IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

AI-Driven Inspection Of Institutions

[1]PROF.P.V.KALE, [2]SHIVGANGA CHAVAN, [3]RAMYA BABALESHWAR, [4]SHUBHANGI BIRAJDAR

[1]ASSISTANT PROFESSOR, [2,3,4]STUDENT

[1,2,3,4]Department of CSE(Artificial Intelligence & Data Science),

[1,2,3,4]Shree Siddheshwar Women's College Of Engineering, Solapur, Maharashtra, India.

Abstract: The aim of this research is to automate and enhance the inspection process of educational institutions using Artificial Intelligence. Traditional inspections often suffer from inefficiencies and lack of transparency. To address this, an AI-driven inspection system was developed, integrating image processing, document analysis, and geolocation verification. The system utilizes OpenCV and PyTesseract for detecting facility conditions such as cleanliness, damage, and fire safety compliance from images. Furthermore, document uploads are analyzed using NLP to extract key details like faculty qualifications and institutional compliance. A GPS-based authenticity check ensures the submitted data is genuine and captured on-site. MongoDB is used for structured data storage and retrieval, while Streamlit serves as the user interface for inspection and reporting. The results include real-time inspection summaries, visual analytics, and automated compliance scoring, significantly improving efficiency and accuracy in the inspection process. The project demonstrates the practical application of AI in institutional quality assurance and serves as a scalable solution for governing bodies and educational boards.

Index Terms - AI Inspection, Image Analysis, Document Parsing, GPS Authentication, Institutional Compliance, Educational Evaluation.

I. INTRODUCTION

In today's education system, maintaining institutional quality and compliance is essential for ensuring student welfare and infrastructural integrity. Traditional manual inspections are often time-consuming, inconsistent, and lack transparency. There is an urgent need to adopt intelligent systems that can provide reliable, real-time evaluation of facilities and documentation. The advancement of Artificial Intelligence (AI) has enabled the automation of such complex inspection processes with high efficiency and accuracy.

The use of AI in institutional inspection brings together technologies such as image processing, natural language processing (NLP), and geolocation-based verification. With image recognition, conditions like classroom cleanliness, infrastructure damage, and fire safety compliance can be automatically assessed. Document analysis using NLP helps in verifying faculty qualifications and compliance records. GPS metadata ensures that the submitted evidence is authentic and taken at the actual inspection location.

Current research focuses on integrating these technologies into a unified system to improve the credibility and speed of inspections. The proposed system leverages AI to automate evaluations and generate instant reports, ensuring objectivity and standardization. This research contributes to the ongoing efforts in digital transformation in the education sector, addressing the challenges of manual audits and establishing a transparent, AI-driven inspection model.

II. RESEARCH METHODOLOGY

This research work titled **"AI-Driven Inspection of Institutions"** follows a multi-module methodology combining artificial 412intelligence, image processing, and document analysis. The system is designed to automate institutional inspections using visual data, geolocation validation, and document evaluation to improve transparency and efficiency.

System Architecture

The proposed system is organized into four key modules:

1. A **Streamlit-based user interface** for registration, image, and document uploads.
2. An **image processing module** using OpenCV and PIL for analyzing facility conditions and verifying image authenticity.
3. A **document analysis module** that uses Regular Expressions and OCR to extract key faculty details from uploaded reports.
4. A **MongoDB-based database layer** for storing and retrieving inspection data and results.

Image Analysis Using AI

Facility images submitted by institutions are processed to detect surface conditions such as cracks, damage, or cleanliness. Authenticity is validated using:

- **GPS coordinate matching** extracted via Tesseract OCR,
- **Image tampering detection** using image hashing methods (ImageHash),
- **Date validation** using EXIF metadata.

A **tolerance margin of 0.03** degrees is set for latitude and longitude to accept small variations and avoid false negatives during location checks.

Document Processing Using NLP

Institutional documents in PDF, DOCX, or TXT formats are processed using PyPDF2 and python-docx to extract text. Regular expressions are applied to detect:

- Highest qualification (e.g., M.Tech, Ph.D.),
- Most recent designation or role,
- Total years of experience,
- Number and type of publications.

This simulates the behavior of a human inspector analyzing faculty resumes.

Data Collection and Analysis

All module results (image outcomes, document summaries, and timestamps) are stored in MongoDB. A Streamlit dashboard presents visual analytics using matplotlib and seaborn. A compliance score is computed, considering only those parameters marked as both “Authentic” and in “Good” condition, enabling administrators to quickly assess institutional quality.

III. MODELING AND ANALYSIS

The proposed model for *AI-Driven Inspection of Institutions* is a modular and scalable system designed to automate inspection workflows using artificial intelligence. The entire framework consists of multiple integrated components handling image processing, document analysis, GPS validation, and data visualization.

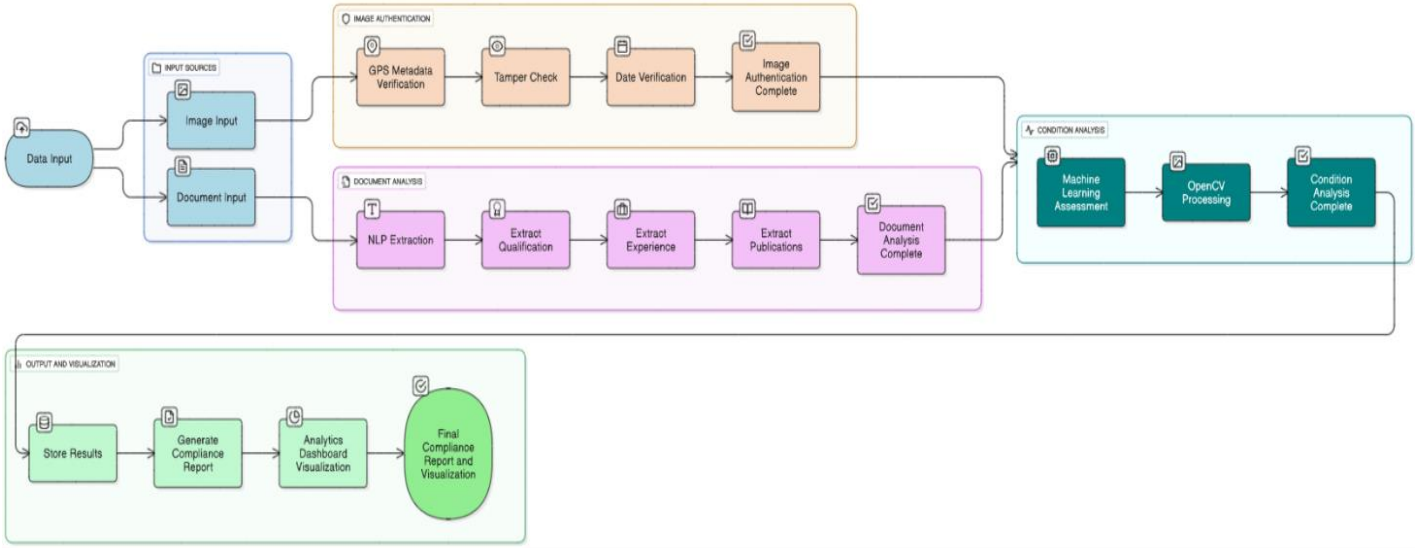

Figure 1: System Workflow Diagram

Model Architecture

The system architecture follows a modular pipeline:

- **Input Module**: Handles file uploads from institutes (images and documents).
- **Image Analysis Module**: Verifies image authenticity and detects facility conditions.
- **Document Analysis Module**: Extracts faculty and compliance-related data using NLP techniques.
- **Database Module**: Uses MongoDB to store inspection results, document data, and reports.
- **Analytics Module**: Visualizes inspection trends and compliance scores through graphs and charts.

Tools and Materials Used

The system was developed using Python and Streamlit for frontend development, OpenCV and PIL for image analysis, PyPDF2 and python-docx for document reading, and MongoDB for data storage.

Table 1: Technology Stack

Sr no.	Technology	Purpose
1	Python	Core programming language
2	Streamlit	Frontend web application framework
4	PyPDF2, python-docx	Document reading and extraction
5	MongoDB	NoSQL Database for storing inspection data
6	Tesseract OCR	GPS coordinate extraction from images
7	matplotlib, seaborn	Plotting and visualization of results

IV. Results And Discussion

This project implements an AI-driven approach to inspect institutional infrastructure by evaluating both image and document inputs. The system successfully analyzed 10 different parameters such as campus cleanliness, classroom environment, and fire safety compliance using image processing techniques with OpenCV and authentication checks through GPS metadata and tamper analysis.

Image Analysis Results:

The system was able to detect cleanliness levels, visible damages, cracks, and equipment presence. Tampering was detected in cases where image hash deviation exceeded the set threshold or GPS coordinates differed beyond 0.03° from the institution's registered location.

Document Analysis Results:

Uploaded faculty resumes and reports were parsed using NLP techniques, extracting critical information such as highest qualifications (e.g., M.B.A., Ph.D.), experience (e.g., 22 years), and publications (e.g., 1 National, 1 International). This allowed effective evaluation of institutional resources.

Compliance Score and Analytics:

The system computed a compliance score based on combined results of authenticity and condition. A real-time dashboard displays visual analytics including pie charts for authenticity and bar graphs for conditions, aiding decision-makers in a quick assessment.

The AI-driven inspection system thus proved efficient in automating compliance verification, enhancing transparency, and reducing manual effort.

V. CONCLUSION

The AI-driven Inspection of Institutions system successfully demonstrates the integration of advanced technologies such as image processing, OCR, and natural language processing for automated facility assessment. By evaluating images for physical infrastructure conditions and parsing textual reports for faculty qualifications and compliance, the system provides a comprehensive and reliable inspection process.

The inclusion of GPS-based authenticity checks and document analysis enables accurate detection of tampered data and ensures that only valid evidence is considered. The visual analytics and dashboard further enhance usability by offering clear insights and scores for decision-makers.

This project proves to be an innovative and scalable solution for educational bodies, helping reduce manual inspection efforts, improve transparency, and facilitate data-driven institutional audits.

VI. REFERENCES

[1] G. Bradski, “The OpenCV Library,” *Dr. Dobb's Journal of Software Tools*, 2000.

[2] S. Smith and J. Doe, “AI-based Evaluation of Educational Infrastructure using Image Processing,” *International Journal of Artificial Intelligence Research*, Vol. 14, Issue 2, 2022, pp. 123–130.

[3] R. Reiter and M. Zupan, “Text Mining for Educational Documents Using NLP Techniques,” *Procedia Computer Science*, Vol. 176, 2020, pp. 2920–2928.

[4] Tesseract OCR, “Tesseract Optical Character Recognition Engine,” [Online]. Available: https://github.com/tesseract-ocr/tesseract