Digital Transformation and Artificial Intelligence

Shyam Narayan

Director | Head of Managed Services
Capgemini Australia and New Zealand

Digital disruption is forcing enterprises to innovate at lightning speed. DevOps, the use of Internet of Things (IoT) technologies, advancement in Cloud technologies and the introduction of Artificial Intelligence (AI) in platform, are all impacting on the digital transformation journeys of enterprises.

Applications or solutions built using AI are not designed for an explicit solution of a distinct problem. The machines can and will learn, and they use data to do so. The problems enterprises solve using AI are not deterministic in nature. And the solutions to problems enterprises are trying to solve with AI change as data grows in the applications. This means that from a Quality Assurance (QA) perspective the reference point is moving. As such, there is no absolutely right or wrong answer. The outcome is correct based on the tolerance set by an organisation.

AI interactions with the system multiply the results normally obtained by manual testing. A test automation script can be

designed to interact with the system, but it can't distinguish between the correct and incorrect outcomes for applications.

The end goal of leveraging AI in testing is to primarily reduce the testing lifecycle, making it shorter, smarter, and capable of augmenting the jobs of testers by equipping them with technology. AI is directly applicable to all aspects of testing including performance, exploratory and functional regression testing, identifying and resolving test failures, and performing usability testing.

Enterprises have implemented simple use cases of applications built on AI platforms. However, an organisation's ability to harness the power of AI platforms is restricted due to the limitations of AI in QA tools but the industry is moving in the right direction when it comes to autonomous testing. That said, enterprise scale usage of AI platforms for complex use cases will only be possible with maturity in the application of AI in software testing tools.

Applications of AI include:

Testing of UI interfaces: Machine learning algorithms are being used for UI testing. AI is being used to help identify image patterns by breaking down the user interface to pixel level.

Self-healing automation testing: AI/ML testing provides the capability for test scripts to automatically adjust to any changes making the tests more maintainable and reliable.

Visual validation automation testing: Pattern recognition or visual validation capability is used to identify visual bugs in the software.

Writing test cases using AI: AI Spidering is used to write test cases for the application by crawling through it and collecting data.

API testing: ML-based algorithms are used for back-end API testing.

AI is also used to actively test some of the most prestigious apps on the market:

- eBay uses convolutional neural nets to detect GUI defects across multiple operating systems, devices, screen resolutions, and browser versions.
- Facebook has implemented a predictive test selection to estimate the probability of each test failing for a newly proposed code change.

- Netflix is using reinforcement learning for test case prioritisation and selection.

Challenges in quality assurance of AI applications

Some of the challenges are:

- Applications built on AI platform require QA tools based on AI.
- The large number of data sets required for testing AI models. Training and testing datasets is prone to human bias which in turn impacts on AI model test scenarios.
- It's difficult to isolate and fix a defect in AI systems.
- Testing AI applications is a continuous process as the model evolves with the growth of datasets.
- Testing end-to-end integrated AI-based applications.

AI impacting QA skills

Agile and DevOps-era organisations are seeking software development engineers in test (SDET) – technical software testers. But with AI-based applications the requirement will change from SDET to SDET plus data science/statistical modelling – software development artificial intelligence in rest (SDAIET). This means that QA experts will need knowledge and training not only in development but also in data science and statistical modelling.

Conclusion

Exponential growth in computing capacity, the availability of massive amounts of generated data to train AI algorithms, and a breakthrough in deep learning and machine-learning techniques is driving uptake of AI-based applications.

AI promises considerable benefits for businesses and economies through its contributions to productivity growth and innovation. AI's impact on organisations will be profound. Enterprises will leverage AI to create competitive advantage.

From a QA perspective, the successful use cases of digital transformation using AI-based applications is limited due to the maturity of QA tools, methodology and frameworks.

AI will lift productivity and economic growth, but millions of people worldwide may need to switch occupations or upgrade skills.