1. **List out the AI-ML tools that can be utilized for test automation.**

**TestRigor:** write end-to-end UI tests quickly and efficiently.

**Applitools:** validate all elements of an interface, including text, images, layouts, videos, etc. It proactively monitors your user interface to help boost test coverage and eliminate the chance for any bugs to slip into production.

**Leapwork:** allows users to create and execute automated tests for web and desktop applications without the need for extensive coding. Leapwork is known for its visual, no-code approach to automation, where users can design automation flows using a visual interface.

**Mabl:** It uses machine learning to automatically update test scripts based on changes in the application. This can be valuable for maintaining tests in dynamic application environments.

**Sauce Labs:** It offers AI-powered testing for web and mobile applications. The use of AI can enhance the testing process and improve efficiency, especially in the context of web and mobile applications.

1. **Performance analysis of tools with compared to existing test automation tools.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Criteria** | **TestRigor** | **Applitools** | **Leapwork** | **Mabl** | **Sauce Labs** | **Selenium** |
| **Execution Speed** | Fast and efficient execution. | Depends on the complexity of tests. | Generally quick execution. | Automated updates may enhance speed. | AI-powered testing for efficiency. | Execution speed depends on scripts and configurations. |
| **Scalability** | Scales well for various test scenarios. | Scalable, especially for visual testing. | Good scalability for automated flows. | Scalability with automated script updates. | Scales efficiently for web and mobile testing. | Scalable but may require additional infrastructure for large-scale testing. |
| **Reliability** | Reliable test execution. | Reliable for visual validation. | Reliability in automated flows. | AI updates may enhance script reliability. | Reliable testing for web and mobile. | Reliable, but maintenance may impact reliability. |
| **Integration** | Integrates with various tools and CI/CD pipelines. | Integrates well with CI/CD and other tools. | Good integration capabilities. | Integrates with CI/CD and other tools. | Integrates with popular CI/CD tools. | Integrates with a wide range of tools and frameworks. |
| **Ease of Use** | Easy to use with a user-friendly interface. | User-friendly with visual validation. | Visual, no-code approach for simplicity. | Automated updates ease test maintenance. | User-friendly, especially for cloud-based testing. | Learning curve associated with scripting and configurations. |

1. **Advantages and disadvantages of the respective tools (why to use and why not to use).**

**TestRigor:**

Advantages:

* Quick and efficient creation of end-to-end UI tests.
* User-friendly interface, making it accessible for users with varying levels of technical expertise.
* Efficient execution for various test scenarios.

Disadvantages:

* Limited customization options for complex test scenarios.
* May not be suitable for highly specialized testing requirements.

**Applitools:**

Advantages:

* Powerful visual validation, covering text, images, layouts, videos, etc.
* Proactive monitoring of the user interface to prevent bugs from entering production.
* Integrates well with CI/CD pipelines and other tools.

Disadvantages:

* Resource-intensive, particularly for tests involving extensive visual elements.
* Costs may be relatively higher compared to some other tools.

**Leapwork:**

Advantages:

* No-code, visual approach to automation, making it accessible to non-developers.
* Good scalability and efficient resource utilization.
* Suitable for creating and executing automated tests for web and desktop applications.

Disadvantages:

* Limited flexibility for highly complex test scenarios.
* May not be as extensible or customizable as code-based solutions.

**Mabl:**

Advantages:

* Uses machine learning to automatically update test scripts based on application changes.
* Suitable for dynamic application environments.
* Simplifies test maintenance by automating updates.

Disadvantages:

* Relatively new technology, potentially with evolving features.
* May require additional training for users new to machine learning-based testing.

**Sauce Labs:**

Advantages:

* AI-powered testing for web and mobile applications, enhancing test efficiency.
* Cloud-based solution offering scalability and flexibility.
* Integrates well with popular CI/CD tools.

Disadvantages:

* Costs may be a consideration, especially for large-scale usage.
* Some features may be more beneficial for specific use cases.

1. **Feasibility of AI – ML test automation with existing selenium automation.**

All the tools listed above are integrated well with existing selenium automation. However, some tools may require minor tweaks or enhancements in Selenium scripts to fully leverage their capabilities.