

# Team Abhimanyu\_MV at Smart India Hackathon'24

## WHAT IS SIH?



Ministry of  
Education  
Government of India



SMART INDIA  
HACKATHON  
2024

Smart India Hackathon (SIH) is a premier nationwide initiative by the **Ministry of Education's Innovation Cell** and the **All India Council of Technical Education (AICTE)** designed to engage students in solving some of the most pressing challenges faced in everyday life. Launched to foster a culture of innovation and practical problem-solving, SIH provides a dynamic platform for students to develop and showcase their creative solutions to real-world problems. By encouraging participants to think critically and innovatively, the hackathon aims to bridge the gap between academic knowledge and practical application.

The themes for innovative ideas, supported by ministries such as **AICTE, ISRO, Ministry of Home Affairs, Ministry of Ayush, Department of Science and Technology, Ministry of Defence, State Governments**, etc, includes Smart Automation, MedTech/BioTech/HealthTech, Smart Vehicles, Transportation & Logistics, Robotics and Drones, Agriculture, Clean & Green Technology, Tourism, Blockchain & Cybersecurity, Smart Education, Disaster Management, etc.



Team **ABHIMANYU\_MV**,  
comprising of:

**Viren Mehta (Team Lead), Perin Modi, Karan Patel, Vinit Chokshi, Khushil Shah & Sanskruti Dhanani** proudly represented **LJ University** in the **Smart India Hackathon 2024 (SIH24) Grand Finale**.

Out of an astounding **49,892 teams**, and **57,378 idea submissions**, **ABHIMANYU\_MV** was selected to work on the problem statement titled "**Trade Mark Saarthi**", under the **Ministry of Information and Broadcasting**.

The Grand Finale, held at **Integral University, Lucknow, Uttar Pradesh** brought together some of the brightest minds from across the nation, all showcasing their innovative solutions to real-world problems.

The problem statement was to develop an **Online system to automatically verify new title submissions by checking for similarities with existing titles**. The problem involves developing an online system to automatically verify new title submissions by checking for similarities with a database of 160,000 existing titles. The system must detect **phonetic similarities, spelling variations, and disallowed prefixes, suffixes**, or words while rejecting titles that combine existing ones or have similar meanings in other languages. It should provide a similarity percentage and a verification probability score, ensuring compliance with outlined guidelines. The system must deliver clear feedback to users, support scalability, and perform efficiently under a large dataset. The solution aims to maintain uniqueness, avoid confusion, and streamline the title verification process.

**Choosing the Problem Statements** One of the key steps was to select the right problem statements (PS). Here's how we approached it:

1. We carefully studied all the available problem statements to understand which ones matched our strengths.
2. From this process, we shortlisted 10-15 problem statements that suited our team's expertise.

**Preparation and Submission** Once we finalized our problem statements, we dove into preparing for them for 1 month. This involved:

- Doing detailed research to understand the challenges and what solutions already existed.
- Coming up with innovative and practical ideas.
- Creating presentations that clearly explained our solutions and how they could work.
- Creating various algorithms and test & deploy them.

## **Our Submission for the Trademark Registration Problem Statement Selected for the Grand Finale!**

The moment our submission was selected for the Grand Finale was a tremendous boost for our team, making all our hard work truly worthwhile. Below is the solution we proposed to the Ministry of Information and Broadcasting and **Press Registrar General of India**, which formed the basis for the prototype we were tasked to develop during the Grand Finale.

**Linkedin Update:** [Team Abhimanyu\\_MV at SIH'24 Grand Finale](#)

## Ideation Phase

- **Brainstorming Sessions:** We discussed challenges like how to deal with different languages, check for restricted words, and make the search accurate yet fast. So accordingly we divided the problem into the following steps.
- **Challenges Identified:** Multilingual handling, restricted words, and fast, accurate searches.
- **Steps Defined:**
  1. Tokenize and embed titles for understanding.
  2. Perform smart searches using vector and phonetic methods.
  3. Filter invalid titles based on guidelines.
  4. Assign scores to titles based on matching criteria.

## Proposed Solution

The system ensures accurate title verification through the following steps:

- **Title Vectorization:** Titles are tokenized, unimportant words removed, phonetic versions generated, and multilingual translations handled. Processed data is stored in the **Milvus** database.
- **Smart Search:** User-submitted titles are matched using phonetic similarity, transliteration, and vector embeddings for comprehensive comparisons.
- **Result Sorting:** Matches are ranked based on phonetics, vector similarity, and combined scores.
- **Title Validation:** Titles are checked for restricted words, special characters, prohibited prefixes/suffixes, and minimum word count compliance.
- **Title Scoring:** A final score combines all checks to determine approval likelihood.

## Design and Development

### System Architecture:

- **Backend:**
  - The backend is built using **FastAPI**, a lightweight **Python framework**. It handles all the heavy lifting, like processing titles, running vector searches, and applying compliance checks.
  - We integrated **Milvus (Zilliz)**, a high-performance vector database, to store and retrieve vector embeddings efficiently.
- **Frontend:**
  - The user interface is powered by **Next.js**, a React-based framework. It provides a smooth, interactive experience for users to input titles and view results.
  - The frontend is deployed using **Vercel**, ensuring fast and reliable access.

**Technologies Used:** Python, FastAPI, Next.js, Zilliz (Milvus), Redis, Langchain, All for Bharat (Indic Transliteration), Vercel, Railway, GitHub.

**Algorithms Used :** Phonetic search, Semantic Search, Different fuzzy logics, Vectorized distance mapping, Cosine Similarity, Soundex, Levenstein distance.

## Experience

- **The Hackathon** began with a grand inauguration ceremony where we had the honor of meeting the Prime Minister, the Education Minister, AICTE representatives, and other key officials from the Ministry of Education, including T.G. Sitharam and Abhay Jere. Several dignitaries from various government ministries also attended, setting a motivating tone for the event.
- At precisely 9:00 AM, the hackathon officially started, and we began working on our prototype. Throughout the day, we participated in various rounds like mentoring round, judging round designed to guide and assess our progress. The first mentoring session was at 11:00 AM, where ministry representatives wanted to understand our approach and ensure we were on the right track. They provided valuable feedback, which we immediately incorporated into our work.
- At 7:00 PM, we faced our first judging round. The judges appreciated our solution and showed a keen interest in its potential. Their encouragement motivated us to refine our work further. Post-judging, we networked with fellow participants, students, professors, and organizers from **Integral University**, which enriched our experience and broadened our perspectives.
- Another mentoring session took place at 9:00 PM. The feedback was constructive, particularly on improving the UI. However, we encountered challenges with our algorithm, as it wasn't delivering the desired results. Despite the limited time, we brainstormed multiple solutions and chose the most feasible one. After a quick dinner, we attended a jamming session organized by the university, which provided a much-needed break and refreshed our spirits.
- Post-midnight, we returned to work, focusing on fine-tuning the algorithm and preparing for the next crucial judging round. At 6:00 AM, we participated in a yoga session, which helped us relax and recharge. The final judging session took place later that morning, where we presented our improved solution. Between sessions, we continued to refine our work, ensuring that every detail was addressed.
- **Conclusion** Our journey through the SIH Grand Finale was filled with challenges, learning opportunities, and moments of triumph. The experience of working under pressure, receiving expert guidance, and collaborating with a talented team has been invaluable. This hackathon not only tested our technical skills but also our perseverance and adaptability. We're grateful for the opportunity and look forward to applying these lessons in future endeavors.
- We would also like to express our gratitude to LJ University for providing us with this opportunity, and to the Heads of Departments, **Mr. Parth Sinroza and Mrs. Khushboo Bhalodiya**, for their continuous coordination throughout.

## Grand Finale

**Jury members: Ashutosh Mohle, Gaurav sharma, Satish Kumar Mishra**

**Mentors: Shammi Kumar Gupta, Akash Srivastava**



**Team with Ashutosh Mohle, Joint Director(PRGI), Ministry of information and broadcasting, GOI and Gaurav Sharma Assistant Director National Informatics Centre(NIC), GOI.**



**Team with Noor Alam Khan Sir (Integral Startups Foundation & Nodal Center Head) and Madan Mohan Sharan Singh Sir (Manager (IP & Technology Transfer) at AICTE).**

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