rework data extraction function to take the last column as label | | |

## Second run (Pass)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case ID | Test case description | Test data/setup | Expected Result | Actual Result | Pass/Fail |
| 1.2 | Test process which separates the labels and metrics | test1.arff.txt | Correctly identify the metrics and labels | Correctly identify the metrics and labels | Pass |
| 1.3 | Check correctness of label conversion function | test1.arff.txt | Labels converted from Boolean/string to integer (0,1) | Labels converted from Boolean/string to integer (0,1) | Pass |
| 1.4 | Test run with actual dataset | test2.arff.txt  (KC dataset) | Extracted data with labels successfully processed | Extracted data with labels successfully processed | Pass |

## Rationale: Test suite 1

The test cases were designed to test the sub-functions (imported from other files) as there exist some dependencies between functions, such as processing being dependant of reading. The test cases (1.1-1.3) are ordered based on this dependency hierarchy. Since unit testing covers these sub-functions, only one test case is dedicated for each. The last test case will test the overall functionality using an actual dataset.

# Test suite 2: Feature selection + Pre-processing (10/9/2021)

## First run (Fail)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case ID | Test case description | Test data/setup | Expected Result | Actual Result | Pass/Fail |
| 2.1 | Function can use processed data | test1.arff.txt  (After processing) | Output successful, with no errors | Failed to output, error raised | Fail |
| 2.2 | Check if a single feature selection is correctly identified | Selection set to only CFS | Output contains result using CFS algorithm | - | - |
| 2.3 | Check if multiple feature selections are correctly identified | Selection set to CFS and RFE | Output contains result using CFS and RFE algorithm | - | - |
| 2.4 | Check k-fold argument correctly passed to pre-processing algorithm | test1.arff.txt  (k\_fold = 10) | Returns 10 train-test splits for all output | - | - |
| 2.5 | Check train size argument correctly passed to feature selection algorithm | test1.arff.txt  (train\_size = 10) | Feature selection outputs contain 10 columns (10 Software metrics) | - | - |
| 2.6 | Test run, including previous steps, with actual dataset | test2.arff.txt  (KC dataset) | Output successful, with no errors | Output successful, with no errors | Pass |
| Bug description | | | * The bug was found within the pre-processing algorithm where the number of folds is not passed correctly   (Issue forwarded to testing on Pre-process)   * The failed runs are because the test1.arff.txt used contains less folds than the default folds.   Test case 2.6 was successful because it uses actual dataset, so the data size is larger than the default folds | | |
| Bug fix | | |  | | |

## Rationale: Test suite 2

# Test suite 3: Model creation (-/9/2021)

## First run (-)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case ID | Test case description | Test data/setup | Expected Result | Actual Result | Pass/Fail |
| 3.1 | Test whether all models can fit processed data (All) | test1.arff.txt  (After processing) | Output successful, with no errors |  |  |
| 3.2 | Test whether all models can fit processed data after CFS selection | test1.arff.txt  (After processing and CFS) | Output successful, with no errors |  |  |
| 3.3 | Test whether all models can fit processed data after RFE selection | test1.arff.txt  (After processing and RFE) | Output successful, with no errors |  |  |
| 3.4 | Check if results output formatted correctly for base and ensemble | test1.arff.txt  (All models selected) | An array containing a list of all base prediction models and a list of all ensemble models |  |  |
| 3.5 | Test base models selection argument | test1.arff.txt  (base\_pred = [0,3]) | Result only contains complement naïve bayes and MLP models |  |  |
| 3.6 | Test ensemble models selection argument | test1.arff.txt  (ensemble\_preds = [0,1]) | Result only contains random forest and rotation forest models |  |  |
| 3.7 | Test whether all models contain the predict() functionality | test1.arff.txt  (All models selected) | All models contain the predict() function and can perform predictions |  |  |
| 3.8 | Test run, including previous steps, with actual dataset | test2.arff.txt  (KC dataset) | Output successful, with no errors |  |  |

# Test suite 4: Evaluation (-/9/2021)

## First run (-)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test case ID | Test case description | Test data/setup | Expected Result | Actual Result | Pass/Fail |
| 4.1 | Test whether all models can fit processed data (All) | test1.arff.txt  (After processing) | Output successful, with no errors |  |  |
| 4.2 | Test whether all models can fit processed data after CFS selection | test1.arff.txt  (After processing and CFS) | Output successful, with no errors |  |  |
| 4.3 | Test whether all models can fit processed data after RFE selection | test1.arff.txt  (After processing and RFE) | Output successful, with no errors |  |  |

# Results

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| **Screenshot 1 (Test file)** |
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| **Screenshot 2 (Test suite 1 output)** |
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