International Journal of Multidisciplinary Innovation and Research Methodology (IJMIRM)
ISSN: 2960-2068, Volume 3, Issue 3, July-September, 2024, Available online at: https://ijmirm.com

Test Automation Frameworks for Data-Driven Applications

Mouna Mothey

Independent Researcher, USA

ABSTRACT

Effective software testing is becoming more and more necessary as software systems gain relevance and meet stricter quality standards. Reducing the quantity of resources required is a better long-term option than increasing the number of test engineers or extending the testing period. The use of automated testing has become essential to guaranteeing the quality and reliability of software as the field of development for software continues to advance in complexity and scale. The use of automated testing frameworks is essential for expediting the testing process; nevertheless, choosing the right framework type is difficult and requires careful consideration. Therefore, the purpose of this thesis is to examine if a data-driven strategy to test automation may be introduced by gathering and curating user behaviour data to provide testing input. This article presents an open source test automation tool and test automation framework for business intelligence and data warehouse applications. Because it may boost test coverage by running test cases repeatedly, unless the amount of test cases is enormous, data-driven automation can play a significant role in this situation. A framework for data-driven continuous testing has been put out in this study. This framework allows for the efficient execution of many scripts. This framework runs different test scenarios using an Excel spreadsheet. Selenium has been used in combination with this framework. Various parameters are being used to execute these scenarios. The paper's findings demonstrate that the framework can manage a high number of test cases and provide precise answers in accordance with the test case. This approach eliminates the need for manual testing in automation.

Keywords: - Automation Testing, Data Driven, Software Testing, Framework, Selenium, Test Engineers, Capability.

INTRODUCTION

Software systems are becoming more and more significant for both people and companies, and they are also becoming larger and more intricate. Therefore, it makes sense that software quality is becoming more and more important. Massive financial losses and even fatalities have resulted from software errors [1]. These losses will only increase if quality does not improve as systems get larger, more complicated, and more significant. Better quality is required, which puts additional strain on software testing and the test engineers who handle it. One apparent option to reduce their burden is to use test automation, i.e. [1, 2]. Assigning certain testing chores to computers. Computers are quicker than people, they don't get bored or fatigued, they're reasonably priced, and they work on the weekends without being paid more [2, 3]. However, since they only detect flaws in locations where they are specifically instructed to seek and because they are readily distracted by changes in the Subject under Test (SUT), they are not the best workhorses. It takes time and effort to provide computers with all the information they need [3, 4].

There are many applications for test automation [4, 5]. No one automation technique is universally effective, and it may and should be used differentially in many settings [5, 6]. Although it's not a panacea either, test automation has a lot of promise and, when implemented properly, may greatly assist test engineers in completing their task [6, 7].

Ensuring the quality and dependability of software applications is crucial in the constantly changing field of software development [8, 9]. Because software projects are dynamic and often include updates and improvements, a strong testing approach that can adapt to these changes is required [9, 10]. Web-based applications were exhibiting the traits of rapid regeneration and short release cycles, as well as more complicated business logic and larger information platform development. Web application testing, particularly functional regression testing, is becoming increasingly difficult as the software process for development becomes shorter. Automation testing is the only viable option as traditional testing methods are no longer able to satisfy the demands of software development. Given the potential for quicker, [10, 11], more effective, and more consistent test processes, test automation has become an essential tool in this regard. The foundation of effective test automation is the choice of a suitable framework [11, 12].

The most crucial stage of the software life cycle of development is software testing. Testing accounts for around 30–40% of the project's overall work [12, 13]. According to Edward Eggleston, an American historian and author, "persistent people begin to succeed where other end in failure." Persistence is crucial in software testing [14, 15]. The

purpose of software testing is to find flaws, not to hide them [15, 16]. According to William Howden, a lecturer at the University of California, the testing process is becoming more intricate and significant as online applications become more complicated [17],

"Any competent attempt to design a software system must include testing".

Software may be tested manually or with any kind of tool. Using a computerized instrument for software evaluation is a smart option since manual testing is a labour-intensive and time-consuming operation [11]. An open source instrument for testing called Selenium was released to improve testing efficiency and automate test cases [1, 7]. Selenium is an automated web application testing tool. The testing of these online apps is becoming increasingly hard as the web grows. When testing such complex online applications, testers must overcome a number of obstacles, such as support for many browsers [8, 9], platforms, wait conditions, flash objects, and multiple languages. Selenium WebDriver guarantees that the tester can manage all of these difficulties [9, 10].

Testing typically accounts for approximately 35% of the total development work and is an essential component of the software life cycle for development [9, 10]. Data-centric apps are difficult to evaluate since testing different data combinations would take a lot of time. Examining because the quality of the data and the attractiveness of the information gleaned from the apps determine how many users an application has, the data warehouse apps are very important [10]. Because they must repeat the same test with a large data set, manual testing of data warehouse apps is a tedious effort for testers. Consequently, automated the test cases may greatly improve the sanity of the testing process. Additionally, test automation shortens testing teams' turnaround times [10, 11], which lowers the overall distribution of defects across modules [11].

Due to the high cost of automation testing technologies, automating test cases may often be costly [11, 12]. The cost of a test automation tool may range from $1200 to $8500 per seat annually; however, this expense can be reduced by adopting Selenium, an open source test automating tool. Selenium, in contrast to other tools based on open source is updated often to reflect the latest developments in the internet technology [12, 13]. Numerous online forums with a large number of active participants effectively support Selenium. One of the greatest test automation tools for web-based application automation is Selenium [13].

Additionally, Selenium facilitates cross-browser testing, which allows programs to be tested across many browsers. Selenium is an excellent option for testing data-centric applications, such as e-commerce websites, since it can also be used to test web 2.0 and HTML 5 apps [12]. The learning path for test engineers is lowered since Selenium test scripts may be written in a variety of languages, including Java [13], Ruby, C#, and PHP [14].

Parallel test execution is possible with Selenium Server. Testing data-centric applications is made easier by running the test cases in parallel, which cuts down on test execution time. The testing process may be made more efficient and hardware costs can be decreased by using cloud-based technologies and virtualization [14, 15]. The efficiency of test automation may be increased with the use of these technologies [15]. The actual hardware required to set up the test environment may be purchased less often thanks to virtualization [18, 19]. Web applications may be tested concurrently with various browser and operating systems combination by using virtualization methods [20].

Selenium Server offers unparalleled capabilities for realistically testing web applications, running test cases concurrently, cutting expenses, and improving test execution speed and code coverage. One tool for multi-threaded test execution is Selenium Server [20, 21]. The test scripts may be smoothly distributed over many computers via the MTE component. These devices may be virtual or actual. This reduces the amount of time needed for test execution by guaranteeing that the test scenarios are run concurrently [20, 21].

Thus, the suggested approach greatly encourages testing and provides engineers with prompt, precise feedback. The MTE component allows for the use of the current hardware infrastructure. In an environment that is diverse with varying OS and browser combinations, numerous test cases are executed concurrently on various hosts utilizing distinct data sets [22]. Multiple instances of Selenium Server may be operated in parallel using the MTE component [22, 23]. The MTE component reduces the amount of time needed to execute the Selenium test cases to a fraction of what would be needed for a single instance of the test execution component [23].

Software testing has undergone a process of change throughout time [23]. Software testing used to be done by hand, and many software companies still do this today. Later automation tools for testing began to appear, but for the majority of them, test engineers still had to write test scripts by hand and only the test case execution process was automated. Automated testing initiatives may help save time and money, but they cannot completely replace manual testing. As a result, automated and manual testing methods are used simultaneously. However, creating and maintaining test cases is a costly and challenging process for both testing methods [11, 12].

One common solution to this issue is the use of model-based testing methodologies. One test automation method that is thought to be a way to automated test design in order to produce test cases from the system under test (SUT) framework is model-based testing [14].

Small and influential smart gadgets are widely employed in today's world to connect with one another and carry out intricate computational operations simultaneously. New kinds of applications called as context-aware or self-adaptive apps have emerged as a result of technology developments [15]. To improve the user experience, context-aware apps can rapidly adjust to situational context and infer and respond to their surroundings. WALKPATH and City Guide are two instances of context-aware programs [16]. Numerous industries, including healthcare and entertainment, adopt context-aware software [16, 17]. Context-aware apps vary from traditional or non-context-aware applications due to a number of unique characteristics [17, 18].

The context itself is the primary factor that distinguishes a context-aware program from a traditional application. Context is a kind of information that may be separated from an activity or event and describes the features of the setting in which it occurred. There are numerous models to determine the context dimensions, and the context may have several dimensions [17]. The pentagonal model put forward in [16] is one example of such a paradigm. Individuality, time, action, place, and relationships are the five context aspects of an entity identified by this approach.

It's critical to comprehend these characteristics and adjust test method while testing context-aware apps. Context, context quality, context sources, [17], context interpretation, and reasoning are some crucial components of context-aware applications [18].

Test automation hasn't been as successful in the past as it might be. The most common causes of this failure include poor design, a lack of adaptability for upcoming improvements, uncontrolled redundancy, etc. The most effective and high-quality method of product testing is automated testing [18]. The method of analysing software using automation tools is known as automated testing. One popular open source automation tool for testing web-based applications is Selenium [18, 19]. It supports almost every contemporary browser, including Safari, Firefox, Chrome, Internet Explorer, Opera, and others, and it operates on a variety of platforms, including Windows, Linux, and Macintosh [2].

To save time and maximize benefits, automation testing requires a well-defined methodology built on a thorough foundation. A collection of theories, theoretical concepts, and practical applications that facilitate automated software testing is known as an automated testing platform [11, 15].

Data-driven evaluations, modularity-driven testing, keyword-driven testing, and hybrid testing are some of the most well-known automation frameworks—though there are many more. The development of test scripts to execute alongside their associated data sets inside the framework is known as data-driven testing. The primary benefits of automated testing are their reusability and their ease of maintenance [2, 4]. Data sheet preparation is required for this, and it is entirely separate from the test automated tool. A few benefits of data-driven testing include:

1. Large amount of data can be fetched using the data sheet for repeated use of test case execution [2, 9].
2. Maintenance and reusable.
3. If the features of the application under test (AUT) changes, just the script that represents a "Business Function" has to be changed or updated [6, 7].
4. A few of the framework's elements, such the test record and report, are quite configurable [8].

With the use of automation tools, automation testing lessens the requirement for manual or human participation in repetitive or duplicate processes [8, 11]. Automated software testing increases test coverage and accuracy quickly and affordably. Test automation offers particular benefits for increasing a software team's testing procedures' long-term effectiveness at a minimal cost and time. Despite the substantial amount of research on software automation for testing that has already been done, an examination of the relevant literature reveals that much of it is too application-specific [18, 19]. Furthermore, none address the real issues with framework development and effective fixes for those [11].

RELATED WORK

Case studies or feasibility examinations comprise the majority of the research published on automated test frameworks. With the aid of the work that has been published up to this point in the field of automation frameworks design for Data Driven Frameworks, this section emphasizes the literature review phase and developed with a problem description [11, 12]. A basic framework for test automation that generates tests for JavaScript web applications based on user input. In addition to requiring access to AUT's source code, this work provided a case study of a particular system rather than a generic or all web applications [11, 12]. The appropriate usage of XML format for describing test data is mentioned in

the XML Schema Based Approach for Testing of Software Components [5, 6]. They succinctly outline certain fundamentals for putting data-driven frameworks into practice, but once again, they don't provide a broad model or structure for design [5].

An explanation of the Coyote framework, which is based on XML and was created for Web service testing. Once again, there were no inferences drawn from this case study [5]. Numerous frameworks, ranging from open source to commercial [6, 7], are available to help with automation testing. These include Junit, Jersey Test Framework, the Software Testing and Automation Framework (STAF), Selendroid, [5, 6], Spock's, Quick Test Professionals (HP Unified Functional Testing Software), Telerik Test Studio, Structure for Integrated Test (FIT), StoryTestIQ, Ranorex, Automation for Testing FX, [6], Concordion, and Selenium. We came to the conclusion after studying these frameworks that each one has unique characteristics and specializations [7, 8].

Proposed Work: Implementation Of Continuous Testing Framework With Selenium

STEP 1: *Establishing the Framework Project Structure*
STEP 2: *Include jar files in the build path for the project*
STEP 3: *Making the Necessary Class Files*
STEP 4: *Add the necessary data.xls files.*
STEP 5: *Include a Reading and Writing Utility for.xls Files in the Framework*
STEP 6: *Developing a Framework-Based Sample Data Reading Test*
STEP 7: *Data Reading Test Implementation in Both Test Suites*
STEP 9: *To run suite from a single location, add a testng.xml file*
STEP 10: *Reporting the Execution Status of the Test Suite*
STEP 11: *Include a test case. The automation framework's skip function*
STEP 12: *Include a Data Skip Function Framework for Iin for Selenium*
STEP 13: *Including Test Failure Information in Test Reports*
STEP 14: *Taking a Screenshot of a Pass or Failure*
STEP 15: *Use Log4j to Implement Logging*
STEP 16: *Create XSLT Reports with ANT*
STEP 17: *Launch the WebDriver test using a batch file (.bat).*
STEP18: *Keep the test results in an Excel document.*
STEP 19: *Keep the information about the environment in a property file.*
STEP 20: *Store different objects in the object repository file of the program that need user action.*
STEP 21: *The logic to confirm the acceptance criteria specified in the requirement is included in the test suite.*
STEP 22: *Test the script in different browsers as necessary.*
STEP 23: *Create reports that include screenshots and pass/fail outcomes. Testing is utilized to get findings in advance.*

The following testing cases for Paytm.com were automated using data-driven continuous testing in Selenium, as shown below:-

(1) When we input the right ID and password, the user should only be able to log into their account [8, 9]; otherwise, they shouldn't be able to [9, 10].
(2) The user selected on one of the items in the categories if the login information was legitimate.
(3) The user click on the subcategory and selected an available product after choosing a Product Category [10, 11].
(4) Put the chosen item in the cart [11].
(5) The user now enters payment information from the TestData.xls Excel file. [11, 12].
(6) The transaction continues and this process is repeated with a new Product name and Category if the credentials are correct [12].
(7) The test case fails if the credentials are invalid, and the event is recorded in the test reports folder as HTML [13].

Any application may utilize the suggested framework directly without any further effort. Define the system's components, their functions, and the binding relationships between them [14] in order to ensure that all of its parts operate in unison [13]. The following lists and discusses the many packages utilized in the proposed work:

- **Config: -** Maintains all configuration files, including property files.
- **App Modules: -** Includes every module in the application.

(1) Check_Out_Action.java
(2) Confirmation_Action.java
(3) Payment_Details_Action.java
(4) Product_Select_Action.java
(5) Sign_in_Action.java
(6) Verification_Action.java

- **Page Objects: -** Includes all of the application's page objects.

(1) BaseClass.java
(2) CheckOut_Page.java
(3) Confirmation_Page.java
(4) Home_Page.java
(5) Login_Page.java
(6) Product_List_Page.java
(7) Product_Selection_Page.java

- **Screenshots: -** Includes screen grabs of several test situations [15, 18].
- **Test Cases: -** Includes the application testing test cases.
- **Test Data: -** Contains includes an Excel sheet that should be used to get data [18].
- **Utility: -** Has a number of useful features, like as:-

(1) Excel_Utils.java
(2) Logs.java
(3) Constants.java
(4) LogUtils.java

TESTING FRAMEWORK, RESULTS AND DISCUSSION

A number of test cases, such as login with user name and password [18, 19], data retrieval, and payment information validation [19, 20], are used to verify that the data driven continuous evaluation architecture is operating properly. Snapshots captured during test case execution are used in Figures 2 through 5 to visually portray the test cases under consideration [20].

```
<div class="card">
    <ng-container *ngIf="layout === 'rtl'; then btn else title"></ng-container>
    <p>Agency: {{agent.agency}}</p>
    <ng-container *ngIf="layout === 'rtl'; then title else btn"></ng-container>
</div>

<ng-template #title>
    <h4 >{{ agent.codeName }}</h4>
</ng-template>
<ng-template #btn>
    <button class="primary">Hire</button>
</ng-template>
```

Fig. 1 An image of the first test case. [20, 21]

Modules Used for this Test Case

All of the constant parameters used in the app's testing are stated in the Constant.java class [20, 21]. This is how this class appears:-

```
Public class Constant {
        public static final String URL = "https://paytm.com/shop";
        public static final String Username = "testuser_1";
        public static final String Password ="Test@123";
            public static final String Path_TestData =
"F://SetUp2//EclipsePortable//Data//workspace//Day1//src//testData//";
            public static final String File_TestData = "TestData.xlsx";
                        //Test Data Sheet Columns

                    public static final int Col_TestCaseName = 0;
                    public static final int Col_UserName =1 ;
                    public static final int Col_Password = 2;
                    public static final int Col_Browser = 3;
                    public static final int Col_ProductType = 4;
                    public static final int Col_ProductNumber = 5;
                    public static final int Col_FirstName = 6;
                    public static final int Col_LastName = 7;
                    public static final int Col_Address = 8;
                    public static final int Col_City = 9;
                    public static final int Col_Country = 10;
                    public static final int Col_Phone = 11;
                    public static final int Col_Email = 12;
                    public static final int Col_Result = 13;
                    public static final String Path_ScreenShot =
    "F://SetUp2//EclipsePortable//Data//workspace//Day1//src//Screenshots//";
            }
      We have a LogIn.java class where the methods are defined.
      public static WebElement txtbx_UserName() throws Exception{
          try{
                element = driver.findElement(By.id("log"));
                Log.info("Username text box is found on the Login Page");
          }catch (Exception e){
                Log.error("UserName text box is not found on the Login Page");
                throw(e);
                }
          return element;
        }
          public static WebElement txtbx_Password() throws Exception{
          try{
                element = driver.findElement(By.id("pwd"));
               Log.info("Password text box is found on the Login page");
          }catch (Exception e){
                Log.error("Password text box is not found on the Login Page");
                throw(e);
                }
          return element;
      }

    }
          public static WebElement btn_LogIn() throws Exception{
        try{
                element = driver.findElement(By.id("login"));
              Log.info("Submit button is found on the Login page");
        }catch (Exception e){
                Log.error("Submit button is not found on the Login Page");
                throw(e);
                }
        return element;
    }
```

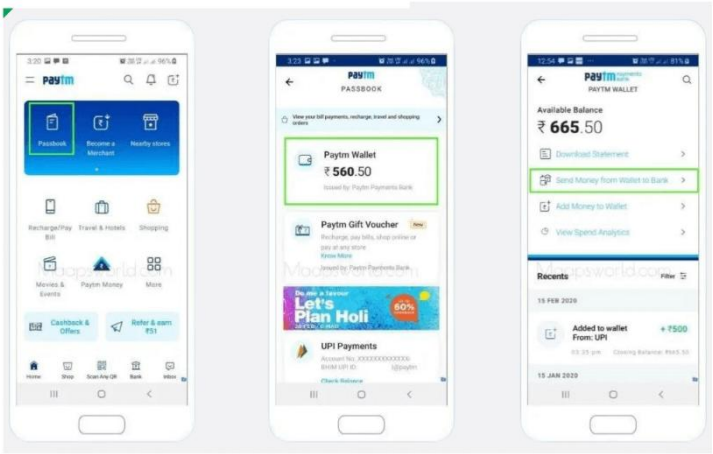

Fig. 1 A snapshot used to test the other Paytm.com test scenarios. [18, 20]

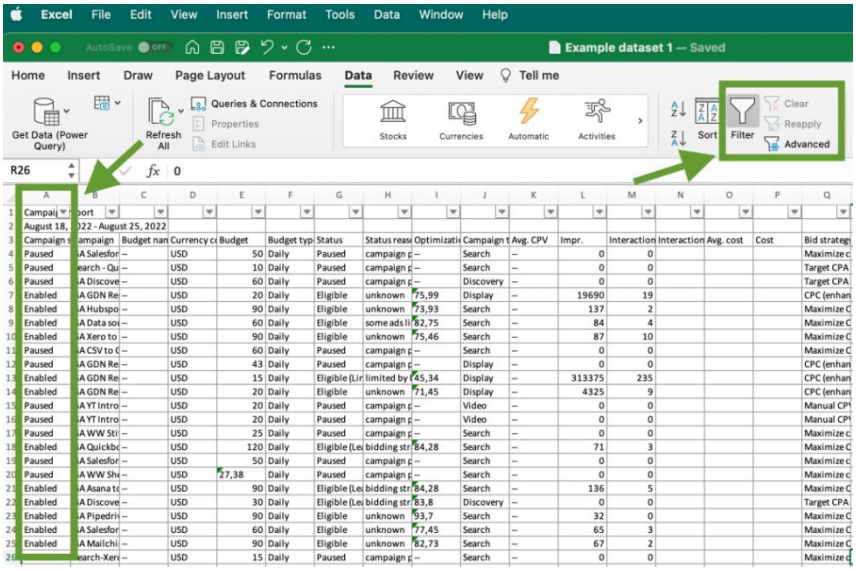

Fig. 2 Getting Information Out of an Excel Sheet. [21, 22]

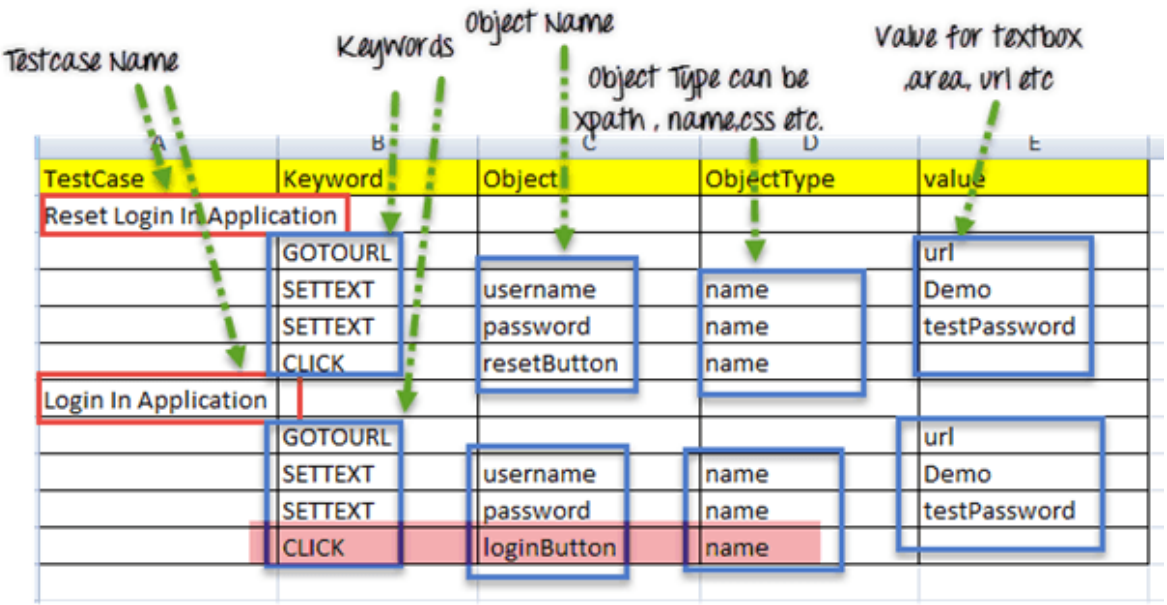

Fig. 3 An image of the Data Driven Automation Framework's Excel sheet [27, 28]

RESULT

Testing, a well-recognized report production framework for the Java programming language, is used to create findings in the form of reports for the suggested task [29, 30]. The JUnit framework's shortcomings are addressed with the introduction of the Testing framework. With the addition of testing in the Selenium web driver, the human examination of the obtained findings was replaced by automated report creation [31, 32]. Figure 6 displays a report that was produced during testing [32, 33]. All of the execution processes carried out across the examined test scenarios are clearly presented in this report [34, 35].

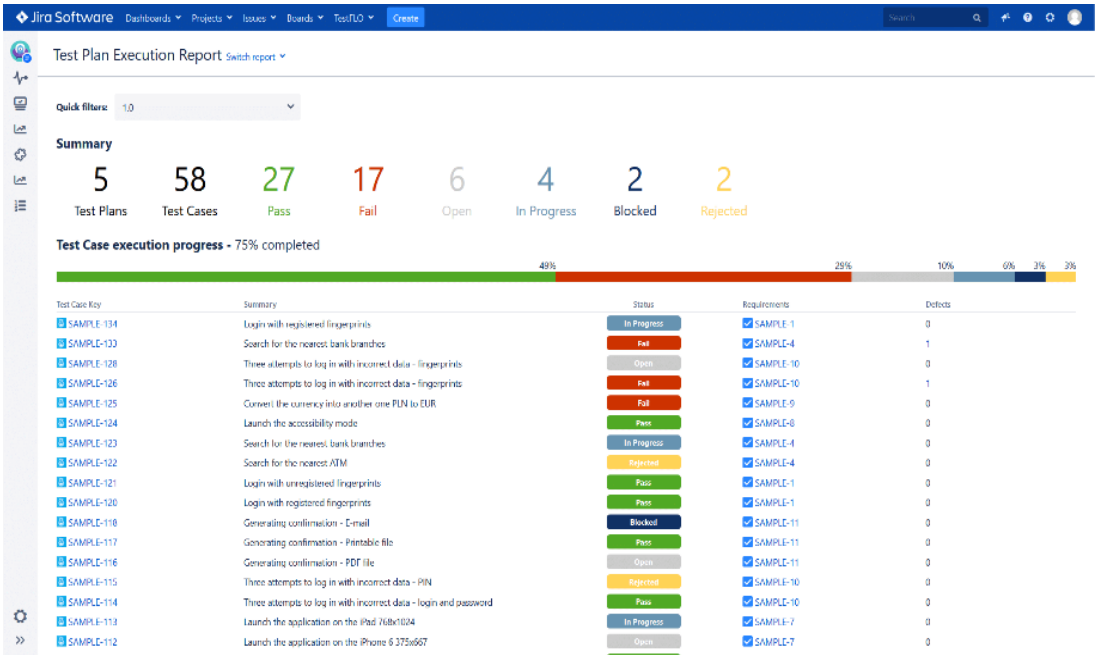

Fig. 4 Report for Test Cases Considered. [29, 30]

CONCLUSION

Automating test cases using a tool is just one aspect of automation; there is much more to it. Because online applications are more complicated and feature-rich, testers may encounter a number of difficulties while automating a web application. When automating an application, choosing a suitable framework is another challenge. In this research, we developed a data-driven framework that uses Selenium WebDriver to automate web application testing.

A thorough examination of the wide variety of test automation framework and the trade-offs that come with each kind. In this thorough analysis, we have examined the core ideas, traits, advantages, and difficulties of different framework types, illuminating the important considerations that testing teams and organizations need to make when choosing the best framework for their projects. In the case of test automation frameworks, our investigation has shown that there is no generally applicable solution. The project's unique needs and constraints, the testing team's experience, and the particular automation goals must all be taken into consideration while selecting a framework.

This study offered a comprehensive strategy for putting in place a framework for testing business intelligence and data warehouse applications that can run test cases more quickly. Frameworks were proposed for extracting test data marts using different techniques. An orthogonal array transformation method for reducing the test data mart was tried.

This article proposes and tests a data-driven continuous testing framework using various test scenarios. Any application may utilize this framework straight away and save a lot of time. Any web browser may operate this framework well as well. A huge number of test cases can be handled by this framework since it is sufficiently resilient. The data-driven framework's drawback is that non-technical users may find it difficult to use and sometimes it may not be able to fully examine the reusability of library functions. A hybrid framework that may help the non-technical user using keyword-driven approaches and maximize the usage of reusability features is needed to eliminate or enhance these restrictions.

When test cases grow to be enormous, an effective process or algorithm will be needed to execute them more quickly than with conventional test case methods. This is another significant problem that might occur with a data-driven approach.

REFERENCES

[1]. Mustafa, K.M.; Al-Qutaish, R.E.; Muhairat, M.I., "Classification of Software Testing Tools Based on the Software Testing Methods," Computer and Electrical Engineering, 2009. ICCEE '09. Second International Conference on, vol.1, no., pp.229, 233, 28-30 Dec. 2009.
[2]. Holmes, A.; Kellogg, M., "Automating functional tests using Selenium," Agile Conference, 2006, vol., no., pp.6 pp., 275, 23-28 July 2006.
[3]. Wissink, T.; Amaro, C., "Successful Test Automation for Software Maintenance," Software Maintenance, 2006. ICSM '06. 22nd IEEE International Conference on, vol., no., pp.265, 266, 24-27 Sept. 2006.
[4]. Zhen Li.;Yong Hu Sun.;, "Use Selenium Grid to enhance testing of web applications", "IBM Techinical Library",07 June 2011.
[5]. Sneed, H.M., "Testing a Datawarehouse - An Industrial Challenge," Testing: Academic and Industrial Conference - Practice And Research Techniques, 2006. TAIC PART 2006. Proceedings, vol., no., pp.203, 210, 29-31 Aug. 2006.
[6]. Kuhn, D.R.; Reilly, M.J., "An investigation of the applicability of design of experiments to software testing," Software Engineering Workshop, 2002. Proceedings. 27th Annual NASA Goddard/IEEE, vol., no., pp.91, 95, 5-6 Dec. 2002.
[7]. Kulkarni, Amol. "Digital Transformation with SAP Hana."International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169.
[8]. Caniupan, M.; Placencia, A., "Data Warehouse Fixer: Fixing Inconsistencies in Data Warehouses," Computer Science Society (SCCC), 2011 30th International Conference of the Chilean, vol., no., pp.28, 32, 9-11 Nov. 2011.
[9]. Ramachandran, M., "Testing software components using boundary value analysis," Euromicro Conference, 2003. Proceedings. 29th, vol., no., pp.94, 98, 1-6 Sept. 2003.
[10]. Reid, S.C., "An empirical analysis of equivalence partitioning, boundary value analysis and random testing," Software Metrics Symposium, 1997. Proceedings, Fourth International, vol., no., pp.64, 73, 5-7 Nov 1997.
[11]. Min Chen; Xuedong Gao; HuiFei Li, "An efficient parallel FP-Growth algorithm," Cyber-Enabled Distributed Computing and Knowledge Discovery, 2009. CyberC '09. International Conference on, vol., no., pp.283, 286, 10-11 Oct. 2009.
[12]. Maity, S.; Nayak, A., "Improved test generation algorithms for pair-wise testing," Software Reliability Engineering, 2005. ISSRE 2005. 16th IEEE International Symposium on, vol., no., pp.10 pp, 244, 1-1 Nov. 2005.
[13]. Glicker, S.; Hosch, F., "A design approach for a distributed test automation system," Applied Computing, 1990., Proceedings of the 1990 Symposium on , vol., no., pp.9,11, 5-6 Apr 1990,
[14]. Mark Hall, Eibe Frank, Geoffrey Holmes, Bernhard Pfahringer, Peter Reutemann, Ian H. Witten (2009); The WEKA Data Mining Software: An Update; SIGKDD Explorations, Volume 11, Issue 1.
[15]. AMELIA II: A Program for Missing Data. James Honaker, Gary King, and Matthew Blackwell. Version 1.7.2. June 8, 2013. (Internet).
[16]. Ying Wah Teh; Abu Bakar Zaitun; Lee, S.P., "Data mining using classification techniques in query processing strategies," Computer Systems and Applications, ACS/IEEE International Conference on. 2001, vol., no., pp.200, 202, 2001.
[17]. Feature Extraction, Construction and Selection: A Data Mining Perspective edited by Huan Liu, Hiroshi Motoda, Kluwer Academic Publishers, 2001
[18]. Alex Cervantes, “Exploring the Use of a Test Automation Framework”, IEEEAC paper #1477, version 2, up dated January 9, 2009.
[19]. Kulkarni, Amol. "Generative AI-Driven for Sap Hana Analytics." International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169.
[20]. Khaled Mustafa, Rafa E. Al-Qutaish, Mohammad I. Muhairat, “Cassification of Software testing Tools Based on the Software Testing Methods”, 2009 second International Conference on Computer and Electrical Engineering, 978-0-7695-3925-6, 2009.
[21]. Harpreet Kaur, Dr.Gagan Gupta, “Comparative Study of Automated Testing Tools: Selenium, Quick Test Professional and Testcomplete”.
[22]. R.S.Pressman, “Software Engineering A Practitioner‟s Approach”, Mcg
[23]. M. Utting and B. Legeard, Practical Model-Based Testing: A Tools Approach, San Francisco, CA, USA:Morgan Kaufmann, 2007.
[24]. H. Lu, W. K. Chan and T. H. Tse, "Testing pervasive software in the presence of context inconsistency resolution services", Proc. ACM/IEEE 30th Int. Conf. Softw. Eng., pp. 61-70, May 2008.
[25]. K. Zhai, B. Jiang, W. K. Chan and T. H. Tse, "Taking advantage of service selection: A study on the testing of location-based Web services through test case prioritization", Proc. IEEE Int. Conf. Web Services (ICWS), pp. 211-218, Jul. 2010.

[26]. P. Dourish, "What we talk about when we talk about context", Pers. Ubiquitous Compute., vol. 8, pp. 19-30, 2004.
[27]. A. Zimmermann, A. Lorenz and R. Oppermann, "An operational definition of context", Proc. 6th Int. Interdiscipl. Conf. Modeling Using Context (CONTEXT), pp. 558-571, 2007.
[28]. B. Chihani, E. Bertin, F. Jeanne and N. Crespi, "Context-aware systems: A case study" in Digital Information and Communication Technology and Its Applications. DICTAP, Berlin, Germany:Springer, vol. 167, 2012.
[29]. S. Yue, S. Yue and R. Smith, "A survey of testing context-aware software: Challenges and resolution", Proc. Int. Conf. Softw. Eng. Res. Pract. (SERP), pp. 102-109, 2016.
[30]. W.T. Tsai, R. Paul, S. Weiwei, and C. Zhibin, "Coyote: an XML-based Framework for Web Services Testing", Proceedings of the 7th IEEE International Symposium on High Assurance Systems Engineering, 2002, pp. 173-174.
[31]. Neha Yadav,Vivek Singh, “Probabilistic Modeling of Workload Patterns for Capacity Planning in Data Center Environments” (2022). International Journal of Business Management and Visuals, ISSN: 3006-2705, 5(1), 42-48. https://ijbmv.com/index.php/home/article/view/73
[32]. Vivek Singh, Neha Yadav. (2023). Optimizing Resource Allocation in Containerized Environments with AI-driven Performance Engineering. International Journal of Research Radicals in Multidisciplinary Fields, ISSN: 2960-043X, 2(2), 58–69. Retrieved from https://www.researchradicals.com/index.php/rr/article/view/83
[33]. C. Merchant, M. Tellez, and J. Venkatesan, "A Browser yu6Agnostic Web Application UI Test Framework:
[34]. Motivation, Architecture, and Design", Proceedings of the 6th International Conference on Information Technology New Generations, April 2009, pp. 748-751.
[35]. D.R. Kuhn, D.R. Wallace, and A. Gallo, “Software Fault Interactions and Implications for Software Testing,” IEEE Trans. Software Eng., vol. 30, no. 6, 2004, pp. 418–421.
[36]. M. Yalla and M. Shanbhag, “Building automation framework around open source technologies,” in proc. of Software Testing Conference, pp. 6-9, Banglore, India, November, 2009
[37]. K. Czarnecki and S. Helsen, "Classification of model transformation approaches", Proc. 2nd OOPSLA Workshop Generative Techn. Context Model Driven Archit., pp. 1-17, 2003.
[38]. N. Kahani and J. R. Cordy, Comparison and Evaluation of Model Transformation Tools, Fountain Valley, CA, USA: Kingston, 2015.
[39]. F. Jouault, F. Allilaire, J. Bézivin and I. Kurtev, "ATL: A model transformation tool", Sci. Comput. Program, vol. 72, no. 1, pp. 31-39, 2008.
[40]. Khair, M. A., Thumati, P. R. R., Kanchi, P., Jain, U., & Goel, P. (2024). Integration of Oracle HCM with third-party tools. Modern Dynamics: Mathematical Progressions, 1(2), 295–315. https://doi.org/10.36676/mdmp.v1.i2.25
[41]. Rahul Arulkumaran, Pattabi Rama Rao Thumati, Pavan Kanchi, Lagan Goel, & Prof.(Dr.) Arpit Jain. (2024). Cross-chain NFT marketplaces with Layer Zero and Chainlink. Modern Dynamics: Mathematical Progressions, 1(2), 316–336. https://doi.org/10.36676/mdmp.v1.i2.26
[42]. Rao, U. P. R., Jain, S., & Tyagi, P. (2024). Enhancing web application performance: ASP.NET Core MVC and Azure solutions. Journal of Emerging Trends and Novel Research, 2(5), 1–18. JETNR.
[43]. Salunkhe, V., Thumati, P. R. R., Kanchi, P., Chhapola, A., & Goel, O. (2024). EHR interoperability challenges leveraging HL7 FHIR for seamless data exchange in healthcare. SSRN. Available at https://ssrn.com/abstract=4984979
[44]. Vivek Singh, Neha Yadav,“Deep Learning Techniques for Predicting System Performance Degradation and Proactive Mitigation” (2024). International Journal of Open Publication and Exploration, ISSN: 3006-2853, 12(1), 14-21. https://ijope.com/index.php/home/article/view/136
[45]. Arulkumaran, R., Thumati, P. R. R., Kanchi, P., & Goel, L., Prof.(Dr.) Arpit Jain. (2024). Cross-chain NFT marketplaces with LayerZero and Chainlink. Modern Dynamics: Mathematical Progressions, 1(2), Jul-Sep. https://doi.org/10.36676/mdmp.v1.i2.26
[46]. Vijayabaskar, S., Thumati, P. R. R., Kanchi, P., Jain, S., & Agarwal, R. (2023). Integrating cloud-native solutions in financial services for enhanced operational efficiency. SHODH SAGAR® Universal Research Reports, 10(4), 402. https://doi.org/10.36676/urr.v10.i4.1355
[47]. Rao, P. R., Chaurasia, A. K., & Singh, S. P. (2023). Modern web design: Utilizing HTML5, CSS3, and responsive techniques. Journal of Novel Research and Innovative Development, 1(8), 1–18. https://jnrid.org
[48]. Rao, U. P. R., Goel, L., & Kushwaha, G. S. (2023). Analyzing data and creating reports with Power BI: Methods and case studies. International Journal of Novel Trends and Innovation, 1(9), 1–15. IJNTI.
[49]. Dipak Kumar Banerjee, Ashok Kumar, Kuldeep Sharma. (2024). AI Enhanced Predictive Maintenance for Manufacturing System. International Journal of Research and Review Techniques, 3(1), 143–146. Retrieved from https://ijrrt.com/index.php/ijrrt/article/view/190
[50]. Banerjee, Dipak Kumar, Ashok Kumar, and Kuldeep Sharma. "Artificial Intelligence on Additive Manufacturing." International IT Journal of Research, ISSN: 3007-6706 2.2 (2024): 186-189.
[51]. Rao, P. R., Goel, P., & Renuka, A. (2023). Creating efficient ETL processes: A study using Azure Data Factory and Databricks. The International Journal of Engineering Research, 10(6), 816–829.

[52]. Rao, P. R., Priyanshi, E., & Vashishtha, S. (2023). Angular vs. React: A comparative study for single-page applications. International Journal of Current Science, 13(1), 1–20. IJCSPUB.
[53]. Balasubramaniam, V. S., Thumati, P. R. R., Kanchi, P., Agarwal, R., Goel, O., & Shrivastav, E. A. (2023). Evaluating the impact of agile and waterfall methodologies in large-scale IT projects. International Journal of Progressive Research in Engineering Management and Science, 3(12), 397–412.
[54]. Pattabi Rama Rao, E., & Vashishtha, S. (2023). Angular vs. React: A comparative study for single-page applications. International Journal of Computer Science and Programming, 13(1), 875–894.
[55]. Gajbhiye, B., Aggarwal, A., & Goel, P. (2023). Security automation in application development using robotic process automation (RPA). Universal Research Reports, 10(3), 167.
[56]. Banerjee, Dipak Kumar, Ashok Kumar, and Kuldeep Sharma. "Artificial Intelligence on Supply Chain for Steel Demand." International Journal of Advanced Engineering Technologies and Innovations 1.04 (2023): 441-449.
[57]. Rao, P. R., Goel, P., & Jain, A. (2022). Data management in the cloud: An in-depth look at Azure Cosmos DB. International Journal of Research and Analytical Reviews, 9(2), 656–671. https://www.ijrar.org/
[58]. Rao, P. R., Gupta, V., & Khan, S. (2022). Continuous integration and deployment: Utilizing Azure DevOps for enhanced efficiency. Journal of Emerging Technologies and Innovative Research, 9(4), 1–21. JETIR.
[59]. Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization techniques in supply chain planning for consumer electronics. International Journal for Research Publication & Seminar, 13(5), 356.
[60]. Khatri, D., Aggarwal, A., & Goel, P. (2022). AI chatbots in SAP FICO: Simplifying transactions. Innovative Research Thoughts, 8(3), Article 1455.
[61]. Rao, P. R., Chhapola, A., & Kaushik, S. (2021). Building and deploying microservices on Azure: Techniques and best practices. International Journal of Novel Research and Development, 6(3), 1–16. IJNRD.
[62]. Pattabi Rama Rao, E. O. G., & Kumar, D. L. (2021). Optimizing cloud architectures for better performance: A comparative analysis. International Journal of Creative Research Thoughts (IJCRT), ISSN 2320-2882.
[63]. Nittala, S. R., Mallikarjun, L., Bhanumathy, V., et al. (2014). Studies on the impact of road traffic noise inside selected schools of Tiruchirappalli city, Tamilnadu, India. Noise & Vibration Worldwide, 45(11), 19–27. https://doi.org/10.1260/0957-4565.45.11.19
[64]. Bharath Kumar Nagaraj, SivabalaselvamaniDhandapani, “Leveraging Natural Language Processing to Identify Relationships between Two Brain Regions such as Pre-Frontal Cortex and Posterior Cortex”, Science Direct, Neuropsychologia, 28, 2023.
[65]. Mokkapati, C., Jain, S., & Chhapola, A. (2024, July). The Role of Leadership in Transforming Retail Technology Infrastructure with DevOps. Darpan International Research Analysis, 12(3), 228–238.
[66]. Chandrasekhara Mokka Pati, Goel, P., & Aggarwal, A. (2024). Scalable Microservices Architecture: Leadership Approaches for High-Performance Retail Systems. Modern Dynamics: Mathematical Progressions, 1(2), 58–71.
[67]. Mokkapati, C., Goel, P., & Renuka, A. (2024). Driving efficiency and innovation through cross-functional collaboration in retail IT. Journal of Quantum Science and Technology, 1(1), 35–49. https://doi.org/10.36676/jqst.v1.i1.08
[68]. Alahari, J., Tangudu, A., Mokkapati, C., Goel, O., & Jain, A. (2024). Implementing continuous integration/continuous deployment (CI/CD) pipelines for large-scale iOS applications. SHODH SAGAR® Darpan International Research Analysis, 12(3), 522. https://doi.org/10.36676/dira.v12.i3.1
[69]. Vishwasrao Salunkhe, A., Tangudu, A., Mokkapati, C., Goel, P., & Aggarwal, A. (2024). Advanced encryption techniques in healthcare IoT: Securing patient data in connected medical devices. Modern Dynamics: Mathematical Progressions, 1(2), 224–247. https://doi.org/10.36676/mdmp.v1.i2.22
[70]. Mokkapati, C., Chhapola, A., & Jain, S. (2024). The role of leadership in transforming retail technology infrastructure with DevOps. Shodh Sagar® Global International Research Thoughts, 12(2), 23. https://doi.org/10.36676/girt.v12.i2.11
[71]. Mokkapati, C., Jain, S., & Pandian, P. K. G. (2024). Reducing technical debt through strategic leadership in retail technology systems. SHODH SAGAR® Universal Research Reports, 11(4), 195.
[72]. Bharath Kumar Nagaraj, NanthiniKempaiyana, TamilarasiAngamuthua, SivabalaselvamaniDhandapania, “Hybrid CNN Architecture from Predefined Models for Classification of Epileptic Seizure Phases”, Manuscript Draft, Springer, 22, 2023.
[73]. Sivabalaselvamani, D., K. Nanthini, Bharath Kumar Nagaraj, KH Gokul Kannan, K. Hariharan, and M. Mallingeshwaran. "Healthcare Monitoring and Analysis Using ThingSpeakIoT Platform: Capturing and Analyzing Sensor Data for Enhanced Patient Care." In Advanced Applications in Osmotic Computing, pp. 126-150. IGI Global, 2024.
[74]. Mokkapati, C., Jain, S., & Aggarwal, A. (2024). Leadership in platform engineering: Best practices for high-traffic e-commerce retail applications. Universal Research Reports, 11(4), 129. Shodh Sagar.
[75]. Chandrasekhara Mokka Pati, Goel, P., & Aggarwal, A. (2024). Scalable microservices architecture: Leadership approaches for high-performance retail systems. Modern Dynamics: Mathematical Progressions, 1(2), 58–71.

[76]. Chandrasekhara Mokkapati, Jain, S., & Pandi Kirupa Gopalakrishna Pandian. (2024). Reducing technical debt through strategic leadership in retail technology systems. Modern Dynamics: Mathematical Progressions, 1(2), 159–172. https://doi.org/10.36676/mdmp.v1.i2.18 2023
[77]. Mokkapati, C., Goel, P., & Aggarwal, A. (2023). Scalable microservices architecture: Leadership approaches for high-performance retail systems. Darpan International Research Analysis, 11(1), 92.
[78]. Mokkapati, C., Jain, S., & Pandian, P. K. G. (2023). Implementing CI/CD in retail enterprises: Leadership insights for managing multi-billion dollar projects. Shodh Sagar: Innovative Research Thoughts, 9(1), Article 1458.2022
[79]. Mokkapati, C., Jain, S., & Pandian, P. K. G. (2022). Designing high-availability retail systems: Leadership challenges and solutions in platform engineering. International Journal of Computer Science and Engineering (IJCSE), 11(1), 87-108.2021
[80]. Shah, Hitali. "Ripple Routing Protocol (RPL) for routing in Internet of Things." International Journal of Research Radicals in Multidisciplinary Fields, ISSN: 2960-043X 1, no. 2 (2022): 105-111.
[81]. Hitali Shah.(2017). Built-in Testing for Component-Based Software Development. International Journal of New Media Studies: International Peer Reviewed Scholarly Indexed Journal, 4(2), 104–107. Retrieved from https://ijnms.com/index.php/ijnms/article/view/259
[82]. Palak Raina, Hitali Shah. (2017). A New Transmission Scheme for MIMO - OFDM using V Blast Architecture.Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal, 6(1), 31–38. Retrieved from https://www.eduzonejournal.com/index.php/eiprmj/article/view/628
[83]. Mokkapati, C., Jain, S., & Jain, S. (2021). Enhancing site reliability engineering (SRE) practices in large-scale retail enterprises. International Journal of Creative Research Thoughts (IJCRT), 9(11). https://www.ijcrt.org/
[84]. Alahari, J., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). Enhancing mobile app performance with dependency management and Swift Package Manager (SPM). International Journal of Progressive Research in Engineering Management and Science, 1(2), 130-138.
[85]. Vijayabaskar, S., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). Best practices for managing large-scale automation projects in financial services. International Journal of Progressive Research in Engineering Management and Science, 1(2), 107-117. https://doi.org/10.58257/IJPREMS12.
[86]. Agrawal, S., Kolli, R. K., Eeti, S., Goel, P., & Jain, A. (2024). Impact of Lean Six Sigma on operational efficiency in supply chain management. Shodh Sagar® Darpan International Research Analysis, 12(3), 420. https://doi.org/10.36676/dira.v12.i3.99
[87]. Agrawal, S., Gangu, K., Gopalakrishna, P. K., Agarwal, R., & Jain, A. (2024). Sustainability in supply chain planning. Modern Dynamics: Mathematical Progressions, 1(2), 23. https://doi.org/10.36676/mdmp.v1.i2.23
[88]. Agrawal, S., Gangu, K., Gopalakrishna, P. K., Agarwal, R., & Jain, A. (2024). Sustainability in supply chain planning. Modern Dynamics: Mathematical Progressions, 1(2), 248–269. https://doi.org/10.36676/mdmp.v1.i2.23
[89]. Agrawal, S., Thakur, D., Krishna, K., Goel, P., & Singh, S. P. (2024). Enhancing supply chain resilience through digital transformation. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 12(8), 104-128. http://www.ijrmeet.org
[90]. Hitali Shah."Millimeter-Wave Mobile Communication for 5G". International Journal of Transcontinental Discoveries, ISSN: 3006-628X, vol. 5, no. 1, July 2018, pp. 68-74, https://internationaljournals.org/index.php/ijtd/article/view/102.
[91]. Agrawal, S., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Goel, P. (2023). The role of predictive analytics in inventory management. Shodh Sagar Universal Research Reports, 10(4), 456. https://doi.org/10.36676/urr.v10.i4.1358
[92]. Agrawal, S., Murthy, P., Kumar, R., Jain, S., & Agarwal, R. (2023). Data-driven decision making in supply chain management. Innovative Research Thoughts, 9(5), 265–271. https://doi.org/10.36676/irt.v9.i5.1487
[93]. Agrawal, S., Antara, F., Chopra, P., Renuka, A., & Goel, P. (2022). Risk management in global supply chains. International Journal of Creative Research Thoughts (IJCRT), 10(12), 221-2668.
[94]. Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization techniques in supply chain planning for consumer electronics. International Journal for Research Publication & Seminar, 13(5), 356.
[95]. Joshi, A., Salunkhe, V. R., Agrawal, S., Goel, P., & Gupta, V. (2022). Optimizing ad performance through direct links and native browser destinations. International Journal for Research Publication and Seminar, 13(5), 538-571.
[96]. Salunkhe, V., Tangudu, A., Mokkapati, C., Goel, P., & Aggarwal, A. (2024). Advanced encryption techniques in healthcare IoT: Securing patient data in connected medical devices. Modern Dynamics: Mathematical Progressions, 1(2), 224–247. https://doi.org/10.36676/mdmp.v1.i2.22
[97]. Salunkhe, V. (2024). Transforming healthcare research with interoperability: The role of FHIR and SMART on FHIR. In Healthcare Administration and Managerial Training in the 21st Century (pp. 38). https://doi.org/10.4018/979-8-3693-5523-7.ch007

[98]. Salunkhe, V., Thumati, P. R. R., Kanchi, P., Chhapola, A., & Goel, O. (2024). EHR interoperability challenges leveraging HL7 FHIR for seamless data exchange in healthcare. Available at SSRN: https://ssrn.com/abstract=4984979
[99]. Salunkhe, V., Mahimkar, S., & Shekhar, S., Jain, Prof. Dr. A., & Goel, Prof. Dr. P. (2023). The role of IoT in connected health: Improving patient monitoring and engagement in kidney dialysis. SHODH SAGAR® Universal Research Reports, 10(4), 437.
[100]. Salunkhe, V., Mahimkar, S., & Shekhar, S., Jain, Prof. Dr. A., & Goel, Prof. Dr. P. (2023). The role of IoT in connected health: Improving patient monitoring and engagement in kidney dialysis. SHODH SAGAR® Universal Research Reports, 10(4), 437.
[101]. Mitesh Sinha. (2024). Cybersecurity Protocols in Smart Home Networks for Protecting IoT Devices. International Journal of Research and Review Techniques, 3(2), 70–77. Retrieved from https://ijrrt.com/index.php/ijrrt/article/view/205
[102]. Salunkhe, Vishwasrao, Thakur, D., Krishna, K., Goel, O., & Jain, Prof. Dr. A. (2023). Optimizing cloud-based clinical platforms: Best practices for HIPAA and HITRUST compliance. Available at SSRN: https://ssrn.com/abstract=4984981
[103]. Salunkhe, V., Chintha, V. R., Pamadi, V. N., Jain, A., & Goel, O. (2022). AI-powered solutions for reducing hospital readmissions: A case study on AI-driven patient engagement. International Journal of Creative Research Thoughts, 10(12), 757-764.
[104]. Joshi, A., Salunkhe, V. R., & Agrawal, S., Goel, Prof. Dr. P., & Gupta, V. (2022). Optimizing ad performance through direct links and native browser destinations. International Journal for Research Publication and Seminar, 13(5), 538-571.
[105]. Salunkhe, V., Chinta, U., Bhimanapati, V. B. R., Jain, S., & Goel, Dr. P. (2022). Clinical quality measures (eCQM) development using CQL: Streamlining healthcare data quality and reporting. Available at SSRN: https://ssrn.com/abstract=4984995 or http://dx.doi.org/10.2139/ssrn.4984995
[106]. Salunkhe, V., Ayyagiri, A., Musunuri, A., Jain, Prof. Dr. A., & Goel, Dr. P. (2021). Machine learning in clinical decision support: Applications, challenges, and future directions. Available at SSRN: https://ssrn.com/abstract=4985006 or http://dx.doi.org/10.2139/ssrn.4985006
[107]. Joshi, A., Tirupati, K. K., Chhapola, A., Jain, S., & Goel, O. (2024). Architectural approaches to migrating key features in Android apps. Modern Dynamics: Mathematical Progressions, 1(2), 495–539. https://doi.org/10.36676/mdmp.v1.i2.33
[108]. Joshi, A., Mahadik, S., Khair, M. A., & Goel, O. (2024). Leveraging system browsers for enhanced mobile ad conversions. Darpan International Research Analysis, 12(1), 180-206.
[109]. Vijayabaskar, S., Krishna Murthy, K. K., Cheruku, S. R., Chhapola, A., & Goel, O. (2024). Optimizing cross-functional teams in remote work environments for product development. Modern Dynamics: Mathematical Progressions, 1(2), 188-197. https://doi.org/10.36676/mdmp.v1.i2.20
[110]. Joshi, A., Dandu, M. M. K., Sivasankaran, V., Renuka, A., & Goel, O. (2023). Improving delivery app user experience with tailored search features. Universal Research Reports, 10(2), 611-638.
[111]. Joshi, A., Arulkumaran, R., Agarwal, N., Aggarwal, A., Goel, P., & Gupta, A. (2023). Cross market monetization strategies using Google mobile ads. Innovative Research Thoughts, 9(1), 480–507.
[112]. Nadukuru, S., Joshi, A., Jain, S., Tirupati, K. K., & Chhapola, A. (2023). Advanced techniques in SAP SD customization for pricing and billing. Innovative Research Thoughts, 9(1), 421-449.
[113]. Tirupati, K. K., Joshi, A., Singh, S. P., Chhapola, A., Jain, S., & Gupta, A. (2023). Leveraging Power BI for enhanced data visualization and business intelligence. Universal Research Reports, 10(2), 676-711.
[114]. Joshi, A., Salunkhe, V. R., Agrawal, S., Goel, P., & Gupta, V. (2022). Optimizing ad performance through direct links and native browser destinations. International Journal for Research Publication and Seminar, 13(5), 538-571.
[115]. Jaswanth Alahari, Kumar Kodyvaur Krishna Murthy, Saketh Reddy Cheruku, A Renuka, & Prof.(Dr.) Punit Goel. (2024). Leveraging Core Data for efficient data storage and retrieval in iOS applications. Modern Dynamics: Mathematical Progressions, 1(2), 173–187. https://doi.org/10.36676/mdmp.v1.i2.19
[116]. Santhosh Vijayabaskar, Kumar Kodyvaur Krishna Murthy, Saketh Reddy Cheruku, Akshun Chhapola, & Om Goel. (2024). Optimizing cross-functional teams in remote work environments for product development. Modern Dynamics: Mathematical Progressions, 1(2), 188–203. https://doi.org/10.36676/mdmp.v1.i2.20
[117]. Cheruku, S. R., Goel, O., & Goel, B. (2024). A comparative study of ETL tools: DataStage vs. Talend. Journal of Quantum Science and Technology, 1(1). https://doi.org/10.36676/jqst.v1.i1.11
[118]. Cheruku, S. R., Jain, S., & Aggarwal, A. (2024). Building scalable data warehouses: Best practices and case studies. Modern Dynamics: Mathematical Progressions, 1(2), 116–130.
[119]. Mitesh Sinha. (2024). “Exploring the Role of Cybersecurity in Integrated Programs for Protecting and Improving Digital Platforms”. International IT Journal of Research, ISSN: 3007-6706, vol. 2, no. 2, June 2024, pp. 190-7, https://itjournal.org/index.php/itjournal/article/view/56.

[120]. Saketh Reddy Cheruku, Om Goel, & Pandi Kirupa Gopalakrishna Pandian. (2024). Performance testing techniques for live TV streaming on STBs. Modern Dynamics: Mathematical Progressions, 1(2), 131–143. https://doi.org/10.36676/mdmp.v1.i2.16
[121]. Cheruku, S. R., Khan, S., & Goel, O. (2024). Effective data migration strategies using Talend and DataStage. Universal Research Reports, 11(1), 192–203. https://doi.org/10.36676/urr.v11.i1.1335
[122]. Saketh Reddy Cheruku, Shalu Jain, & Anshika Aggarwal. (2024). Building scalable data warehouses: Best practices and case studies. Modern Dynamics: Mathematical Progressions, 1(2), 116–130. https://doi.org/10.36676/mdmp.v1.i2.15
[123]. Cheruku, S. R., & Goel, P., & Jain, U. (2023). Leveraging Salesforce analytics for enhanced business intelligence. Innovative Research Thoughts, 9(5).
[124]. Mahadik, S., Murthy, K. K. K., & Cheruku, S. R., Prof.(Dr.) Arpit Jain, & Om Goel. (2022). Agile product management in software development. International Journal for Research Publication & Seminar, 13(5), 453.
[125]. Khair, M. A., Murthy, K. K. K., Cheruku, S. R., Jain, S., & Agarwal, R. (2022). Optimizing Oracle HCM cloud implementations for global organizations. International Journal for Research Publication & Seminar, 13(5), 372.
[126]. Voola, P. K., Murthy, K. K. K., Cheruku, S. R., Singh, S. P., & Goel, O. (2021). Conflict management in cross-functional tech teams: Best practices and lessons learned from the healthcare sector. International Research Journal of Modernization in Engineering, Technology, and Science, 3(11), 1508–1517. https://doi.org/10.56726/IRJMETS16992
[127]. Cheruku, S. R., Renuka, A., & Pandian, P. K. G. Real-time data integration using Talend Cloud and Snowflake. International Journal of Creative Research Thoughts (IJCRT), ISSN 2320-2882, g960–g977.
[128]. Aadya Sharma. (2024). India's Shift to Electric Mobility. Journal of Sustainable Solutions, 1(4), 1–16. https://doi.org/10.36676/j.sust.sol.v1.i4.18
[129]. Pillai, Sanjaikanth E. VadakkethilSomanathan, et al. "MENTAL HEALTH IN THE TECH INDUSTRY: INSIGHTS FROM SURVEYS AND NLP ANALYSIS." JOURNAL OF RECENT TRENDS IN COMPUTER SCIENCE AND ENGINEERING (JRTCSE) 10.2 (2022): 23-34.
[130]. Parth Vishnubhai Prajapati. (2024). Structural Integrity, Environmental Sustainability, and Cost-Effectiveness of Fly Ash Bricks. Journal of Sustainable Solutions, 1(4), 17–26. https://doi.org/10.36676/j.sust.sol.v1.i4.19
[131]. Vadlamani, S., Kankanampati, P. K., Agarwal, R., Jain, S., & Jain, A. (2024). Integrating cloud-based data architectures for scalable enterprise solutions. International Journal of Electrical and Electronics Engineering (IJEEE), 13(1), 49–76.
[132]. Voola, P. K., Gangu, K., Pandian, P. K. G., Goel, D. P., & Jain, P. (2021). AI-Driven Predictive Models in Healthcare: Reducing Time-to-Market for Clinical Applications
[133]. Alahari, J., Tangudu, A., Mokkapati, C., Goel, O., & Jain, A. (2024). Implementing continuous integration/continuous deployment (CI/CD) pipelines for large-scale iOS applications. SHODH SAGAR® Darpan International Research Analysis, 12(3), 522. https://doi.org/10.36676/dira.v12.i3.1
[134]. Jaswanth Alahari, Kodyvaur K. M., Cheruku, S. R., Renuka, A., & Prof. (Dr.) Punit Goel. (2024). Leveraging Core Data for efficient data storage and retrieval in iOS applications. Modern Dynamics: Mathematical Progressions, 1(2), 173–187. https://doi.org/10.36676/mdmp.v1.i2.19
[135]. Pamadi, V. N., Alahari, J., Chintha, V. R., Aggarwal, A., & Gupta, V. (2024). Strategies for managing localization and internationalization in large-scale iOS applications. International Journal of Research in Modern Engineering and Emerging Technology, 12(8), 1–26.
[136]. Alahari, J., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Gupta, V. (2024). Strategies for managing localization and internationalization in large-scale iOS applications. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 12(8), 1–26. https://www.ijrmeet.org/
[137]. Alahari, J., Mangal, A., Singiri, S., Goel, O., & Goel, P. (2023). The impact of augmented reality (AR) on user engagement in automotive mobile applications. Innovative Research Thoughts, 9(5), 202-212. https://doi.org/10.36676/irt.v9.i5.1483
[138]. Alahari, J., Pakanati, D., Cherukuri, H., & Goel, O., Prof. (Dr.) Arpit Jain. (2023). Best practices for integrating OAuth in mobile applications for secure authentication. SHODH SAGAR® Universal Research Reports, 10(4), 385.
[139]. Alahari, J., Thakur, D., Goel, P., Chintha, V. R., & Kolli, R. K. (2022). Enhancing iOS application performance through Swift UI: Transitioning from Objective-C to Swift. International Journal for Research Publication & Seminar, 13(5), 312.
[140]. Pillai, Sanjaikanth E. VadakkethilSomanathan, et al. "Beyond the Bin: Machine Learning-Driven Waste Management for a Sustainable Future. (2023)." JOURNAL OF RECENT TRENDS IN COMPUTER SCIENCE AND ENGINEERING (JRTCSE), 11(1), 16–27 .https://doi.org/10.70589/JRTCSE.2023.1.3
[141]. Alahari, J., Kolli, R. K., Eeti, S., Khan, S., & Verma, P. (2022). Optimizing iOS user experience with SwiftUI and UIKit: A comprehensive analysis. International Journal of Creative Research Thoughts, 10(12), f699.

[142]. Alahari, J., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). Enhancing mobile app performance with dependency management and Swift Package Manager (SPM). International Journal of Progressive Research in Engineering Management and Science, 1(2), 130-138.
[143]. Santhosh Vijayabaskar, Kodyvaur K. M., Cheruku, S. R., Chhapola, A., & Goel, O. (2024). Optimizing cross-functional teams in remote work environments for product development. Modern Dynamics: Mathematical Progressions, 1(2), 188–203. https://doi.org/10.36676/mdmp.v1.i2.20
[144]. Vijayabaskar, S., Gangu, K., Gopalakrishna, P. K., Goel, P., & Gupta, V. (2024). Agile transformation in financial technology: Best practices and challenges. Shodh Sagar Darpan International Research Analysis, 12(3), 374. https://doi.org/10.36676/dira.v12.i3.9
[145]. Vijayabaskar, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2024). Using Alteryx for advanced data analytics in financial technology. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 12(8), 27–48. https://www.ijrmeet.org/
[146]. Murali Mohana Krishna Dandu, Santhosh Vijayabaskar, Voola, P. K., Agarwal, R., & Goel, O. (2024). Cross category recommendations using LLMs. Darpan International Research Analysis, 12(1), 80–107. https://doi.org/10.36676/dira.v12.i1.108
[147]. Narani, Sandeep Reddy, Madan Mohan Tito Ayyalasomayajula, and SathishkumarChintala. "Strategies For Migrating Large, Mission-Critical Database Workloads To The Cloud." Webology (ISSN: 1735-188X) 15.1 (2018).
[148]. Ayyalasomayajula, Madan Mohan Tito, SathishkumarChintala, and Sandeep Reddy Narani. "Intelligent Systems and Applications in Engineering.", 2022.
[149]. Jaswanth Alahari, Kodyvaur K. M., Cheruku, S. R., Renuka, A., & Prof. (Dr.) Punit Goel. (2024). Leveraging core data for efficient data storage and retrieval in iOS applications. Modern Dynamics: Mathematical Progressions, 1(2), 173–187. https://doi.org/10.36676/mdmp.v1.i2.19
[150]. Vijayabaskar, S., Mangal, A., Singiri, S., Renuka, A., & Chhapola, A. (2023). Leveraging Blue Prism for scalable process automation in stock plan services. Innovative Research Thoughts, 9(5), 216. https://doi.org/10.36676/irt.v9.i5.1484
[151]. Vijayabaskar, S., Thumati, P. R. R., Kanchi, P., Jain, S., & Agarwal, R. (2023). Integrating cloud-native solutions in financial services for enhanced operational efficiency. SHODH SAGAR® Universal Research Reports, 10(4), 402. https://doi.org/10.36676/urr.v10.i4.13
[152]. Vijayabaskar, S., Mahimkar, S., Shekhar, S., Jain, S., & Agarwal, R. (2022). The role of leadership in driving technological innovation in financial services. International Journal of Creative Research Thoughts, 10(12). ISSN: 2320-2882. https://ijcrt.org/download.php?file=IJCRT2212662.pdf
[153]. Vijayabaskar, S., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). Best practices for managing large-scale automation projects in financial services. International Journal of Progressive Research in Engineering Management and Science, 1(2), 107-117. https://doi.org/10.58257/IJPREMS12
[154]. Shi, D., Li, L., Shao, Y., Zhang, W., & Ding, X. (2023). Multimode control strategy for robotic rehabilitation on special orthogonal group SO(3). IEEE Transactions on Industrial Electronics, 71(2), 1749-1757.
[155]. Rambabu, S., Sriram, K. K., Chamarthy, S., & Parthasarathy, P. (2021). A proposal for a correlation to calculate pressure drop in reticulated porous media with the help of numerical investigation of pressure drop in ideal & randomized reticulated structures. Chemical Engineering Science, 237, 116518. Pergamon.
[156]. Hidayah, R., Chamarthy, S., Shah, A., Fitzgerald-Maguire, M., & Agrawal, S. K. (2019). Walking with augmented reality: A preliminary assessment of visual feedback with a cable-driven active leg exoskeleton (C-ALEX). IEEE Robotics and Automation Letters, 4(4), 3948-3954. IEEE.
[157]. Hidayah, R., Jin, X., Chamarthy, S., Fitzgerald, M. M., & Agrawal, S. K. (2018). Comparing the performance of a cable-driven active leg exoskeleton (C-ALEX) over-ground and on a treadmill. In 2018 7th IEEE International Conference on Biomedical Robotics and Biomechatronics (Biorob) (pp. 299-304). IEEE.
[158]. Jin, X., Hidayah, R., Chamarthy, S., Fitzgerald, M. M., & Agrawal, S. K. (2018). Comparing the performance of a cable-driven active leg exoskeleton (C-ALEX) over-ground and on a treadmill. In 2018 7th IEEE International Conference on Biomedical Robotics and Biomechatronics (Biorob) (pp. 299-304). IEEE.
[159]. Srinivasan, K., Siddharth, C. S., Kaarthic, L. V. A., & Thenarasu, M. (2018). Evaluation of mechanical properties, economic and environmental benefits of partially replacing silica sand with biomass ash for aluminium casting. Materials Today: Proceedings, 5(5), 12984-12992. Elsevier.
[160]. Bhardwaj, A., Tung, N. S., & Kamboj, V. (2012). Unit commitment in power system: A review. International Journal of Electrical and Power Engineering, 6(1), 51-57.
[161]. NS Tung, V Kamboj, B Singh, A Bhardwaj, Switch Mode Power Supply An Introductory approach, Switch Mode Power Supply An Introductory approach, May 2012.
[162]. Pramod Kumar Voola, Aravind Ayyagiri, Aravindsundeep Musunuri, Anshika Aggarwal, & Shalu Jain. (2024). Leveraging GenAI for clinical data analysis: Applications and challenges in real-time patient monitoring. Modern Dynamics: Mathematical Progressions, 1(2), 204–223. https://doi.org/10.36676/mdmp.v1.i2.21
[163]. Ayyagiri, A., Pandian, P. K. G., & Goel, P. (2024). Efficient data migration strategies in sharded databases. Journal of Quantum Science and Technology, 1(2). https://doi.org/10.36676/jqst.v1.i2.17

[164]. Ayyagiri, A., Jain, D. A., & Goel, O. (2024). Utilizing Python for scalable data processing in cloud environments. Darpan International Research Analysis, 12(2), 183–198.
[165]. Ayyagari, A., Jain, A., & Goel, O. (2024). Utilizing Python for scalable data processing in cloud environments. Shodh Sagar: Darpan International Research Analysis, 12(2), 183–194. https://doi.org/10.36676/dira.v12.i2.78
[166]. Ayyagari, A., Goel, O., & Pandian, P. K. G. (2024). Leveraging AI and machine learning for performance optimization in web applications. Shodh Sagar: Darpan International Research Analysis, 12(2), 199–214. https://doi.org/10.36676/dira.v12.i2.85
[167]. Jaswanth Alahari, Kumar Kodyvaur Krishna Murthy, Saketh Reddy Cheruku, A Renuka, & Prof.(Dr.) Punit Goel. (2024). Leveraging Core Data for efficient data storage and retrieval in iOS applications. Modern Dynamics: Mathematical Progressions, 1(2), 173–187. https://doi.org/10.36676/mdmp.v1.i2.19
[168]. Aravind Ayyagiri, Prof.(Dr.) Punit Goel, & A Renuka. (2024). Leveraging AI and machine learning for performance optimization in web applications. Modern Dynamics: Mathematical Progressions, 1(2), 89–104. https://doi.org/10.36676/mdmp.v1.i2.13
[169]. Ayyagiri, A., Goel, O., & Goel, B. (2024). Innovative approaches to full-text search with Solr and Lucene. Shodh Sagar: Universal Research Reports, 11(3). https://urr.shodhsagar.com/index.php/j/article/view/1336
[170]. Ayyagiri, A., Goel, O., & Goel, B. (2024). Innovative approaches to full-text search with Solr and Lucene. International Research Thoughts, 10(3). https://doi.org/10.36676/irt.v10.i3.1473
[171]. Tangudu, A., Jain, A., & Goel, O. (2024). Effective strategies for managing multi-cloud Salesforce solutions. Universal Research Reports, 11(2). https://doi.org/10.36676/urr.v11.i2.1338
[172]. Bhardwaj, A., Tung, N. S., Shukla, V. K., & Kamboj, V. K. (2012). The important impacts of unit commitment constraints in power system planning. International Journal of Emerging Trends in Engineering and Development, 5(2), 301-306.
[173]. Saketh Reddy Cheruku, Om Goel, & Pandi Kirupa Gopalakrishna Pandian. (2024). Performance testing techniques for live TV streaming on STBs. Modern Dynamics: Mathematical Progressions, 1(2), 131–143. https://doi.org/10.36676/mdmp.v1.i2.16
[174]. Ayyagiri, A., Jain, S., & Aggarwal, A. (2023). Innovations in multi-factor authentication: Exploring OAuth for enhanced security. Innovative Research Thoughts, 9(4).
[175]. Arulkumaran, R., Ayyagiri, A., & Musunuri, A., Prof.(Dr.) Punit Goel, & Prof.(Dr.) Arpit Jain. (2022). Decentralized AI for financial predictions. International Journal for Research Publication & Seminar, 13(5), 434.
[176]. Mahadik, S., Murthy, K. K. K., & Cheruku, S. R., Prof.(Dr.) Arpit Jain, & Om Goel. (2022). Agile product management in software development. International Journal for Research Publication & Seminar, 13(5), 453.
[177]. Salunkhe, V., Ayyagari, A., Musunuri, A., Jain, A., & Goel, P. (2021). Machine learning in clinical decision support: Applications, challenges, and future directions. International Research Journal of Modernization in Engineering, Technology, and Science, 3(11), 1493–1506. https://doi.org/10.56726/IRJMETS16993
[178]. Ayyagari, A., Goel, P., & Verma, P. (2021). Exploring microservices design patterns and their impact on scalability. International Journal of Creative Research Thoughts (IJCRT), 9(8), e532–e551. https://www.ijcrt.org/
[179]. Jaswanth Alahari, Kumar Kodyvaur Krishna Murthy, Saketh Reddy Cheruku, A Renuka, & Prof.(Dr.) Punit Goel. (2024). Leveraging Core Data for efficient data storage and retrieval in iOS applications. Modern Dynamics: Mathematical Progressions, 1(2), 173–187. https://doi.org/10.36676/mdmp.v1.i2.19
[180]. Santhosh Vijayabaskar, Kumar Kodyvaur Krishna Murthy, Saketh Reddy Cheruku, Akshun Chhapola, & Om Goel. (2024). Optimizing cross-functional teams in remote work environments for product development. Modern Dynamics: Mathematical Progressions, 1(2), 188–203. https://doi.org/10.36676/mdmp.v1.i2.20
[181]. P. K., Goel, O., & Krishnan, K. (2024). Leadership in technology: Strategies for effective global IT operations management. Journal of Quantum Science and Technology, 1(3). https://doi.org/10.36676/jqst.v1.i3.23
[182]. Murthy, K. K. K., & Goel, E. O. (2024). Navigating mergers and demergers in the technology sector: A guide to managing change and integration. Modern Dynamics: Mathematical Progressions, 1(2), 144–158.
[183]. Murthy, K. K., Goel, O., & Jain, S. (2023). Advancements in digital initiatives for enhancing passenger experience in railways. Darpan International Research Analysis, 11(1), 40.
[184]. Mahadik, S., Murthy, K. K. K., & Cheruku, S. R., Prof.(Dr.) Arpit Jain, & Om Goel. (2022). Agile product management in software development. International Journal for Research Publication & Seminar, 13(5), 453.
[185]. Khair, M. A., Murthy, K. K. K., Cheruku, S. R., Jain, S., & Agarwal, R. (2022). Optimizing Oracle HCM cloud implementations for global organizations. International Journal for Research Publication & Seminar, 13(5), 372.
[186]. Murthy, K. K. K., Jain, S., & Goel, O. (2022). The impact of cloud-based live streaming technologies on mobile applications: Development and future trends. Innovative Research Thoughts, 8(1).
[187]. Murthy, K. K. K., & Gupta, V., Prof.(Dr.) Punit Goel. Transforming legacy systems: Strategies for successful ERP implementations in large organizations. International Journal of Creative Research Thoughts (IJCRT), ISSN 2320-2882, h604–h618.

[188]. Voola, P. K., Murthy, K. K. K., Cheruku, S. R., Singh, S. P., & Goel, O. (2021). Conflict management in cross-functional tech teams: Best practices and lessons learned from the healthcare sector. International Research Journal of Modernization in Engineering, Technology, and Science, 3(11), 1508–1517. https://doi.org/10.56726/IRJMETS16992
[189]. Arulkumaran, R., Antara, F., Chopra, P., Goel, O., & Jain, A. (2024). Blockchain analytics for enhanced security in DeFi platforms. Shodh Sagar® Darpan International Research Analysis, 12(3), 475.
[190]. Arulkumaran, R., Thumati, P. R. R., Kanchi, P., Goel, L., & Jain, A. (2024). Cross-chain NFT marketplaces with LayerZero and Chainlink. Modern Dynamics: Mathematical Progressions, 1(2), Jul-Sep. https://doi.org/10.36676/mdmp.v1.i2.26
[191]. Dandu, M. M. K., Arulkumaran, R., Agarwal, N., Aggarwal, A., & Goel, P. (2024). Improving neural retrieval with contrastive learning. Modern Dynamics: Mathematical Progressions, 1(2), 399–425. https://doi.org/10.36676/mdmp.v1.i2.30
[192]. Bhardwaj, Amit. "Literature Review of Economic Load Dispatch Problem in Electrical Power System using Modern Soft Computing,"International Conference on Advance Studies in Engineering and Sciences, (ICASES-17), ISBN: 978-93-86171-83-2, SSSUTMS, Bhopal, December 2017.
[193]. Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Goel, L., & Goel, O. (2023). Predictive analytics in industrial processes using LSTM networks. Shodh Sagar® Universal Research Reports, 10(4), 512. https://doi.org/10.36676/urr.v10.i4.1361
[194]. Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Aggarwal, A., & Gupta, V. (2023). AI-driven optimization of proof-of-stake blockchain validators. Innovative Research Thoughts, 9(5), 315. https://doi.org/10.36676/irt.v9.i5.1490
[195]. Arulkumaran, R., Chinta, U., Bhimanapati, V. B. R., Jain, S., & Goel, P. (2023). NLP applications in blockchain data extraction and classification. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 11(7), 32-60. Available at http://www.ijrmeet.org
[196]. Arulkumaran, R., Daram, S., Mehra, A., Jain, S., & Agarwal, R. (2022). Intelligent capital allocation frameworks in decentralized finance. International Journal of Creative Research Thoughts (IJCRT), 10(12), 669.
[197]. Arulkumaran, R., Ayyagiri, A., Musunuri, A., Goel, P., & Jain, A. (2022). Decentralized AI for financial predictions. International Journal for Research Publication & Seminar, 13(5), 434.
[198]. Arulkumaran, R., Mahimkar, S., Shekhar, S., Jain, A., & Jain, A. (2021). Analyzing information asymmetry in financial markets using machine learning. International Journal of Progressive Research in Engineering Management and Science, 1(2), 53-67. https://doi.org/10.58257/IJPREMS16
[199]. Arulkumaran, R., Mahimkar, S., Shekhar, S., Jain, A., & Jain, A. (2021). Analyzing information asymmetry in financial markets using machine learning. International Journal of Progressive Research in Engineering Management and Science, 1(2), 53-67. https://doi.org/10.58257/IJPREMS16
[200]. Tirupati, K. K., Singh, S. P., Nadukuru, S., Jain, S., & Agarwal, R. (2024). Improving database performance with SQL Server optimization techniques. Modern Dynamics: Mathematical Progressions, 1(2), 450–494. https://doi.org/10.36676/mdmp.v1.i2.32
[201]. Joshi, A., Tirupati, K. K., Chhapola, A., Jain, S., & Goel, O. (2024). Architectural approaches to migrating key features in Android apps. Modern Dynamics: Mathematical Progressions, 1(2), 495–539. https://doi.org/10.36676/mdmp.v1.i2.33
[202]. Tirupati, K. K., Dandu, M. M. K., Balasubramaniam, V. S., Renuka, A., & Goel, O. (2023). End to end development and deployment of predictive models using Azure Synapse Analytics. Innovative Research Thoughts, 9(1), 508–537.
[203]. Tirupati, K. K., Mahadik, S., Khair, M. A., Goel, O., & Jain, A. (2022). Optimizing machine learning models for predictive analytics in cloud environments. International Journal for Research Publication & Seminar, 13(5), 611-634. https://doi.org/10.36676/jrps.v13.i5.1530
[204]. Tirupati, K. K., Mahadik, S., Khair, M. A., & Goel, O., Jain, A. (2022). Optimizing machine learning models for predictive analytics in cloud environments. International Journal for Research Publication and Seminar, 13(5), 611-642.
[205]. Dandu, M. M. K., Joshi, A., Tirupati, K. K., Chhapola, A., Jain, S., & Shrivastav, A. (2022). Quantile regression for delivery promise optimization. International Journal of Computer Science and Engineering (IJCSE, 11(1), 245-276.
[206]. Mahadik, S., Pakanati, D., Cherukuri, H., Jain, S., & Jain, S. (2024). Cross-functional team management in product development. Modern Dynamics: Mathematical Progressions, 1(2), 270–294. https://doi.org/10.36676/mdmp.v1.i2.24
[207]. Mahadik, S., Chinta, U., Bhimanapati, V. B. R., Goel, P., & Jain, A. (2023). Product roadmap planning in dynamic markets. Innovative Research Thoughts, 9(5), 282. https://doi.org/10.36676/irt.v9.i5.1488
[208]. Mahadik, S., Fnu Antara, Chopra, P., Renuka, A., & Goel, O. (2023). User-centric design in product development. Shodh Sagar® Universal Research Reports, 10(4), 473.

[209]. Mahadik, S., Murthy, P., Kumar, R., Goel, O., & Jain, A. (2023). The influence of market strategy on product success. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 11(7), 1-31. Available at http://www.ijrmeet.org
[210]. Balasubramaniam, V. S., Mahadik, S., Khair, M. A., & Goel, O., & Jain, A. (2023). Effective risk mitigation strategies in digital project management. Innovative Research Thoughts, 9(1), 538–567.
[211]. Mahadik, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2023). Universal research reports. SSRN. https://ssrn.com/abstract=4985267
[212]. Mahadik, S., Mangal, A., Singiri, S., Chhapola, A., & Jain, S. (2022). Risk mitigation strategies in product management. International Journal of Creative Research Thoughts (IJCRT), 10(12), 665.
[213]. Mahadik, S., Murthy, K. K. K., Cheruku, S. R., Jain, A., & Goel, O. (2022). Agile product management in software development. International Journal for Research Publication & Seminar, 13(5), 453.
[214]. Tirupati, K. K., Mahadik, S., Khair, M. A., & Goel, O., & Jain, A. (2022). Optimizing machine learning models for predictive analytics in cloud environments. International Journal for Research Publication & Seminar, 13(5), 611-637. https://doi.org/10.36676/jrps.v13.i5.1530
[215]. Mahadik, S., Khatri, D., Bhimanapati, V., Goel, L., & Jain, A. (2022). The role of data analysis in enhancing product features. SSRN. https://ssrn.com/abstract=4985275
[216]. Amit Bhardwaj. (2021). Impacts of IoT on Industry 4.0: Opportunities, Challenges, and Prospects. International Journal of New Media Studies: International Peer Reviewed Scholarly Indexed Journal, 8(1), 1–9. Retrieved from https://ijnms.com/index.php/ijnms/article/view/164
[217]. Tirupati, K. K., Mahadik, S., Khair, M. A., & Goel, O., & Jain, A. (2022). Optimizing machine learning models for predictive analytics in cloud environments. International Journal for Research Publication & Seminar, 13(5), 611-642.
[218]. Mahadik, S., Kolli, R. K., Eeti, S., Goel, P., & Jain, A. (2021). Scaling startups through effective product management. International Journal of Progressive Research in Engineering Management and Science, 1(2), 68-81.
[219]. Upadhyay, A., Oommen, N. M., & Mahadik, S. (2021). Identification and assessment of Black Sigatoka disease in banana leaf. In V. Goar, M. Kuri, R. Kumar, & T. Senjyu (Eds.), Advances in Information Communication Technology and Computing (Vol. 135). Springer, Singapore. https://doi.org/10.1007/978-981-15-5421-6_24
[220]. Pramod Kumar Voola, Aravind Ayyagiri, Aravindsundeep Musunuri, Anshika Aggarwal, & Shalu Jain. (2024). Leveraging GenAI for clinical data analysis: Applications and challenges in real-time patient monitoring. Modern Dynamics: Mathematical Progressions, 1(2), 204–223. https://doi.org/10.36676/mdmp.v1.i2.21
[221]. Aravindsundeep Musunuri, Akshun Chhapola, & Shalu Jain. (2024). Optimizing high-speed serial links for multicore processors and network interfaces. Modern Dynamics: Mathematical Progressions, 1(2), 31–43. https://doi.org/10.36676/mdmp.v1.i2.9
[222]. Musunuri, A., Goel, O., & Jain, A. (2024). Developing high-reliability printed circuit boards for fiber optic systems. Journal of Quantum Science and Technology, 1(1). https://doi.org/10.36676/jqst.v1.i1.09
[223]. Voola, P. K., Ayyagiri, A., Musunuri, A., Aggarwal, A., & Jain, S. (2024). Modern Dynamics: Mathematical Progressions. Available at SSRN: https://ssrn.com/abstract=4984961
[224]. Musunuri, A., Goel, P., & Renuka, A. (2023). Innovations in multicore network processor design for enhanced performance. Innovative Research Thoughts, 9(3), Article 1460.
[225]. Musunuri, A., Jain, S., & Aggarwal, A. (2023). Characterization and validation of PAM4 signaling in modern hardware designs. Darpan International Research Analysis, 11(1), 60.
[226]. Arulkumaran, R., Ayyagiri, A., & Musunuri, A., Prof. (Dr.) Punit Goel, & Prof. (Dr.) Arpit Jain. (2022). Decentralized AI for financial predictions. International Journal for Research Publication & Seminar, 13(5), 434.
[227]. Musunuri, A., Goel, O., & Agarwal, N. (2021). Design strategies for high-speed digital circuits in network switching systems. International Journal of Creative Research Thoughts (IJCRT), 9(9), d842–d860. https://www.ijcrt.org/
[228]. Salunkhe, V., Ayyagiri, A., Musunuri, A., Jain, Prof. Dr. A., & Goel, Dr. P. (2021). Machine learning in clinical decision support: Applications, challenges, and future directions. Available at SSRN: https://ssrn.com/abstract=4985006 or http://dx.doi.org/10.2139/ssrn.4985006
[229]. Tangudu, A., & Agarwal, D. Y. K. PROF.(DR.) PUNIT GOEL, "Optimizing Salesforce Implementation for Enhanced Decision-Making and Business Performance." International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320, 2882, d814-d832.
[230]. Alahari, J., Tangudu, A., Mokkapati, C., Goel, O., & Jain, A. (2024). "Implementing Continuous Integration/Continuous Deployment (CI/CD) Pipelines for Large-Scale iOS Applications." SHODH SAGAR® Darpan International Research Analysis, 12(3): 522. https://doi.org/10.36676/dira.v12.i3.1,4.
[231]. Tangudu, A., Pandian, P. K. G., & Jain, S. (2024). "Developing Scalable APIs for Data Synchronization in Salesforce Environments." Modern Dynamics: Mathematical Progressions, 1(2), 44-57.
[232]. Vishwasrao Salunkhe, Abhishek Tangudu, Chandrasekhara Mokkapati, Prof.(Dr.) Punit Goel, & Anshika Aggarwal. (2024). "Advanced Encryption Techniques in Healthcare IoT: Securing Patient Data in Connected

Medical Devices." Modern Dynamics: Mathematical Progressions, 1(2), 224–247. https://doi.org/10.36676/mdmp.v1.i2.22.
[233]. Tangudu, A., Jain, S., & Aggarwal, A. (2024). "Best Practices for Ensuring Salesforce Application Security and Compliance." Journal of Quantum Science and Technology, 1(2), 88–101. https://doi.org/10.36676/jqst.v1.i2.18.
[234]. Tangudu, A., Pandian, P. K. G., & Jain, S. (2024). "Developing scalable APIs for data synchronization in Salesforce environments." Modern Dynamics: Mathematical Progressions, 1(2), 44–56. https://doi.org/10.36676/mdmp.v1.i2.10.
[235]. Abhishek Tangudu, Dr. Punit Goel, & A Renuka. (2024). "Migrating Legacy Salesforce Components to Lightning: A Comprehensive Guide." Darpan International Research Analysis, 12(2), 155–167. https://doi.org/10.36676/dira.v12.i2.76.
[236]. Abhishek Tangudu, Dr. Arpit Jain, & Er. Om Goel. (2024). "Effective Strategies for Managing Multi-Cloud Salesforce Solutions." Universal Research Reports, 11(2), 199–217. https://doi.org/10.36676/urr.v11.i2.1338.
[237]. Tangudu, A., Jain, S., & Pandian, P. K. G. (2023). "Developing scalable APIs for data synchronization in Salesforce environments." Darpan International Research Analysis, 11(1), 75.
[238]. Amit Bhardwaj. (2023). Time Series Forecasting with Recurrent Neural Networks: An In-depth Analysis and Comparative Study. Edu Journal of International Affairs and Research, ISSN: 2583-9993, 2(4), 44–50. Retrieved from https://edupublications.com/index.php/ejiar/article/view/36
[239]. Tangudu, A., Chhapola, A., & Jain, S. (2023). "Integrating Salesforce with third-party platforms: Challenges and best practices." International Journal for Research Publication & Seminar, 14(4), 229. https://doi.org/10.36676/jrps.v14.i4.
[240]. Abhishek Tangudu, Akshun Chhapola, & Shalu Jain. (2023). "Leveraging Lightning Web Components for Modern Salesforce UI Development." Innovative Research Thoughts, 9(2), 220–234. https://doi.org/10.36676/irt.v9.i2.1459.
[241]. Alahari, J., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). "Enhancing Mobile App Performance with Dependency Management and Swift Package Manager (SPM)." International Journal of Progressive Research in Engineering Management and Science, 1(2), 130-138.
[242]. Vijayabaskar, S., Tangudu, A., Mokkapati, C., Khan, S., & Singh, S. P. (2021). "Best Practices for Managing Large-Scale Automation Projects in Financial Services." International Journal of Progressive Research in Engineering Management and Science, 1(2), 107-117. https://doi.org/10.58257/IJPREMS12.
[243]. Tangudu, A., Pandian, P. K. G., & Jain, S. (2024). "Developing scalable APIs for data synchronization in Salesforce environments." Modern Dynamics: Mathematical Progressions, 1(2), 44–56. https://doi.org/10.36676/mdmp.v1.i2.10
[244]. Abhishek Tangudu, Dr. Punit Goel, & A Renuka. (2024). "Migrating Legacy Salesforce Components to Lightning: A Comprehensive Guide." Darpan International Research Analysis, 12(2), 155–167. https://doi.org/10.36676/dira.v12.i2.76.
[245]. Abhishek Tangudu, Dr. Arpit Jain, & Er. Om Goel. (2024). "Effective Strategies for Managing Multi-Cloud Salesforce Solutions." Universal Research Reports, 11(2), 199–217. https://doi.org/10.36676/urr.v11.i2.1338.
[246]. Abhishek Tangudu, Akshun Chhapola, & Shalu Jain. (2023). "Leveraging Lightning Web Components for Modern Salesforce UI Development." Innovative Research Thoughts, 9(2), 220–234. https://doi.org/10.36676/irt.v9.i2.1459
[247]. Tangudu, A., Pandian, P. K. G., & Jain, S. (2024). "Developing scalable APIs for data synchronization in Salesforce environments." Modern Dynamics: Mathematical Progressions, 1(2), 44–56. https://doi.org/10.36676/mdmp.v1.i2.10.
[248]. Agarwal, N., Fnu Antara, R., Chopra, P., Renuka, A., & Goel, P. (2024). Hyper parameter optimization in CNNs for EEG analysis. Modern Dynamics: Mathematical Progressions, 1(2), 336–379. https://doi.org/10.36676/mdmp.v1.i2.27
[249]. Balasubramaniam, V. S., Dandu, M. M. K., Renuka, A., Goel, O., & Agarwal, N. (2024). Enhancing vendor management for successful IT project delivery. Modern Dynamics: Mathematical Progressions, 1(2), 370–398. https://doi.org/10.36676/mdmp.v1.i2.29
[250]. Dandu, M. M. K., Arulkumaran, R., Agarwal, N., Aggarwal, A., & Goel, P. (2024). Improving neural retrieval with contrastive learning. Modern Dynamics: Mathematical Progressions, 1(2), 399–425. https://doi.org/10.36676/mdmp.v1.i2.30
[251]. Agarwal, N., Kolli, R. K., Eeti, S., Jain, A., & Goel, P. (2024). Multi-sensor biomarker using accelerometer and ECG data. SHODH SAGAR® Darpan International Research Analysis, 12(3), 494. https://doi.org/10.36676/dira.v12.i3.1,3
[252]. Agarwal, N., Gunj, R., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Gupta, V. (2023). GANs for enhancing wearable biosensor data accuracy. SHODH SAGAR® Universal Research Reports, 10(4), 533. https://doi.org/10.36676/urr.v10.i4.13,62

[253]. Agarwal, N., Murthy, P., Kumar, R., Goel, O., & Agarwal, R. (2023). Predictive analytics for real-time stress monitoring from BCI. International Journal of Research in Modern Engineering and Emerging Technology, 11(7), 61-97.
[254]. Joshi, A., Arulkumaran, R., Agarwal, N., Aggarwal, A., Goel, P., & Gupta, A. (2023). Cross market monetization strategies using Google mobile ads. Innovative Research Thoughts, 9(1), 480–507.
[255]. Agarwal, N., Gunj, R., Mahimkar, S., Shekhar, S., Jain, A., & Goel, P. (2023). Signal processing for spinal cord injury monitoring with sEMG. Innovative Research Thoughts, 9(5), 334. https://doi.org/10.36676/irt.v9.i5,1491
[256]. Pamadi, V. N., Chhapola, A., & Agarwal, N. (2023). Performance analysis techniques for big data systems. International Journal of Computer Science and Publications, 13(2), 217-236. https://rjpn.org/ijcspub/papers/IJCSP23B1501.pdf
[257]. Vadlamani, S., Agarwal, N., Chintha, V. R., Shrivastav, A., Jain, S., & Goel, O. (2023). Cross-platform data migration strategies for enterprise data warehouses. International Research Journal of Modernization in Engineering Technology and Science, 5(11), 1-15. https://doi.org/10.56726/IRJMETS46858
[258]. Agarwal, N., Gunj, R., Chintha, V. R., Kolli, R. K., Goel, O., & Agarwal, R. (2022). Deep learning for real-time EEG artifact detection in wearables. International Journal for Research Publication & Seminar, 13(5), 402.
[259]. Agarwal, N., Gunj, R., Mangal, A., Singiri, S., Chhapola, A., & Jain, S. (2022). Self-supervised learning for EEG artifact detection. International Journal of Creative Research Thoughts (IJCRT, 10(12).
[260]. Balasubramaniam, V. S., Dandu, M. M. K., Renuka, A., Goel, O., & Agarwal, N. (2024). Enhancing vendor management for successful IT project delivery. Modern Dynamics: Mathematical Progressions, 1(2), 370–398. https://doi.org/10.36676/mdmp.v1.i2.29
[261]. Balasubramaniam, V. S., Thumati, P. R. R., Kanchi, P., Agarwal, R., Goel, O., & Shrivastav, E. A. (2023). Evaluating the impact of agile and waterfall methodologies in large scale IT projects. International Journal of Progressive Research in Engineering Management and Science, 3(12), 397-412.
[262]. Joshi, A., Dandu, M. M. K., Sivasankaran, V., Renuka, A., & Goel, O. (2023). Improving delivery app user experience with tailored search features. Universal Research Reports, 10(2), 611-638.
[263]. Tirupati, K. K., Dandu, M. M. K., Balasubramaniam, V. S., Renuka, A., & Goel, O. (2023). End to end development and deployment of predictive models using Azure Synapse Analytics. Innovative Research Thoughts, 9(1), 508–537.
[264]. Balasubramaniam, V. S., Mahadik, S., Khair, M. A., & Goel, O., Prof. (Dr.) Jain, A. (2023). Effective risk mitigation strategies in digital project management. Innovative Research Thoughts, 9(1), 538–567.
[265]. Dandu, M. M. K., Balasubramaniam, V. S., Renuka, A., Goel, O., Goel, Dr. P., & Gupta, Dr. A. (2022). BERT models for biomedical relation extraction. SSRN. https://ssrn.com/abstract=4985957
[266]. Balasubramaniam, V. S., Vijayabaskar, S., Voola, P. K., Agarwal, R., & Goel, O. (2022). Improving digital transformation in enterprises through agile methodologies. International Journal for Research Publication and Seminar, 13(5), 507-537.
[267]. Chandramouli, A., Shukla, S., Nair, N., Purohit, S., Pandey, S., & Dandu, M. M. K. (2021). Unsupervised paradigm for information extraction from transcripts using BERT. ECML PKDD 2021. https://doi.org/10.48550/arXiv.2110.00949
[268]. Dandu, M. M. K., & Kumar, G. (2021). Composable NLP workflows for BERT-based ranking and QA system. UC San Diego. Retrieved from [https://gaurav5590.github.io/data/UCSD_CASL_Research_Gaurav_Murali.pdf].
[269]. PK Voola, A Mangal, S Singiri, A Chhapola, S Jain. (2024). International Journal of Research in Modern ….
[270]. Voola, Pramod Kumar, Pakanati, D., Cherukuri, H., Renuka, A., & Goel, Dr. Punit. (2024). Ethical AI in healthcare: Balancing innovation with privacy and compliance. Shodh Sagar Darpan International Research Analysis, 12(3), 389. https://doi.org/10.36676/dira.v12.i3.9
[271]. Voola, Pramod Kumar, Pakanati, D., Cherukuri, H., Renuka, A., & Goel, Dr. Punit. (2024). Ethical AI in healthcare: Balancing innovation with privacy and compliance. Available at SSRN: https://ssrn.com/abstract=4984953
[272]. Voola, Pramod Kumar, Ayyagiri, A., Musunuri, A., Aggarwal, A., & Jain, S. (2024). Leveraging GenAI for clinical data analysis: Applications and challenges in real-time patient monitoring. Modern Dynamics: Mathematical Progressions, 1(2), 204–223. https://doi.org/10.36676/mdmp.v1.i2.21
[273]. Santhosh Vijayabaskar, Kodyvaur K. M., Cheruku, S. R., Chhapola, A., & Goel, O. (2024). Optimizing cross-functional teams in remote work environments for product development. Modern Dynamics: Mathematical Progressions, 1(2), 188–203. https://doi.org/10.36676/mdmp.v1.i2.20
[274]. Voola, Pramod Kumar, Daram, S., Mehra, A., Jain, S., & Goel, O. (2024). Using Alteryx for advanced data analytics in financial technology. International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET), 12(8), 27–48. https://www.ijrmeet.org/
[275]. Voola, P. K., Pakanati, D., Cherukuri, H., & Renuka, A. Prof. (Dr.) Punit Goel. (2024). Ethical AI in healthcare: Balancing innovation with privacy and compliance. Shodh Sagar Darpan International Research Analysis, 12(3), 389.

[276]. Vijayabaskar, S., Gangu, K., Gopalakrishna, P. K., Goel, P., & Gupta, V. (2024). Agile transformation in financial technology: Best practices and challenges. Shodh Sagar Darpan International Research Analysis, 12(3), 374. https://doi.org/10.36676/dira.v12.i3.9
[277]. Voola, Pramod Kumar, Daram, S., Mehra, A., Jain, S., & Goel, O. (2024). Data streaming pipelines in life sciences: Improving data integrity and compliance in clinical trials. Available at SSRN: https://ssrn.com/abstract=4984955
[278]. Voola, P. K., Pakanati, D., Cherukuri, H., Renuka, A., & Goel, Dr. Punit. (2024). Leveraging GenAI for clinical data analysis: Applications and challenges in real-time patient monitoring. Available at SSRN: https://ssrn.com/abstract=4984961
[279]. Voola, P. K., Avancha, S., Gajbhiye, B., Goel, O., & Jain, U. (2023). Automation in mobile testing: Techniques and strategies for faster, more accurate testing in healthcare applications. Shodh Sagar® Universal Research Reports, 10(4), 420–432. https://doi.org/10.36676/urr.v10.i4.1356