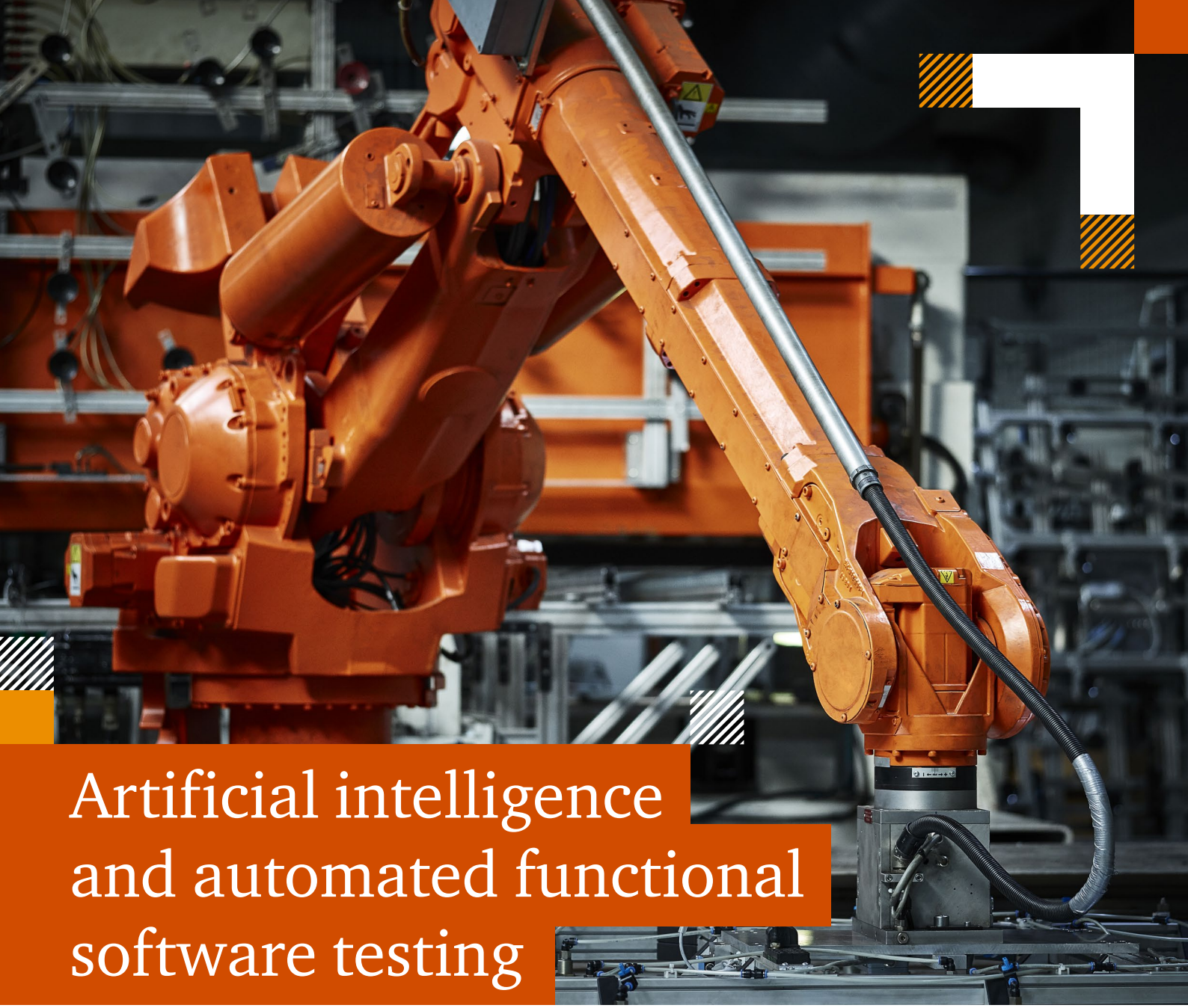

Artificial intelligence and automated functional software testing

Industries across various sectors are increasingly adopting generative AI – a sub-branch of AI which can create content similar to human generated output. AI has been beneficial in enhancing the efficiency of operations of many sectors including the software industry. Though the implementation of AI is still at a nascent stage, organisations are increasingly seeking ways to adopt digital technologies to reduce manual effort and enhance the overall efficiency of their processes.

For any software product before it is released in the market, various testing activities need to be performed to make the software stable and fulfil the user's expectations. Functional testing is an integral part of the software testing process which involves the creation of functional test cases from user stories. It also generates different types of testcases (positive, negative, data validation, etc.). However, developing test cases take a lot of time and manual effort. This is where generative AI can help in creating test cases, minimise manual effort and reduce the delivery time of the final product in the market.

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Pre-requisites for generating AI-based manual test cases

To implement AI-enabled manual test cases, the following parameters should be considered:

- An integrated development environment (IDE) where the tools can be integrated and enabled.
- All required licenses of AI-enabled tools should be available.
- User stories with the acceptance criteria in the proper format should be available for the application. Business analysts can create user stories in a project management tool and the user story should contain the acceptance criteria in Given-When-Then format. The test cases can be created from each scenario of the acceptance criteria of the same user story, i.e. each scenario will be the input for the AI to create the test cases.
- To generate the test cases, one should have a prompt with all the necessary details. Prompts are the instruction sets that indicate the user requirement, e.g. in which format the user is expecting the test cases and what are the expected columns.

Testing functionalities using AI-based manual test case generator model

Human generated test cases are written in different formats. They also follow the business requirements for each type of test cases. AI tools can create different types of test cases and reduce the human effort with a huge test case bank. Given below are some examples of AI-based tests:

- Reduces manual effort: AI can develop test cases from a user story within minutes which can take a considerable amount of time if they are created manually. Therefore, implementation of AI can reduce manual effort significantly. In software testing, there are different types of test cases like positive, negative, data validation, graphical user interface (GUI) validation, performance and compatibility.. With AI, all types of test cases can be generated within minutes.
- Test scenarios: Test cases can be generated along with the test scenarios which is important to understand the application's test coverage at a high level, i.e. which area or module of the application the test case is covering for testing.
- Formats available: AI provides test cases in user-friendly formats as per the requirements for any specific projects.

Generative AI also helps in creating different combination of test cases. It creates base test cases with different validation and steps that helps to reduce the overall time of the test case generation process. However, it needs to be reviewed and updated; therefore, human intervention is still an integral part of the process.

Way forward

There is ample scope for AI to add more features and customise the output in a more structured manner. As AI tools develop, the output of the tools can be more accurate and reliable for functional testing and AI can be used for other phases of manual testing such as automation, security testing and performance testing to enhance the efficiency of the process. However, one also needs to understand that AI-generated content sometimes may not be accurate and human review is integral before the software is implemented.

How PwC can help

Testing is a key activity in different projects and domains. PwC's team of specialists can help you in creating different types of base test cases with the help of generative AI. Based on the input, the project team can quickly review and update the test cases if required and verify if the team has covered the different types of verification and decrease the testing time while maintaining the overall quality.

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