American Journal of
AI Digital Transformation and Regenerative Pharmacist
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0418 www.zesterapublications.com Original Research Paper

Institute Performance Ranking Platform With Transparent Multi-Metric Evaluation

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ABSTRACT

The Institute Performance Ranking Platform with Transparent Multi-Metric Evaluation is a web-based application developed to provide students and stakeholders with a reliable and transparent method for evaluating educational institutions. Traditional institute selection often depends on advertisements, unofficial websites, and incomplete information, which may lead to biased or inaccurate decisions. The proposed system addresses this problem by presenting verified institutional data through a centralized platform using multiple performance metrics. The application is developed using React.js for the frontend, Django Representational State Transfer (REST) Framework for backend services, and My Structured Query Language (MySQL) for database management. It follows a three-tier architecture that ensures secure communication, efficient data processing, and scalable performance. The platform provides role-based access with two types of users: administrator and regular user. Administrators verify user registrations, manage institute information, and ensure the authenticity of performance data, while approved users can view, filter, compare, and analyse institutes based on verified metrics such as placement percentage, student strength, location, and contact information. The system computes institute rankings automatically using a weighted multi-metric evaluation approach, ensuring fair, transparent, and reproducible assessment. Application Programming Interfaces (APIs) facilitate seamless communication between the frontend and backend, while Hypertext Transfer Protocol (HTTP) enables secure data transmission. By integrating structured data management, administrative validation, and automated ranking mechanisms, the proposed platform improves transparency, reduces misinformation, and supports informed academic decision-making. The modular architecture also enables future integration of Artificial Intelligence (AI) and predictive analytics for advanced institutional performance evaluation.

Key words: Educational Institution Ranking, Multi-Metric Evaluation, Performance Analysis, React.js, Django REST Framework, MySQL, Role-Based Access Control (RBAC).

1. INTRODUCTION

Nowadays, ranking of scientific impacts is a crucial task and it is a focus of research communities, universities, and governmental funding agencies. In this ranking, the target entities can be researchers, universities, countries, journals, or conferences. As shown in fig. 1 Performance analysis and benchmarking of scientific achievement have a variety of substantial purposes. At the researcher level, the research's impact is an important measure to define the main rules of academic institutions and universities on determination of funding, hiring, and promotions [1]. From the university's view point, university rankings are considered as a source of strategic information for governments, funding agencies, and the media in order to compare universities; then students and their parents use university rankings as a selection criterion [2].

Received: 30-05-2026 | Accepted: 01-07-2026 | Published: 08-07-2026

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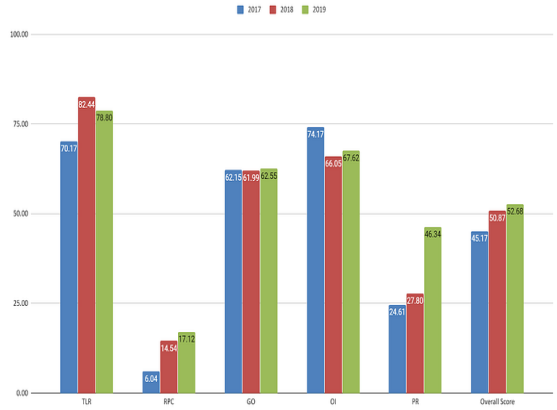


Fig. 1: Institute Performance Ranking

As the assessment of scientific achievement has gained a great deal of attention for various interested groups, such as students, parents, institutions, academicians, policy makers, political leaders, donors/funding agencies, and news media; several assessment methods have been developed in the field of bibliometric and scient metrics through the utilization of mathematical and/or statistical methods [3]. In order to measure a researcher's performance, many indicators have been proposed which can also be utilized in other scientific areas. Traditional research indicators include the numbers of publications and citations, the average number of citations per paper, and the average number of citations per year [4]. In 2005, Hirsch [5] proposed a new indicator, called *h*-index, which revolutionized scient metrics (informatics).

The original definition of the *h*-index indicator is that, "A scientist has the index h if h of his/her Np papers have at least received h citations each, and the other $Np-h$ papers have no more than h citations each." Later, other indicators were proposed to enhance the *h*-index. Additionally, *h*-index was defined for other scientific aggregation levels [6]. Ranking methods at researcher level tend to use only one indicator (h-index or its improved versions), but at other aggregation scientific levels they prefer to have a more comprehensive set of indicators [7]. In the field of optimization, an algorithm tries to find the best solution in a search space in terms of an objective function which should be minimized or maximized [8] accordingly. However, in singe-objective problems [9], there is only one objective to be optimized; in the multi-objective version, the algorithm tries to find a set of solutions based on more than one objective [10].

2. LITERATURE SURVEY

Tiberius V et al. [11] stated that the increased interest in institutional entrepreneurship had produced a large number of scholarly publications, especially in the last five years. As a consequence, the literature landscape had become somewhat complex and scattered. They aimed to compile a quantitative overview of the field within business and management research by conducting bibliometric performance analyses and science mappings. They identified the most productive and influential journals, authors, and articles with the highest impact. They found that institutional entrepreneurship had stronger ties to organization studies than to entrepreneurship research. Additionally, a large body of literature at the intersection of institutions and entrepreneurship did not refer to institutional entrepreneurship theory. Makki et al. [12] proposed a new approach to rank university colleges by evaluating their educational quality. Standard sets of criteria from multiple international university ranking systems and a university's strategic plan's Balanced Scorecard perspectives were cross-mapped for the evaluation. A new multi-criteria decision-making-based framework was applied to six colleges of a non-profit university in the Middle East. It revealed their performance rankings and contributions to the university's educational quality objectives. This work offered a novel approach for universities to develop strategies

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that satisfied multiple international ranking systems while achieving their strategic goals concurrently and according to their priorities. The implications included informing university leaders about the most contributing colleges and assisting in identifying quality shortcomings and their causes.

Mrzygłocka-Chojnacka J and Ryńca R [13] proposed a tool that provided an opportunity for a more holistic view of sustainable development implementation, both by prioritizing factors and by considering that higher education institutions were systems composed of two distinct but necessarily cooperating subsystems: the academic subsystem and the administrative subsystem. The proposal was preliminary, but it indicated that, given the relevance and urgency of sustainable development issues, this direction was appropriate for research on sustainable development management in higher education institutions. Marinović et al. [14] proposed a novel multi-criteria decision-making approach to evaluate and select the most suitable operating system for educational institutions. The methodology integrated the PIPRECIA method for assessing weighted criteria along with utility analysis (NWA), enabling a balanced decision-making process between institutional management and IT experts. The evaluation considered criteria such as performance, cost, security, usability, implementation, support, and documentation. The study compared three popular operating systems: Microsoft Windows 11, GNU Linux Ubuntu 22.04 LTS, and Apple macOS 12 using the proposed approach. The results, based on the integrated evaluation of all criteria, indicated that GNU Linux Ubuntu 22.04 LTS ranked highest (0.562), followed by Microsoft Windows 11 (0.553) and Apple macOS 12 (0.543). Wang et al. [15] proposed a multi-indicator comprehensive evaluation method based on entropy weight correlation scaling, which calculated the weights of each evaluation indicator using test data and thereby provided a balanced and comprehensive evaluation mechanism for model performance. In the experiments, specific interferences were designed for SAR images in the testing stage, and three models from the YOLO series were tested. Finally, a multi-dimensional performance profile diagram for deep learning object detection models was constructed, providing a new visualization method to comprehensively characterize model performance in complex application scenarios. This approach provided more accurate and comprehensive model performance evaluation for remote sensing data processing and guided model selection and optimization.

Burmann et al. [16] proposed a methodology based on goal programming that allowed objective, transparent, and reproducible weighting of criteria. Moreover, it avoided problems associated with correlated criteria. The methodology was applied to a sample of 718 universities using 11 criteria obtained from two prestigious university rankings covering sustainability, teaching, and research. A sensitivity analysis was carried out to assess the robustness of the results obtained. This analysis showed how the weights of the criteria and the universities' ranks changed depending on the λ parameter of the goal programming model, which was the only parameter set by the decision maker.

Elbawab [17] aimed to explore university rankings in depth. University rankings were considered contributors to assessing university performance. Previous literature showed different types of goals, such as output and support goals, and advised alignment between these two types of goals. Universities had different goals; however, university rankings measured all universities using the same criteria. Subsequently, this research used the most widely

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used university ranking dataset in the literature, the QS World Ranking dataset. Unsupervised machine learning was performed to cluster the universities. The results divided universities into four clusters. This study helped allocate universities to appropriate clusters and assisted university managers in defining institutional goals. The study recommended that universities align their support goals with their output goals, develop international goals and strategies, and support research by encouraging and supporting scholars.

3. PROPOSED METHODOLOGY

This research methodology introduces a web-based system designed to analyze and present educational institute performance in a structured and reliable manner. The platform integrates a modern frontend built using React.js with a robust backend developed using Django REST Framework to ensure seamless communication and data handling. As shown as fig. 2 Institutional data such as placement percentage, student strength, location, and contact details are stored in a centralized MySQL database after administrative verification. Role-based access control allows administrators to manage users and validate institute information, while users can view and compare institutes using approved metrics. The system minimizes bias by focusing on data-driven evaluation rather than subjective opinions. Institute ranking is calculated automatically using a weighted scoring algorithm based on placement percentage and student strength. Institutes are sorted in descending order of computed scores and assigned ranks dynamically. This ensures fair, transparent, and reproducible evaluation. The platform ensures transparency, data authenticity, and informed decision-making for students and stakeholders through a scalable and user-friendly architecture.

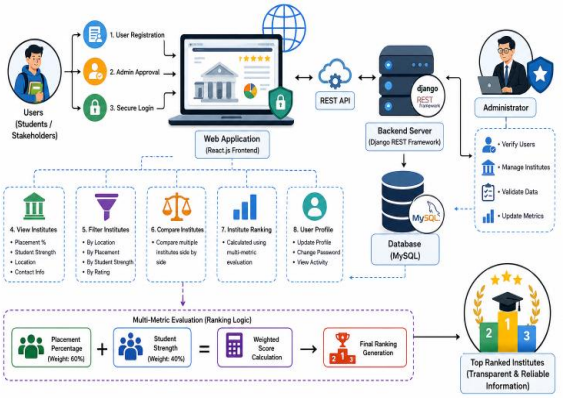


Fig. 2: Proposed system architecture of institute performance ranking platform.

User Interface (Web Browser – React): Users interact with the system through a browser-based interface developed using React.js, which provides smooth navigation and responsive design. Features such as user registration, login, institute viewing, and profile management are designed for simplicity. Users can browse institute details and performance metrics through their dashboards. Every interaction is converted into secure Hypertext Transfer Protocol (HTTP) requests sent to the backend for processing.

Backend Server (Django REST Framework): The backend server acts as the core processing unit, handling all requests from the frontend. It manages authentication, role verification, admin approval checks, and business logic execution. Application Programming Interface (API)s process institute data, user details, and access permissions securely. This layer ensures controlled and reliable communication between the interface and database.

Database Layer (MySQL): The MySQL database stores all persistent system data in a structured relational format. It maintains records of users, roles, approval status, and institute performance metrics such as placement percentage and student count. Efficient SQL queries ensure fast data retrieval and updates. Data integrity and consistency are preserved across all operations.

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User Registration and Approval Flow: Users submit registration details which are validated and stored with a pending approval status. This prevents unauthorized access to system resources. The administrator reviews user details and approves legitimate accounts. Approved users then gain access to role-specific features and dashboards.

Administrator Management Module: Administrators manage users and institutional data within the platform. They approve user registrations, add institute details, update performance metrics, and ensure data authenticity. Admin control prevents manipulation of institute data. This module maintains transparency and reliability across the system.

Institute Data Management Module: Institutes are added and updated only through admin-authorized actions. Performance attributes such as placement percentage, student strength, location, and contact details are stored in verified form. The system ensures that only approved data is visible to users. This maintains standardization and accuracy in evaluation.

User Access and Institute Viewing Module: Approved users can view a list of institutions along with verified performance metrics. Users can compare institutes based on multiple data parameters rather than assumptions. The structured presentation supports informed academic decision-making. All displayed data originates from admin-approved records.

End-to-End Operational Flow: All operations follow a systematic flow from React interface to Django backend and MySQL database. Each request is authenticated, validated, processed, and stored securely. Role-based access ensures users interact only with permitted functionalities. The integrated workflow supports transparency, data accuracy, and scalable performance evaluation.

Workflow

The workflow of this research follows a structured and role-based process to ensure data accuracy, security, and transparency. The system begins with user registration through the web interface, where details are validated and stored with a pending approval status. Administrative verification acts as a control mechanism to prevent unauthorized access and ensure authenticity of users and institutional data. Once approved, users can securely log in and access permitted functionalities. Administrators manage institute details and verify performance metrics before publishing them for public viewing. Users can then view and compare institutes based on verified multi-metric data, completing a reliable end-to-end evaluation flow illustrated in fig 4.2.

User Access and Interface Interaction: The workflow begins when a user accesses the system through a web browser using a React-based interface. The interface provides options such as registration, login, and navigation to user dashboards. Dynamic rendering ensures smooth interaction without page reloads. Each user action is converted into a secure HTTP request and forwarded to the backend server.

User Registration Process: New users submit personal details including username, email address, mobile number, and address through the registration form. The backend validates the input data and stores it in the database with a pending approval status. This step prevents immediate unauthorized access to system resources. Users are notified that account access is subject to administrative verification.

Administrator Approval Workflow: The administrator logs into the system and reviews the list of registered users awaiting approval. User information is verified to ensure authenticity and legitimacy. Upon approval, the user's account status is updated in the database. This workflow ensures that only verified users can access platform functionalities.

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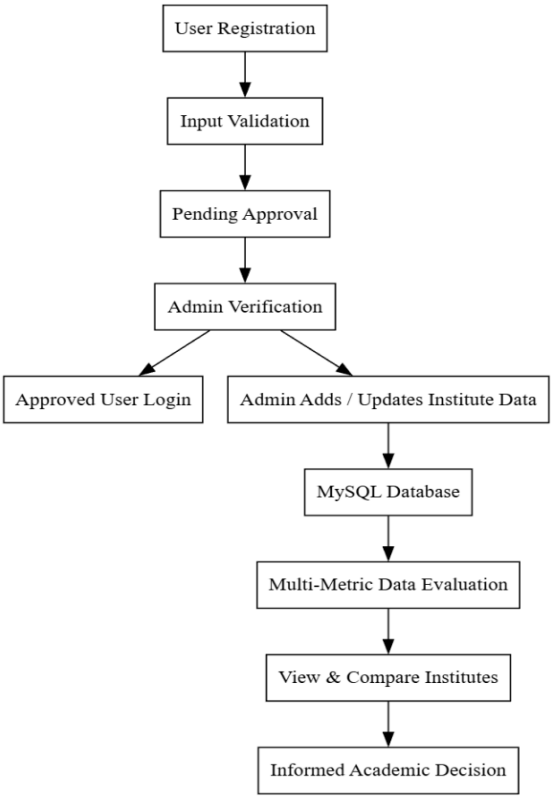


Fig. 3: Workflow of institute performance ranking platform.

Login and Role Validation: After approval, users log in using valid credentials. The backend verifies authentication details and identifies the user role as administrator or regular user. Based on the role, users are redirected to their respective dashboards. Invalid or unapproved login attempts are restricted to maintain security.

Institute Data Management by Administrator: The administrator adds, updates, and manages institute details such as location, placement percentage, total student strength, and contact information. All data entries are validated before being stored in the database. Only admin-approved institutional data is made available to users. This process ensures accuracy and transparency in performance evaluation.

Institute Ranking and Filtering: After fetching institute data, the system computes performance scores, assigns ranks, and allows users to filter institutes based on location and minimum placement criteria.

Institute Viewing and Comparison by Users: Approved users access their dashboards to view a list of institutes with verified performance metrics. The system presents multi-metric data in a structured format for easy comparison. Users analyze institutional performance based on factual data rather than assumptions. This supports informed academic decision-making.

Data Storage and Performance Evaluation: All institutional and user-related data are securely stored in the MySQL database. Performance metrics are retrieved and organized through backend APIs for presentation. This structured storage supports consistent and reliable evaluation. Data integrity is maintained across all operations.

End-to-End System Synchronization: All interactions are processed through Django REST APIs, ensuring secure validation and routing. The frontend dynamically updates views based on backend responses. The workflow operates continuously, maintaining data consistency and real-time synchronization. The integrated architecture supports scalability and transparent performance analysis.

4. RESULTS AND DISCUSSION

The results of the proposed Sanitation Request and Complaint Management System demonstrate that the application operates efficiently in managing sanitation-related activities through a centralized platform. The system successfully handles user registration, authentication, request submission, worker assignment, and complaint management without operational errors. Testing confirmed that supervisors can approve users, assign workers to requests, and monitor system activity effectively. Residents were able to submit service requests and complaints, while workers could update task completion status in real time. The integration of database

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management and file upload functionality ensured reliable storage of service records and complaint evidence.



Fig. 4: User details page.

Fig. 4 displays registered users with information such as username, email, mobile number, and approval status. The admin can monitor and manage user accounts efficiently through this interface.

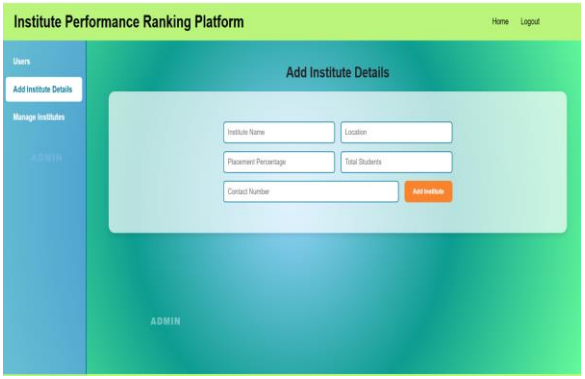


Fig. 5: Add institute details page.

Fig. 5 provides the Institute Performance Ranking Platform with an option to add institute details. The admin can enter information such as institute name, location, placement percentage, total students, and contact number. It provides a structured interface for managing and maintaining institute data efficiently.



Fig. 6: Manage institutes page.

Fig. 6 represents the Manage Institutes module of the Institute Performance Ranking Platform, designed for administrative control and monitoring. It displays a ranked list of institutes with key performance details such as location, placement percentage, student strength, and contact information in a structured table format. Administrators can efficiently edit or delete institute records, ensuring data accuracy, transparency, and up-to-date performance evaluation.



Fig. 7: Views institutes page.

Fig. 7 represents the User Dashboard of the Institute Performance Ranking Platform, where approved users can view a ranked list of available institutes. It presents verified performance metrics such as location, placement percentage, total students, and contact details in a clear tabular format. The dashboard supports transparent comparison and helps users make informed academic decisions based on reliable data.

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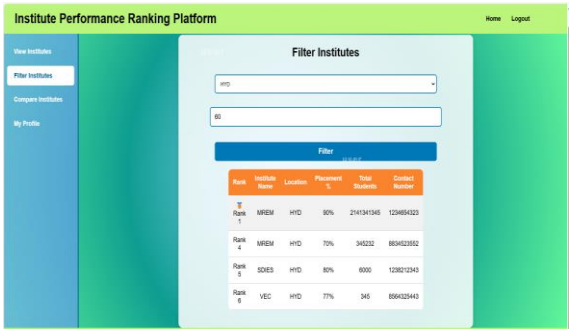


Fig. 8: Filter institutes page.

Fig. 8 illustrates the Filter Institutes feature in the User Dashboard, allowing users to refine institute results based on location and minimum placement percentage. By applying filters, users can quickly narrow down institutes that match their preferences and eligibility criteria. The filtered results are displayed in a ranked table, supporting faster and more focused decision-making.

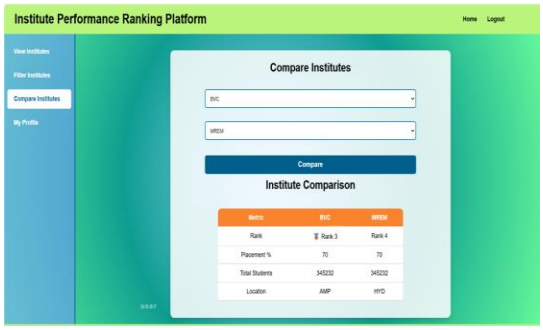


Fig. 9: Compare institutes page.

Fig. 9 shows the Compare Institutes feature, where users can select two institutes from dropdown lists and compare them side by side. Key metrics such as rank, placement percentage, total students, and location are displayed in a structured comparison table. This decision-support view helps users clearly evaluate differences and choose the most suitable institute.

5. CONCLUSION AND FUTURE SCOPE

This research successfully delivers a reliable, data-driven solution for evaluating educational institutions. By integrating a React JS frontend with a Django REST Framework backend and a MySQL database, the system ensures efficient data handling and smooth user interaction. Centralized institute data management eliminates inconsistencies found in traditional evaluation methods. Multi-metric performance presentation reduces bias by relying on verified numerical indicators rather than subjective opinions. Modular system design supports efficient maintenance and scalability. Dynamic rendering in React improves user experience through real-time updates without page reloads. Efficient query execution in MySQL ensures stable performance even with increasing data volume. Backend validation and controlled workflows reduce processing errors and improve accuracy. The platform enhances transparency, performance efficiency, and informed decision-making. The system stands as a practical and robust solution for institutional performance evaluation. Dynamic rank computation and filtering significantly improved system usability and evaluation accuracy. In the future, automated ranking algorithms can be implemented to generate dynamic institute rankings based on weighted performance metrics. Advanced analytics and visualization dashboards can provide deeper insights into institutional trends. Machine learning techniques may be integrated to predict performance outcomes. The system can also be extended to include additional evaluation parameters and nationwide data coverage.

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