"Design and Implementation of an Admin- Approved Lost and Found Item Management System with Automated Matching"

Arpitha Vasudev, Siddartha H R, Sanju T R, Shashank D, Shivacharan Tej

Department of Computer Science & Engineering, Dayananda Sagar Academy of Technology and Management, Bengaluru, Karnataka, India

Abstract
The loss of personal items is a common problem in educational institutions, corporate campuses, and public places. It often causes inconvenience, stress, and complicated recovery processes. Traditional systems for lost and found largely depend on manual reporting, notice boards, and informal communication, which consume a lot of time, are disorganized, and are open to misuse. Digital solutions available today are mostly text-based, and they lack proper verification methods, which results in low recovery rates and worries about privacy.

The paper describes the development and implementation of a Lost and Found Item Management System with automated matching that is authorized by an administrator. A major goal of the system is to increase the efficiency of item recovery by using structured content similarity and image-based matching techniques for internal comparison of lost and found items, all the while making sure that secure and controlled information exchange is taking place. Through a web-based interface, users are allowed to report lost or found items along with detailed descriptions and pictures. The system then automatically examines these entries and provides potential matches through similarity scores. Every match that has been identified will be sent to an administrator for assessment, where the decision to approve or reject it will be made before any contact information is disclosed.

Role-based authentication, centralized dashboards, and secure data storage are used in the implementation of the system to facilitate a modern full-stack architecture. Experimental evaluation indicates that accuracy of matching has improved, manual effort has been reduced, and user trust has been increased through admin-controlled validation. The proposed solution presents a scalable, secure, and efficient method for managing lost and found items in real-life situations.

Keywords: Lost and Found System, Automated Matching, Admin Approval.

I.   Introduction

Loss of personal belongings is one of the most common problems faced by students in schools, people in offices, and even in public places. These places are frequent with the loss of items like phones, wallets, ID cards, and papers. Manual processes that depend on notice boards, physical registers, or informal communication mark the traditional lost and found systems. These approaches are not just hard to manage but are also very inefficient. Besides, they do not have proper organization, and the human effort needed is extensive, and they still end up not linking the lost items with their rightful owners timely. Even existing digital platforms mostly rely on manual searching and exact text matching, which makes them less than effective when item descriptions are incomplete or inconsistent. Nonetheless, the development of intelligent systems that improve lost and found item recovery while ensuring user privacy and security is a result of advances in web technologies and automated data processing. Matching lost and found items through automated comparison using structured content and image similarity can greatly improve the accuracy of the match. In addition, the introduction of an admin-controlled approval mechanism not only makes the system stronger but also prevents false claims and controls the exchange of contact information. The project is about the design and implementation of an admin-approved Lost and Found Item Management System that incorporates automated matching, role-based access control, and secure information sharing as a means of providing a reliable, efficient, and scalable solution for real-world environments.

1.1   Background and Significance

Institutions and public places that have a large crowd of people interacting daily find it hard to manage lost and found items among the most common daily problems. The movement of large crowds and the presence of

shared areas are the main reasons for the frequent loss of items such as electronic gadgets, personal documents, and accessories. Even though such incidents happen daily, many organizations still stick to manual tracking methods that are inefficient, inaccurate, and unaccountable. A lack of a centralized system is often the reason for delays in recovery, unclaimed items piling up, and an increase in administrative workload—these are some of the limitations that traditional methods have.

The work done here is crucial as it is capable of changing the lost and found process through automation and controlled verification. The system, by merging automated matching of lost and found items with an admin approval workflow, not only ensures correct identification but also protects user privacy. Admin-controlled validation is a barrier to false claims and also specifies the level of sensitive contact information that may be shared among users, hence the latter gains trust. This method shows the practical usefulness of pairing up modern web technologies with systematic comparison techniques in order to present forth- the security, reliability, and scalability that can be applied to educational institutions, workplaces, and public service areas—solutions that are indeed the top quality because they come straight from the very ground of the technology and capacity that defines them.

1.2 Problem Statement

The current systems for lost and found rely on manual work or simple digital listings where the users have to do the matching themselves. As a result, the recovery rates are very low and management is not very efficient. The lack of automated comparison processes in these systems makes it hard to find possible matches with differing or incomplete item descriptions. Moreover, the lack of proper vetting and approval processes can lead to claims that are not true and the unauthorized sharing of personal contact details, thus heightening the privacy and security issues. What is needed is a centralized and smart system that would automatically make the comparison of lost and found items, allow administrative validation of the matches, and provide secure and controlled information exchange, thus improving the reliability and effectiveness of the system in the real world.

1.3 Objectives of the Study

This research's primary aim is to create and put into practice a unified Lost and Found Item Management System that will not only run the comparison of lost and found items but also make it easier through the use of structured content and image-based similarity techniques. The system's intention is to eliminate manual searching by recognizing possible mates- after which presenting them for administrative review.

The adoption of role-based access control further protects the confidentiality of users who report and monitor items, while administrators take care of the verification and approval stages. One more significant goal is to build user confidence and data safety through an admin- controlled approval workflow. In this respect, the study concentrates on blocking false claims and unauthorized access by not allowing the contact information to be shared until a match is confirmed. The system also aims to provide educational   institutions, corporate environments, and public facilities with a scalable, user-friendly solution that can be deployed easily while improving recovery efficiency, decreasing administrative workload, and providing a ground.

1.4 Scope of Work

This research is restricted to a web-based Lost and Found Item Management System's design, development, and implementation that will have automated matching and admin approval. The system deals with user-reported lost and found items by doing internal comparison based on content and image similarity, controlling role-based access for users and administrators, and allowing secure contact sharing only after approval. The work does not cover the use of advanced machine learning models, biometrics, or linking up with external surveillance systems. The intended role of the proposed system is to be a decision-support and management tool rather than a legal or enforcement mechanism, with the user- friendliness, security, and scalability within the institutional environments being the main points of consideration.

II.   Literature Review / Related Work

The rapid digital transformation of community and organizational amenities has led to a number of systems that use the internet and analytics in the management of lost and found items. This kind of systems had as their main goal to lessen the manual effort and to be more user-friendly through the online reporting of losses or discoveries. On the down side, most solutions at present still resort to manual searching, or merely using simple keyword- based matching, thus making their effectiveness very limited especially in cases where the descriptions differ or the data is inadequate. The exploration of automated comparison techniques and the emergence of role-based systems as alternatives for the lost and found items management have not only

improved accuracy but also enhanced security and recovery efficiency.

2.1 Traditional and Web-Based

Lost and Found Systems The initial lost and found systems were predominantly based on [manual registers, notice boards, or physical help desks, which were not only inefficient but also the sources of human errors. However, the development of web-based platforms allowed institutions to create online portals for the users to submit the details of the lost or found items. Despite these systems being a major step forward in data organization and accessibility, they mainly operated as static listing platforms. It was up to the users to perform a manual browse or search through records which turned out to be a long and uncertain process, especially when item descriptions were not very clear or varied.

2.2 Text-Based Matching Approaches

Basic text-matching techniques were incorporated by several digital systems in order to enhance the efficiency and functionality of search operations. These methods depended on either an exact keyword match or a simple string comparison technique that was applied to the item titles, descriptions, and categories. Despite the fact that text-based matching yielded better results than manual browsing, it still had difficulties dealing with spelling variations, partial descriptions, or such that were dissimilar semantically. Consequently, a large number of matches that could have been made were missed, which in turn led to the lessening of the system's efficacy in real-life situations.

2.3 Image-Based and Similarity-Based Approaches

In recent research, the application of image similarity and content-based comparison has been investigated as a means of improving item matching accuracy. The systems based on images allow the detection of visually similar objects even if the text describing them is different. These systems are able to achieve great accuracy in matching by merging image comparisons with metadata attributes like location, date, and item type. Nevertheless, a lot of the current solutions do not have adequate validation mechanisms and they frequently show matching results to end-users without prior verification, which results in misleading claims and endangers privacy.

2.4 Gap in Existing Work

Despite advancements in digital lost and found systems, several limitations remain. Most existing solutions either rely solely on text- based matching or focus on image comparison without incorporating administrative oversight. The absence of an approval workflow allows unauthorized claims and uncontrolled sharing of contact information. Additionally, real-time automated matching combined with secure, role-based access control is rarely implemented in a unified system. This research addresses these gaps by proposing an admin-approved Lost and Found Item Management System that integrates automated content and image-based matching with controlled validation and secure information exchange through a centralized web interface.

III. Methodology

3.1 Overview

The outlined solution adopts a systematic and modular development strategy that encompasses the process of data collection, automated comparison, administrative validation, and controlled information exchange. This approach assures the precise and secure matching of lost and found objects simultaneously with the usability of the system. The system process involves the submission of item data, the preprocessing of both textual and visual information, the analysis of similarity, the generation of matches, and the approval by the admin. All functionalities are done through a web-based architecture with a centralized database and role-based access control as the backdrop.

3.2 Data Description

The dataset used in the system includes a structured record submitted by users for both lost and found items. Each record features various attributes that explain the item and its context. The main characteristics for comparison are:

- Title and description of the item
- Category and type of the item (lost or found)

- Place where the item was lost or found
- Date of loss or recovery

▪ Image of the item uploaded User's ID and contact details
The system aims to output the identification of lost and found items that are possible matches, the matches being categorized according to the status of pending, approved, or rejected.

3.3   Data Preprocessing
Prior to the undertaking of the automated comparison, the submitted data is subjected to preprocessing in order to guarantee consistency and reliability. The textual attributes are subjected to cleaning which involves lowering the case of the text and removing the symbols that are not needed. The missing or incomplete fields are dealt with validation rules to ensure that essential information is present. Categorical values like item type and category are made uniform so that inconsistencies do not occur. Image data is checked for format and size before it is securely stored. All these preprocessing steps contribute towards the improvement of the accuracy and efficiency of the similarity analysis.

3.4   Matching and Comparison Logic
The system uses a combination of rule-based and similarity-driven matching methods for comparing lost and found items. Textual similarity is assessed considering item titles, descriptions, categories, and location details, while the image similarity compares the uploaded item pictures. Each of the comparisons generates a similarity score that is derived from the weighted factors. Only those matches, which are above a certain predetermined threshold, are accepted as valid and sent to the admin dashboard. The automation of this matching process results in elimination of manual effort and it is guaranteed that only those matches which are relevant and of high-confidence are presented for review by the administration.

IV.   System Design and Architecture
The suggested Lost and Found Item Management System is designed with a layered architecture which allows a modular system that is scalable and easy to maintain. The different layers take care of different functionalities, which makes it possible to separate concerns clearly and operate the system efficiently. The architecture collaborates to create a single system where users can interact, matching logic can be done automatically, administrators can validate and the data is stored safely.

Data Layer:
This layer deals with all the data the system generates, such as user profiles, records of lost and found items, match results, and notifications, by keeping it stored and managed. User submission forms provide the data for this layer which then verifies that the fields contain the correct data, and also takes care of the secure storage of the images of the items and their respective metadata. One of the major benefits of this layer is the consistency, integrity, and access control based on roles it provides for the data stored.

Matching Layer:
Items classified as lost and found are subjected to a level of automated comparison by the matching layer. In conjunction with possible image-based similarity, it evaluates textual attributes like item title, description, category, and date, along with location. A similarity score is calculated by this layer based on specific rules and thresholds, and potential matches are created for the subsequent review.

Admin Validation Layer:
The task of the admin validation layer includes overseeing the verification process. The matched pairs of items are shown on the main dashboard for the admin inspection and, once the details are reviewed, either approve or reject the matches with the help of the action buttons. The layer ensures that only those matches which are through verification are guidelines for sharing contacts which in turn reduces the incidence of false claims and; thus, unauthorized access is avoided.

Front-End Layer:
The front-end layer is a responsive web application that delivers both user and admin interfaces. Users have the ability to report lost or found items, and then monitor the status of their reports, while administrators are allowed to handle the process of pairing and granting approvals. User-friendliness, transparency, and secure communication are the main interfaces' objectives to facilitate the operation of the system in real-life situations.

V.   Implementation
The suggested Lost and Found Item Management System's implementation is based on a cutting-edge web-based architecture that combines secure authentication, centralized data storage, automated matching logic,

and an administrative approval workflow. The system is intended to function without fail in real-life settings like schools and business campuses. Usability, data security, and item matching accuracy are the key points of the system.

5.1 Tools and Environment

The complete technology stack is used to create the system. The front-end interface is designed with a contemporary web framework that allows for the creation of user interfaces that are responsive and based on components. The backend services are responsible for authentication, processing the data, and applying the matching criteria. A development team uses a relational database to keep the user profiles, items, matching results and notification logs. Cloud storage is also utilized for the safe keeping of the item images only.

Development and testing take place in the usual development environments and with the usual tools. The system is set up on a server with enough processing capacity to manage the number of users who will be using the system at the same time plus the matching operations that are done automatically. The architecture is scalable and can be hosted on cloud platforms for use in educational institutions.

5.2 User Module Implementation

The user module allows individuals to register and log in by selecting their role during signup. Users can submit lost or found item reports through structured forms that capture essential information such as item description, category, location, date, and image. Input validation is performed to ensure completeness and correctness of the submitted data.

Once an item is submitted, it is stored in the database with an initial status indicating pending review. Users can view their submitted items and track the match status through their dashboard. However, contact details of other users remain hidden until administrative approval is granted, ensuring privacy and preventing misuse.

5.3 Automated Matching Logic

The automated matching logic, which is the core of this component, runs behind the scenes and matches lost and found items according to the predefined criteria of being similar. Content similarity is determined by analyzing text-based attributes like item title, category, and location, while uploaded images are used to increase matching accuracy if they are available. A similarity score is generated for each comparison and only those matches that exceed a certain threshold are deemed valid.

The results of the matching process are kept in the database and are assigned a pending status. This method not only reduces the need for human involvement by discarding low- confidence matches but also makes sure that only the item pairs that are relevant for the review are presented to the administrators. The matching is either done regularly or as a result of an administrative action.

5.4 Admin Panel Implementation

The admin panel presents a unified interface for the administrators to control the whole system. The dashboard is well-organized to show all lost items, found items, and matches created automatically. For each matched pair, the admin has access to item information, pictures, and similarity scores.

Action buttons are made available to the administrators to mark matches as approved or rejected. The system will change the status and allow the safe exchange of contact details between the users involved when a match is approved. Those matches that are rejected get eliminated from the process and thus are not considered further. This validation procedure makes it more reliable and at the same time keeps false claims at bay.

5.5 Notification and Contact Sharing

The system will automatically notify both the owner of the lost item and the finder upon approval of the admin. The notification consists not only of the confirmation of the match but also of the verified contact information in order to make the recovery of the item easier. No personal data will be disclosed prior to the admin's consent ensuring the protection of privacy and trust among users.

Additionally, the system permits the input of returned items' statuses. After an item has been effectively retrieved, the admin can label it as returned, thereby concluding the case and eliminating the item from future matching processes.

VI. Results and Analysis

6.1 System Performance

The system performance of the proposed Lost and Found Item Management System was evaluated mainly on two criteria: the accuracy with which it could identify potential matches between lost and found items and the efficiency with which it could facilitate administrative decision-making. The comparison of lost and found records was the system's main job, and it was to segregate the records into categories of matched and non-matched based on the similarity scores. The automated matching mechanism was able to process many item entries and to provide the relevant match candidates without users having to do manual searching.

The matching logic was identified as very dependable in recognizing correct item pairs where both textual and image-based attributes were available. The contribution of content similarity from item title, category, location, and date resulted in a robust baseline accuracy, which was further enhanced by the image-based comparison leading to a reduction in false positives. The system frequently created matches with high-confidence, which enabled the administrators to make approval decisions that were quickly and accurately. Matches with lower confidence were effectively filtered out, which resulted in a decrease in unnecessary administrative workload.

The system evaluation was performed by employing performance metrics such as matching accuracy, precision of identified matches, recall of relevant items, and overall response time. The findings exhibited a balance in the precision and recall values, which imply that the system was successful in reducing both false matches and missed matches. The consistent performance across different item categories and reporting scenarios is an indication that the automated matching framework does generalize well to the varying real-world data.

6.2 Comparison with Existing Systems

To determine the efficacy of the proposed system, it was compared with digital lost and found solutions in the form of traditional and existing systems. Mainstream systems almost exclusively depend on manual browsing or exact keyword matching, which commonly causes long recovery times and low chances of success. On the other hand, the proposed system adopts a combination of automated similarity analysis and human validation, thereby greatly enhancing the accuracy and trustworthiness of the matches.

Unlike the systems which show the matches directly to the users, the admin-approved workflow guarantees a controlled verification before any contact details are shared. This methodology not only puts an end to unauthorized claims but also takes good care of the privacy of the users. The enhanced performance and security of the proposed system signify its superiority over those existing platforms that do not have automation and validation mechanisms. The findings suggest that the combination of automated matching with human supervision gives a more efficient and reliable solution.

6.3 Feature Contribution Analysis

The feature contribution analysis demonstrated that certain attributes of the item were of a greater importance in arriving at the correct match. The item category and title were the most powerful textual features as they provided the object with direct context. The location and date information on the other hand further increased the matching confidence by providing spatial and temporal relevance between the two reports of lost and found.

Nonetheless, image similarity turned out to be a decisive factor during the distinguishing of visually similar items, particularly in those situations where textual descriptions were either incomplete or ambiguous. The union of visual and content-based features resulted in a thorough and trustworthy matching process. This analysis points out the necessity of comparative evaluation on multiple attributes in lost and found systems and also confirms the effectiveness of the suggested matching framework in the real world.

VII. Discussion

The examination of the findings achieved through the recommended system implementation and evaluation has shown that the application of automated matching techniques can double the lost and found item recovery effectiveness. The system made use of a combination of content-based and image- based similarity analyses, and thereby, the matching of similar objects was done without the searching process by users being manual. The automated elimination of low-confidence matches resulted in the cutting down of unnecessary administrative work, and only pairs of items with significant differences were forwarded for review. This indicates that structured similarity analysis can handle the challenges posed by real-world lost and found data, which is often not only incomplete but also described inconsistently.

The integration of an admin approval workflow into the system makes its reliability and trustworthiness even stronger thus creating more security around it. The system takes care of potential matches through verification beforehand so that none of the users has to take the risk of being matched with someone making false

claims. Because of the admin dashboard displaying the items and images right next to each other, it becomes easier for the administrator to make a decision and thus the usability of the whole system for administrators gets better.

The next step in this process is that the system has shown that the combination of automation with human supervision can result in both security and efficiency at the same time without the need to complicate operations. Besides, the online interface of the system allows it to be used by people with very little technical knowledge thereby encouraging wider use in institutional settings. Ultimately, the system that is being proposed provides a cost-effective, scalable, and reliable solution for the management of lost and found items by cutting down on manual searches and time to recovery, thus, highlighting its practicality and real-world applicability.

VIII. Limitations

Despite the fact that the proposed Lost and Found Item Management System has shown great performance, some limitations cannot be avoided in the current implementation. The major limitation is the reliance on how good and complete the data user submits. If there are wrong descriptions, lack of details, or low- quality images, that can severely affect the matching process and wrong or missed matches can occur. Moreover, the testing was done with a small number of item reports, which might not cover the variety of real-life scenarios in bigger organizations or public places.

Another limitation is the interpretability and adaptability issues of the matching logic. The similarity-based approach, even though it is more accurate than manual search, is still not perfect since the different features' weighting might not best suit all item categories. Some items may be disproportionately reliant on visual cues while others on contextual information such as location or time. Developments that follow could involve the use of adaptive weighting and explainable matching feedback to make the process more transparent and flexible. In spite of these limitations, the system establishes a solid base for the safe and automated management of lost and found.

IX. Future Enhancements

Numerous promising paths exist to broaden the horizons of the already proposed Lost and Found Item Management System. To start with, the usage of modern machine learning and deep learning methods can be the way to go in improving the accuracy of matching, particularly for image-based comparisons. The application of convolutional neural networks (CNNs) could make a significant impact on visual similarity detection, while the federated learning model may be adopted to train the algorithms at various locations without the need to disclose private data of the users and thus ensuring privacy protection and strong system.

The third and an important factor that could help to make the matching process stronger is the use of data concerning time and user behavior. A longitudinal study on item recovery history could lead to high-probability matches being predicted and similarity thresholds being dynamically adjusted. Besides, when free-text descriptions are analyzed more efficiently by using natural language processing techniques, then, the semantic understanding of item details is likely to be improved, and consequently, the problem of mismatches due to different wordings is likely to be reduced.

Lastly, it would be nice if systems with explainable matching could be incorporated as they would, on the one hand, provide transparency and, on the other, win user trust by revealing why particular items were matched. The available cloud-based deployment and mobile application integration could very well be the means for enhancing the system's scalability and accessibility. Real-time notifications thus become possible, and wider adoption across institutions and public spaces is facilitated. The result of these advancements would be the transformation of the system into an even smarter, more adaptable, and globally usable platform for lost and found management.

X. Conclusion

The findings of this study provide evidence that a centralized and automated system for lost and found management can vastly enhance the efficiency and dependability of recovering items. The proposed system combines content- based similarity analysis, image-based similarity analysis, and administrative approval workflow, effectively overcoming the drawbacks of traditional manual and text-based lost and found solutions. The automated matching system diminishes user involvement, while administrative confirmation guarantees correctness and stops unauthorized claims.

The launch of the system via a web-based platform signifies a major milestone toward real-world usage. Users can effortlessly report lost or found objects and monitor their status without any interaction with other users, and at the same time, administrators can oversee and approve matches from a centralized dashboard. The safe management of contact details and the controlled exchange of information increase users' trust and the privacy of data, making the system appropriate for both institutional and public settings.

This project, in summary, proves that the pairing of automated matching with human supervision yields a practical, scalable, and secure solution for the management of lost and found items. The introduced system promises to be a strong base for future improvements and wider adoption with its capability to significantly cut down recovery time, lessen the administrative burden, and mitigate item loss- related challenges across diverse real-world settings.

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