基於分群技術緩解網頁組合測試結果判定問題
A Clustering-Based Approach to Alleviating Test Oracle Problem of Webpage Combinatorial Testing

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開發工具：Python 3.10.1
測試環境：macOS Mojave 10.14.6

一、簡介：

The process of testing software is examining the artifacts and behavior of the software under test by validating and verifying it. Testing can provide valuable information about the software. Given an input to the system, there is a challenge of distinguishing correct from potentially incorrect behavior, which is the test oracle problem.

Although the combinatorial testing approach can effectively reduce the number of test cases, the manual inspection of the outputs is still required. We propose an approach to automatically classify the return pages by conducting combinatorial testing based on page similarities and hierarchical clustering, by which potential output anomalies can be identified.

In the experiment, we apply our approach to a real-world e-commerce website, an anomaly can be found with the visualization of the clustering hierarchy, which suggests the potential of the applicability of the approach.
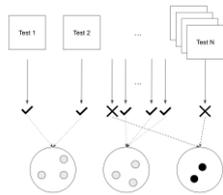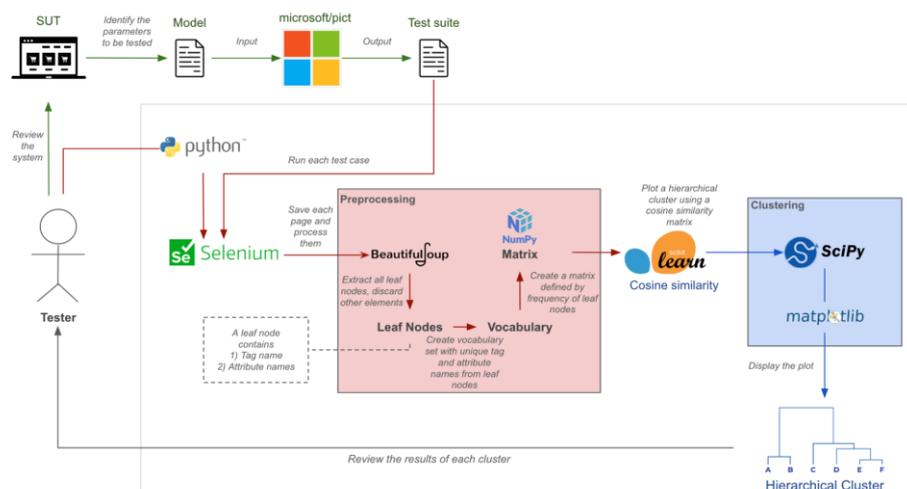

Fig 1. Clustering Potential Output Anomalies

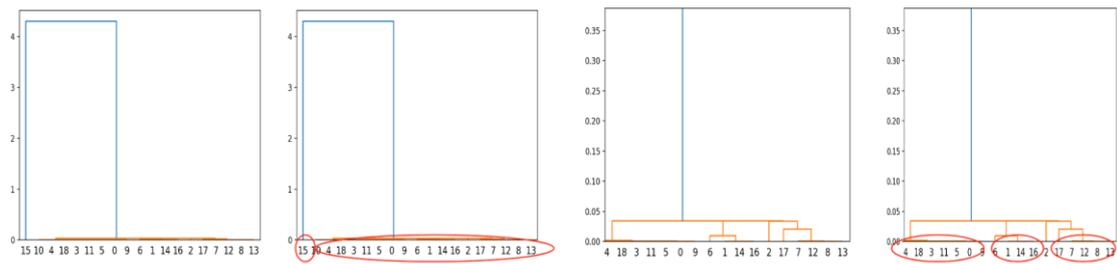## 二、 軟體架構：

三、測試結果：

Fig 2. Hierarchical Cluster Zoomed-Out (left) and Zoomed-In (right)
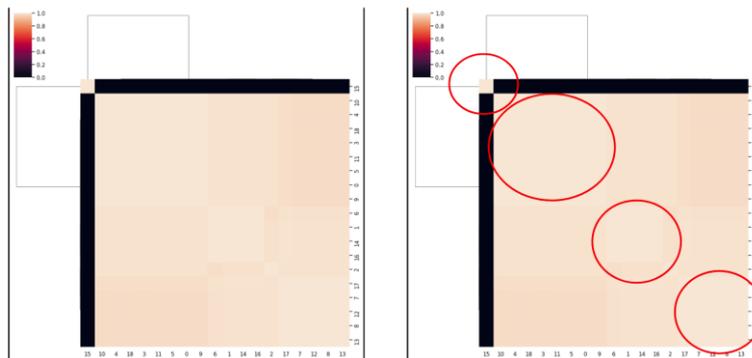

Fig 3. Hierarchical Cluster Heatmap

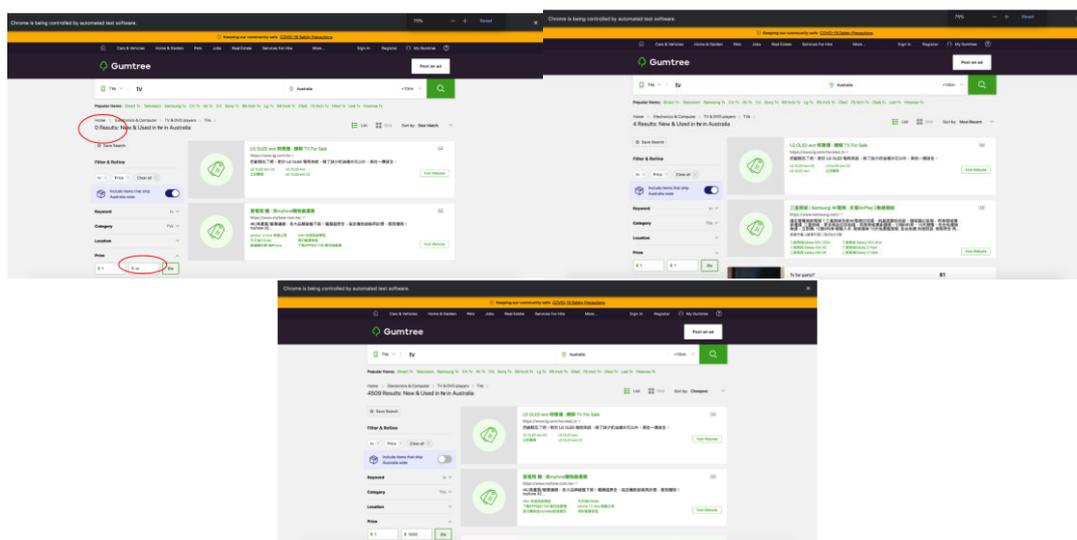Fig 4. Zoomed-Out Cluster 1 (left) and Cluster 2 (right)

Fig 5. Zoomed-In Cluster 1 (top-left), Cluster 2 (top-right), Cluster 3 (bottom)