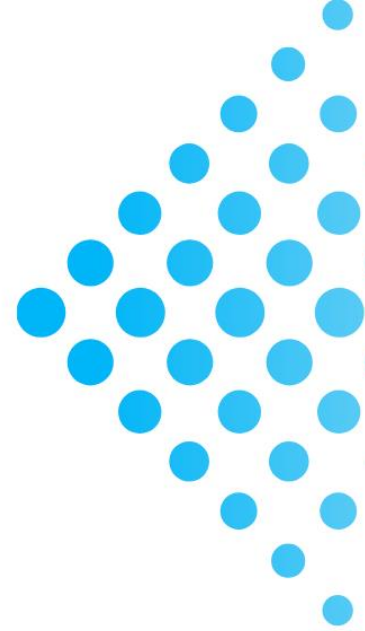




MATRYXSOFT
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ARTIFICIAL INTELLIGENCE IMAGE VERIFICATION FOR TEST AUTOMATION



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Abstract

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and learn like humans. The goal of AI is to develop systems that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

AI in image recognition refers to the use of artificial intelligence techniques, particularly machine learning, to enable computers to interpret and understand visual information from images or videos. The primary goal is to develop systems that can automatically identify and classify objects, scenes, and patterns within visual data. Image recognition is a crucial component of computer vision, a field within AI that focuses on teaching machines to interpret and understand the visual world.

In the realm of Test Automation, various challenges arise when it comes to Image verification, including issues like brittleness, responsive design, dynamic content, localization, performance, maintenance, and dealing with False Positives/Negatives in different Test Environments. The introduction of AI addresses these challenges by eliminating the requirement for baseline images. Instead, verification happens dynamically during runtime, improving performance and ensuring precise results without the need for frequent maintenance.

This article explores various facets of image verification techniques facilitated by AI and OCR. It delves into the reasons for opting for AI in image verification and its advantages compared to traditional methods.

“Targeted at IT organizations engaged in test automation, particularly those in sectors such as healthcare, manufacturing, and the electrical domain where image comparison is vital, this white paper sheds light on the benefits of adopting AI-based image verification tools. It aims to provide a clear understanding of how leveraging AI in image verification not only ensures accurate outputs but also minimizes regression and reduces maintenance efforts to zero.”

Introduction

The synergy of Artificial Intelligence (AI) with Test Automation presents a highly effective approach to Image Verification, eliminating the necessity for storing baseline images. The verification process is not impacted by UI changes, as it occurs in real-time images rather than relying on baseline image comparisons.

This methodology significantly enhances the accuracy and quality of image verification. In the healthcare sector, particularly in the radiology department, AI has become a prominent trend due to its application in image verification. The combination of AI and OCR is especially beneficial for customers seeking robust image verification techniques.

To initiate the process, sending sample images for a Proof of Concept (POC) ensures its efficacy.

Outline about AI Image Verification Technique

The traditional approach to image verification involves comparing the real-time image with a baseline image, either in its entirety or by masking the relevant area. This method often necessitates significant maintenance efforts or adjustments to the baseline image, particularly when verification failures occur due to factors like UI changes, alterations in workflow, pixel variations, or resolution adjustments.

Addressing these challenges in regression testing can be tedious. To overcome these issues, AI is employed to train images, enabling them to autonomously identify the specific area for verification. This approach minimizes maintenance efforts to nearly zero percent, elevating the accuracy and quality of image verification to almost 100%.

Importantly, AI eliminates the need for baseline images altogether.

The key insights of this white paper:

- Outline about AI Image Verification Technique
- Advantages of AI Image Verification Technique
- Comparison between Conventional & AI way of Image Verification
- Implementation of AI in Image Verification
- Challenges of training AI Images
- How AI Image verification helps customer
- Conclusion.



Advantages of AI Image Verification Technique

1. **Enhanced Accuracy:** AI-powered image verification ensures precise identification and validation of visual elements, reducing the likelihood of errors in test results.
2. **Adaptability to Changes:** AI algorithms can adapt to changes in the application's visual appearance, making them robust in scenarios where UI elements or layouts evolve over time.
3. **Scalability:** AI-powered image verification is scalable across different screen resolutions, devices, and platforms, providing a comprehensive testing solution for diverse environments.
4. **Cross-Browser and Cross-Platform Compatibility:** AI-powered image verification can facilitate consistent testing across various browsers and platforms, ensuring that the application functions seamlessly in diverse environments.
5. **Conserves Storage:** There is no need to store expected images and no need to keep changing your expected image when there is a UI image change. It removes the need to compare two images for identifying content.

Comparison between Conventional and AI way of Image Verification

Features	Conventional Way	AI Way
Require Baseline Image	Yes	No
Any Change requires Change in Baseline Image	Yes	No
Accuracy	Less	More
Rework	Yes	No
Time Efficient	No	Yes
Conserves Storage	No	Yes
Adaptability	No	Yes
Cross-Browser and Cross-Platform Compatibility	Dependent	Independent
Scalability	No	Yes

Implementation of AI in Image Verification

Capturing and training images for verification involves utilizing AI, and the quantity of images needed depends on specific requirements. The training process typically requires a few hours of effort to align the image with the desired specifications.

For text verification within images, a combination of OCR and AI can be employed to execute a comprehensive verification process, addressing both textual and image elements.

This implementation fulfils a longstanding need in test automation for an image verification technique that enhances accuracy and reliability.

The current implementation covers certain patterns, it has the potential to be extended to accommodate various patterns in the future

- a. Annotations
- b. Colour
- c. Rotation/Tilt
- d. Resize
- e. Measurements of Annotations (Shapes + Text)
- f. Zoom

Conclusion:

The incorporation of AI into Image Verification ensures a smooth regression run on target systems with diverse resolutions and operating systems, demonstrating efficient performance across all browsers. The combination of AI and OCR proves invaluable for both Image and Text verification, addressing a critical requirement in image verification techniques.

The return on investment (ROI) is straightforward, as maintenance is nearly eliminated, leading to increased productivity and reduced testing cycles. The adaptability and reliability of AI contribute to a smoother and less error-prone regression cycle, further enhancing the overall efficiency of the process. The integration of AI + OCR is essential for Image verification in Test Automation.

Challenges of AI in Image Verification

Capturing an increasing number of images is essential for diverse image verification techniques, tailored to specific requirements. Training all these images in a conducive environment involves making necessary adjustments to accurately identify the targeted areas within the images. While this process requires some effort, it is crucial for optimal performance.

Recognizing both images and text together poses a challenge, as incorporating AI and OCR necessitates code modifications.

However, once all the images are appropriately trained, the process runs seamlessly and efficiently, delivering reliable results.

How AI Image verification helps customers

Image verification plays a pivotal role in numerous applications across various domains such as Healthcare, E-Commerce, and Manufacturing. The traditional method of comparing the current image with a baseline image poses risks and requires extensive maintenance, especially when dealing with UI and resolution changes. The integration of AI and OCR in image verification serves to enhance accuracy, reliability, and significantly reduces maintenance efforts.

This increases the productivity of the test automation team and increases release velocity.



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About the authors

Lokesh Kumar K R :

is the CEO of Matryxsoft with 16 Years of IT experience in QA focusing on building unique solutions in Test Automation world.

Lokesh is currently working on implementation of Artificial Intelligence (AI) in Test Automation. Image verification has been the biggest drawback in Test automation hence overcame the challenges with AI removing the concept of Baseline Image which brings accuracy and reliability in Image verification technique.

About the authors

Bhumik Patel:

is a Software Engineer with IT experience in QA researching on AI Technology.

Bhumik has been focusing on providing solutions to Test Automation Projects using AI. He has implemented the solution of AI in Image verification techniques for Matryxsoft Tech.