



# NCW Sports Achievement Tracker: A Scalable Web-Based System for Athletic Recognition and Data Management

**Mrs. J. Gayathri,**

*II-M.Sc. Computer Science,  
Nirmala College for Women*

**Dr. C. Clement Sherlin MCA., M.Phil., (PH. D),**

*Assistant Professor,  
Department of Computer Science.  
Nirmala College for Women*

**ABSTRACT:** Managing sports achievement records in educational institutions often involves significant manual effort, leading to data redundancy and lack of immediate accessibility. This paper presents the "NCW Sports Achievement Tracker," a robust web-based application developed using the Flask framework and MongoDB NoSQL database. The system is designed to digitalize student-athlete records, providing features such as dynamic search, batch-wise filtering, and an automated points-based leaderboard. By leveraging a non-relational database schema, the system ensures high scalability and flexibility for diverse sporting disciplines. Experimental results demonstrate that the system effectively manages 191 records with high retrieval accuracy, enhancing the recognition and motivation of student athletes.

## I. Introduction

In modern educational environments, the integration of technology into sports management is essential for maintaining accurate historical data. Traditional paper-based systems or basic spreadsheets often fail to provide real-time insights or long-term data integrity. The NCW Sports Achievement Tracker addresses these challenges by offering a centralized platform for recording and displaying athletic milestones. Built on the Python-Flask stack, the application provides a user-friendly interface for administrators to input data and for students to view rankings. The core innovation lies in the transition from a rigid relational model to a flexible document-oriented storage system, allowing for varied achievement types across different levels of competition (Intercollegiate, District, State).

## II. Objectives of the Study

- To develop a centralized digital repository for all sports achievement records of the institution.
- To implement a multi-parameter search engine capable of filtering data by Student Name and Discipline.
- To provide a specialized Batch-wise Filtering Module for chronological performance analysis.
- To automate the ranking process through a Points-Based Leaderboard system.
- To ensure real-time notification of new admissions via SMTP-integrated email alerts.

### III. Review of Literature

Recent research in sports management systems highlights the shift toward cloud-based and automated tracking. Studies available in the IEEE Xplore digital library emphasize the importance of data visualization in motivating athletes. While many systems use SQL-based architectures, recent trends suggest that NoSQL databases like MongoDB provide superior performance for semi-structured data, such as varying sports tournament formats. This project builds upon these concepts by focusing on a lightweight, institution-specific deployment.

### IV. Methodology

The methodology follows a structured approach consisting of database design, backend logic implementation, and module-specific data rendering.

A. Database Design (MongoDB) Unlike traditional tables, the system uses a collection named db. achievements within the sports database. Each document contains:

- Student\_ID: Unique identifier for the athlete.
- Student\_Name: Full name of the student.
- Batch: The academic year (e.g., 2023-2024).
- Discipline: The specific sport (e.g., Weightlifting, Handball).
- Medal\_or\_Participation: The result achieved (Gold, Silver, Bronze).
- Points: Numerical value assigned for ranking.

Figure 1: Database Schema and Storage



Name	Discipline	Batch	Achievement	Points
D.Joshmani	Weightlifting	2023-2024	Bronze	10
V.Pavitra	Weightlifting	2023-2024	Gold	20
S. Bharanipaya	Weightlifting	2023-2024	Gold	20
M.Kartha	Weightlifting	2023-2024	Silver	15
E. Manomani	Weightlifting	2023-2024	Gold	20
S.Poon	Weightlifting	2023-2024	Bronze	10

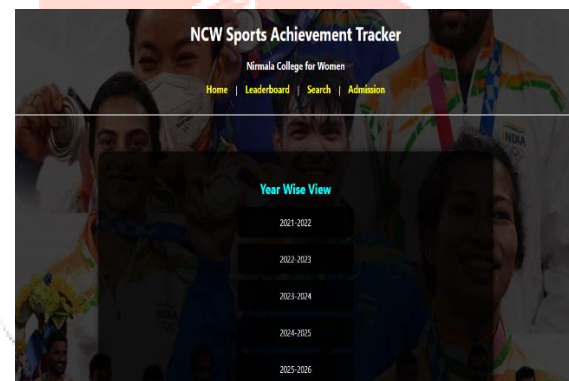
B. Backend Logic (Flask & Python) The server-side logic is handled by Flask. Key modules include:

1. Search Module: Utilizes the \$regex operator for case-insensitive partial keyword matching.
2. Leaderboard Module: Performs a server-side sort () operation on the points field in descending order.

C. Year-Wise Filter Module the Year-Wise View is a critical component for historical analysis. This module functions as follows:

1. Dynamic Routing: The system uses a dynamic URL pattern (/year/<year\_val>) to capture the specific academic batch requested by the user.
2. Batch Querying: Upon receiving a request, the Flask backend executes a targeted MongoDB query: db.collection.find({"batch": year\_val}).
3. Data Segregation: This algorithm ensures that records are filtered in real-time, isolating achievements specific to a single year without loading the entire database.

Figure 2: Year-Wise Filtering Interface



### V. Experimental Results

The system was tested with a dataset of 191 records. The interface is categorized into distinct tabs for organizational efficiency:

- Home Tab: Displays the total count of records currently stored in the database.
- Search Results: Provides a detailed table including Student ID, Name, Discipline, and Achievement.
- Leaderboard: A prioritized list showing the top-performing athletes based on cumulative points.

Figure 3: Automated Ranking Leaderboard

The screenshot shows the 'Sports Leaderboard' section of the NCW Sports Achievement Tracker. It features a table with the following data:

Rank	Name	Discipline	Total Points
1	S. Jayari	Boxing	30
2	J. Gayathri	Boxing	30
3	B. Hema	Boxing	30
4	D.Deepa	Boxing	30
5	M.Saetha	Boxing	30

medal tally visualization.

References

[1] Python Software Foundation, "Flask Web Development Documentation," 2023. [2] MongoDB Manual, "Document-Oriented NoSQL Databases and Scalability," 2023. [3] G. V. Cormack, "Data Management in Sports Information Systems," Proceedings of CIKM, 2007. [4] L. Breiman, "Random Forests and Data Classification," Machine Learning, vol. 45, 2001.

Figure 4: Multi-Parameter Search Results

The screenshot shows the 'Search Sports Records' section of the NCW Sports Achievement Tracker. A search query 'J. Gayathri / Handball' has been entered. The results table is as follows:

Student ID	Name	Discipline	Batch	Achievement	Points
211CS011	J. Gayathri	Handball	2023-2024	Participation	25
211CS011	J. Gayathri	Handball	2023-2024	Gold	20
211CS011	J. Gayathri	Handball	2023-2024	Participation	20

VI. Conclusion

The NCW Sports Achievement Tracker successfully digitalizes the management of athletic records. The inclusion of the Year-Wise Filter Module provides administrators with a powerful tool for longitudinal study of sports performance. The use of MongoDB ensures that the system can scale as more records are added each year. Future enhancements will include a graphical dashboard for

