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Accelerating Test Automation with AI-Based Similarity Analysis

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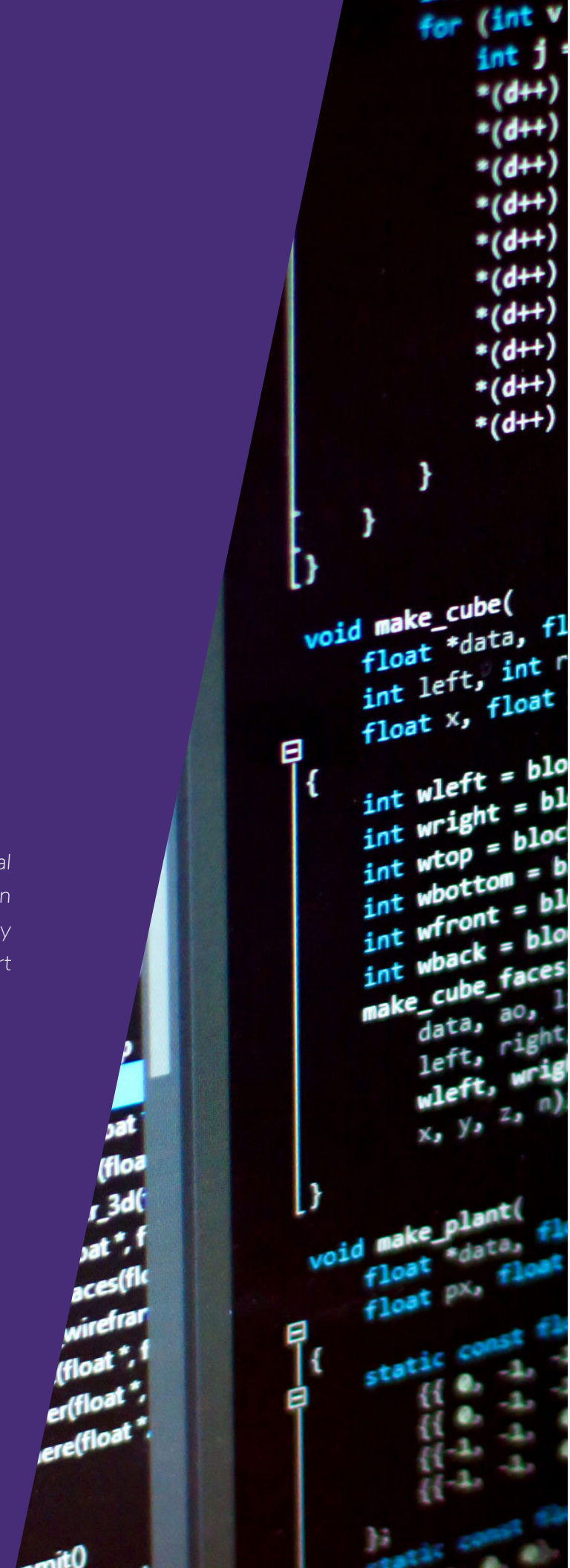
The Client

QualityLogic has provided manual testing services over the past 5 years to a large international streaming content provider. The streaming content runs over ten device platforms ranging from mobile phones to Over-the-Top (OTT) devices like Apple and Fire TV. Our testing activities consist of new feature and bug fix validation in addition to an extensive regression suite containing over 5,000 test cases that cumulatively get run across all device platforms.

Our staff acts as integral members of the customer's Agile teams, providing real time feedback into the customer's issue management system regarding test results. The client also has an ongoing effort to automate the regression test cases across all device platforms.

The Issue

Over the years, the available window to execute a full regression test has been reduced dramatically. A regression test that started out near 20,000 test cases has been halved and halved again to the current test case count of around 5,000. As we looked at the upcoming year, we could see that we would be in a tough position to deliver the expected test coverage. Factors included:

- An ambitious set of new features likely to drive up the number of required regression test cases
- Additional budget for testing resources was not available
- Further reduction of the regression test cases represented unacceptable risks
- Sprint times were likely to get smaller and smaller
- And we had little visibility into when the customers automation efforts might provide some relief

The Solution

QualityLogic decided to use some internally developed Artificial Intelligence (AI) software to analyze the 5,000 manual regression test cases to identify test cases with high degrees of similarity that could be consolidated, reducing

the overall testing effort while maintaining the same test coverage. The AI software leveraged natural language processing using Jaccard, Cosine, and other similarity algorithms along with a proprietary genetic clustering algorithm.

The first step of this effort focused on AI analysis of the test cases for each individual device platform, looking for almost identical test cases that could be eliminated or consolidated. Further AI analysis looked for test cases that had substantially similar test sequences within each device platform as well as identical test cases across all 10 device platforms. Our understanding is that the automation code being developed by our customer is cross-platform, meaning that the same test script can be leveraged across multiple platforms. That being the case, identifying substantially similar test cases across all device platforms could dramatically impact the customers automation efforts in the following ways:

- Isolation of globally common code fragments whose functionality can be automated as part of a common code library shared by all test developers. This reduces the workload for most test cases by only having to code these common sequences once.

- Clustering similar test cases for assignment to the same programmer. This can provide dramatic efficiency gains once the programmer codes the first test case in a cluster of test cases, subsequent test cases in the cluster group will be much faster to code given the developers familiarity with the test flow.

- Predictive ordering of test cases for development to maximize code sharing between similar test cases.

The Outcome

This AI analysis identified on average 16 almost identical test cases for each consolidated device platform with no impact on test coverage. This analysis resulted in a 4% reduction in overall test cases with immediate savings in the labor required for each regression testing cycle.

Once the duplicates were removed, the regression test cases for each device platform were further analyzed looking for test cases that had substantially similar test sequences. This analysis identified an average of

46 clusters of similar test sequences in the regression tests for each device platform. Focusing on these identified clusters accelerates test automation efforts where two, three, or more tests automated with minor variations of the same basic code set. This represents a possible 10% reduction in test automation cost for each device platform.

While the regression tests for each device platform are independent from a manual testing process, the test automation coding functions run effectively cross platform, thus identifying duplicate test cases across device platforms could yield significant test automation cost savings. Results of the AI analysis across device platforms identified over a 1,000 clusters of almost identical test cases. While most of these clusters were pairs, the test automation labor savings could be over 20% by leveraging the same test script across multiple device platforms.

Our client was delighted with both the immediate cost savings from duplicate test case removal and excited about the automation cost savings potential of the other AI analysis results.

For More Information

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