

FACULTY OF ENGENEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER ENGENEERING

## CEF440: INTERNET PROGRAMMING AND MOBILE PROGRAMMING

**TASK 2: REQUIREMENT GATHERING REPORT**

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**MOBILE APP REQUIRMENTS FOR MOBILE-BASED ARCHIVAL AND RETRIEVAL OF MISSING OBJECT**

1. **PURPOSE**

The purpose of this report is to document the requirements and implementation of a mobile based application that will enable that will make users to archive and retrieve missing object using image matching techniques

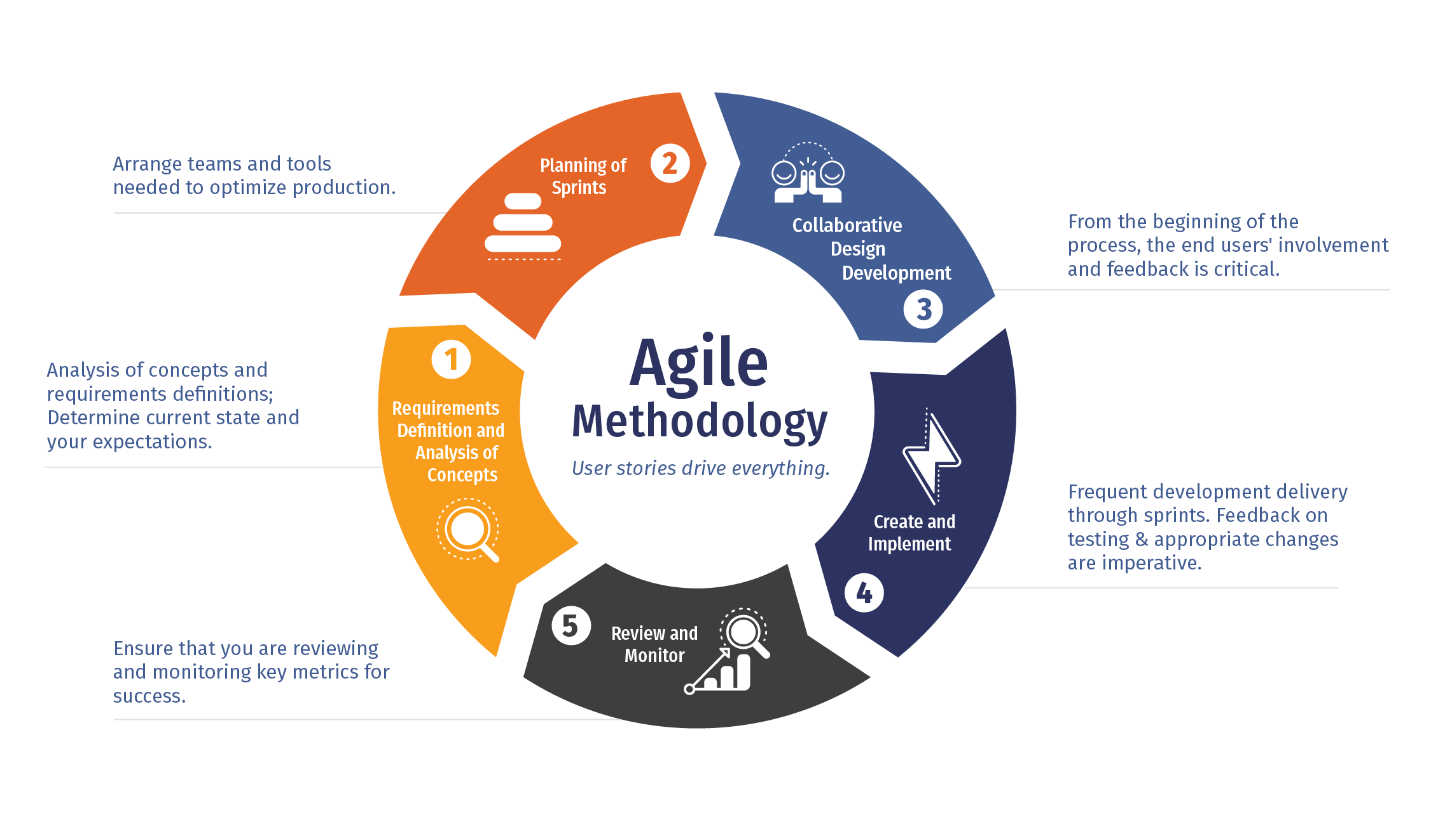
1. **SCOPE**

This document covers the following aspect of the application.

* Technical requirements
* User requirements
* System requirement
  + Functional requirements
  + Non-functional requirements
* Requirements based on the priorities
* User stories

1. **METHODOLOGY**

Agile methodology, with its emphasis on flexibility, collaboration, customer-centricity, incremental development, and continuous improvement, would be best suited for developing a Mobile-Based Archival and Retrieval of Missing Objects Application using Image Matching. By adopting Agile practices, tools, and principles, the development team can effectively navigate challenges, capitalize on opportunities, and deliver a successful, valuable, and high-quality solution that meets users' needs, expectations, and requirements throughout its lifecycle.



1. **Requirement Gathering Based on Different stakeholders**

**-Users (Students, People, etc):**

 The individuals or organizations who own the missing objects. They may interact with the system to report the loss, provide additional details about the objects, or track progress in locating them.

**-Private investigators:**

Professionals who may use the system to gather information and images related to missing objects as part of their investigation work.

**Authorities:**

-University administration:

university administration might use this system to find lost ID cards or other important university missing objects for both student and staff.

-Law Enforcement agencies:

In cases where the system is utilized for locating missing objects related to criminal investigations, law enforcement agencies can use the system to access relevant information and images to aid in their investigations.

**Surveys**

1. Requirement: User-Friendly Mobile Application Interface

- The system shall have a user-friendly mobile application interface that is easy to navigate and understand.

- Participants emphasized the importance of clear instructions and intuitive design to facilitate smooth image capture and retrieval processes.

2. Requirement: Image Upload and Annotation

- The system shall allow participants to easily upload images of missing objects using their mobile devices.

- Participants expressed the need for annotation tools to highlight specific areas or features within the uploaded images for better identification.

3. Requirement: Geolocation Integration

- The system shall automatically capture and associate the geolocation data of missing objects or participants during the image capture process.

- Participants suggested that geolocation information would enhance the accuracy of matching missing objects with their respective locations.

4. Requirement: Real-Time Notifications and Alerts

- The system shall provide real-time notifications and alerts to participants regarding potential matches or relevant updates related to missing objects.

- Participants highlighted the importance of timely communication to maximize the chances of successful retrieval.

5. Requirement: Privacy and Data Security

- The system shall ensure the privacy and security of participant data, including uploaded images and personal information.

- Participants stressed the need for secure storage, data encryption, and strict access controls to protect sensitive information.

6. Requirement: Integration with Existing Systems and Databases

- The system shall integrate with existing databases, such as law enforcement databases or community resources, to improve the search and retrieval process.

- Participants emphasized the importance of accessing comprehensive and up-to-date information from various sources.

7. Requirement: Mobile Compatibility and Accessibility

- The system shall be compatible with a wide range of mobile devices and operating systems to ensure broad accessibility for participants.

- Participants highlighted the need for cross-platform support to accommodate different user preferences and device types.

8. Requirement: Reporting and Feedback Mechanisms

- The system shall provide participants with the ability to provide feedback, report inaccuracies, or suggest improvements related to the archival and retrieval process.

- Participants expressed the desire to actively contribute to the system's development and enhance its effectiveness.

9. Requirement: Integration with Social Media Platforms

- The system shall integrate with popular social media platforms to enable participants to share information about missing objects and increase public awareness.

- Participants identified social media as a powerful tool for spreading the word and engaging a wider community in the retrieval efforts.

10. Requirement: Offline Functionality and Data Synchronization

- The system shall support offline functionality, allowing participants to capture and store images even in areas with limited or no internet connectivity.

- Participants emphasized the importance of preserving data integrity and synchronizing captured images once an internet connection is available.

11. Requirement: Language Localization

- The system shall support multiple languages to cater to a diverse user base.

- Participants highlighted the importance of providing localized interfaces and instructions to ensure ease of use and understanding.

12. Requirement: Search Filters and Advanced Filtering Options

- The system shall provide participants with search filters and advanced filtering options to refine search results based on specific criteria.

- Participants expressed the need for filters such as object category, colour, size, or time of disappearance to streamline the retrieval process.

13. Requirement: Community Engagement and Collaboration Features

- The system shall facilitate community engagement and collaboration by providing features such as discussion forums, user profiles, or shared case boards.

- Participants emphasized the value of connecting and collaborating with other participants or volunteers to increase the chances of successful retrieval.

14. Requirement: Training and Support Materials

- The system shall provide comprehensive training materials, tutorials, and user guides to help participants effectively use the mobile application.

- Participants highlighted the importance of clear and accessible resources to ensure successful adoption and utilization of the system.

15. Requirement: Integration with Emergency Services and Authorities

- The system shall integrate with emergency services, law enforcement agencies, or relevant authorities to enable efficient communication and coordination in critical cases.

- Participants emphasized the need for seamless collaboration between the system and official channels to expedite the retrieval process.

16. Requirement: Gamification and Incentives

- The system shall incorporate gamification elements and incentives to encourage active participation and engagement from users.

- Participants suggested features such as badges, rewards, or leaderboards to motivate users and foster a sense of community involvement.

17. Requirement: Offline Image Recognition and Matching

- The system shall support offline image recognition and matching capabilities, allowing participants to perform basic analysis and matching on their devices without an internet connection.

- Participants highlighted scenarios where internet connectivity might be limited, such as remote areas or during emergencies.

18. Requirement: Historical Data and Analytics

- The system shall maintain historical data and provide analytics to track the progress and impact of retrieval efforts.

- Participants expressed interest in visualizing trends, success rates, or patterns over time to assess the system's effectiveness and identify areas for improvement.

19. Requirement: Integration with Public Awareness Campaigns

- The system shall integrate with public awareness campaigns, media outlets, or online platforms to amplify the reach and impact of missing object retrieval efforts.

- Participants emphasized the importance of leveraging existing networks and channels to increase public engagement and participation.

20. Requirement: Continuous System Improvement and Updates

- The system shall have a mechanism for continuous improvement based on user feedback and technological advancements.

- Participants highlighted the importance of regular updates and enhancements to ensure the system remains effective and up-to-date.

These requirements are derived from survey responses and reflect the preferences and priorities of participants regarding our mobile-based archival and retrieval system for missing objects. They can serve as valuable insights for designing a system that meets the expectations and needs of the target user base.

**Interviews**

Users (Students and People)

1. Requirement: User-Friendly Interface:

- Users desire a system with an intuitive and user-friendly interface that is easy to navigate and understand.

- They emphasize the importance of clear and logically organized menus, buttons, and icons to facilitate smooth interaction with the system.

2. Requirement: Customization Options:

- Users often have specific preferences and requirements for how they interact with a system.

- They express the need for customizable features, such as the ability to adjust settings, personalize display options, or create custom workflows, to align the system with their individual needs and work processes.

3. Requirement: Efficient Data Entry and Management:

- Users want a system that enables them to enter and manage data efficiently and effectively.

- They value features such as bulk data import, data validation, intelligent auto-fill or suggestions, and the ability to easily edit, update, or delete existing data.

4. Requirement: Robust Search and Filtering Capabilities:

- Users want to find specific information quickly within a system.

- They emphasize the need for powerful search and filtering functionalities that allow them to locate records, documents, or data based on various criteria and parameters.

5. Requirement: Real-Time Collaboration:

- Users frequently collaborate with colleagues or team members on projects or tasks.

- They express the need for real-time collaboration features, such as shared document editing, instant messaging, or notification systems, to facilitate seamless teamwork and communication.

6. Requirement: Mobile Accessibility:

- Users require access to the system while on the go or from remote locations.

- They prioritize a system that is mobile-friendly and responsive, allowing them to access and interact with key features and data from smartphones or tablets.

7. Requirement: Integration with Existing Tools and Systems:

- Users may already utilize various tools or systems as part of their workflow.

- They value a system that integrates smoothly with their existing tools, enabling seamless data exchange, synchronization, or interoperability.

8. Requirement: Training and Support:

- Users want adequate training and ongoing support to effectively utilize the system.

- They emphasize the need for comprehensive user documentation, training materials, tutorials, and responsive customer support to address any issues or questions that may arise.

9. Requirement: Data Security and Privacy:

- Users are concerned about the security and privacy of their data within the system.

- They emphasize the need for robust security measures, such as encryption, access controls, audit logs, and regular data backups, to protect sensitive information from unauthorized access or breaches.

10. Requirement: Reporting and Analytics:

- Users want to generate reports or analyse data within the system.

- They value features that allow them to create customizable reports, visualize data through charts or graphs, and perform data analysis to derive insights or make informed decisions.

11. Requirement: Integration with External Systems:

- Users may rely on other software or systems for specific tasks or processes.

- They express the need for seamless integration with external systems, such as social media platforms, accounting software, customer relationship management (CRM) systems, or email platforms, to enable smooth data exchange and streamline workflows.

12. Requirement: Scalability and Performance:

- Users want a system that can handle their growing needs and perform efficiently as the user base or data volume increases.

- They might the need for a scalable architecture, optimized database management, and fast response times to ensure smooth system performance even under heavy loads.

13. Requirement: Accessibility and Compliance:

- Users require the system to comply with accessibility guidelines or specific regulations.

- They value features that ensure the system is accessible to users with disabilities or supports compliance requirements, such as data retention policies or data protection regulations .

14. Requirement: Training and Onboarding:

- Users want a system that is easy to learn and use, even for new users.

- They express the need for comprehensive training programs, onboarding materials, or interactive tutorials to quickly familiarize themselves with the system's features and functionalities.

15. Requirement: System Reliability and Downtime:

- Users rely on the system for their daily tasks and operations.

- They prioritize a system that is reliable, with minimal downtime and regular maintenance windows, to ensure uninterrupted access and productivity.

16. Requirement: Cost-Effectiveness:

- Users consider the cost implications of implementing and maintaining the system.

- They value a system that offers a competitive pricing structure, transparent pricing models, functionality, and performance.

By understanding and incorporating these user requirements, the system can be designed and developed to meet the needs and expectations of its users, ensuring a positive user experience and maximizing user satisfaction.

**University Administration for lost Id**

1. Requirement: Lost ID Card Reporting:

- The university administration wants a system that allows students and staff to report lost ID cards easily and efficiently.

- They emphasize the need for a user-friendly interface that enables individuals to quickly provide the necessary information, such as their name, student/staff ID number, and the circumstances surrounding the loss.

4. Requirement: Lost ID Card Database:

- The administration wants to maintain a comprehensive database of lost ID cards for reference and tracking purposes.

- They emphasize the need for a system that records and stores relevant information about each reported lost card, such as the date of loss, the cardholder's information, and any additional notes or comments.

5. Requirement: Communication and Notifications:

- The administration wants a system that facilitates communication with individuals who have reported lost ID cards.

- They value features such as automated email notifications to confirm receipt of the report of a loss or retrieved id.

6. Requirement: Analytics and Reporting:

- The administration seeks a system that provides insights and analytics related to lost ID cards.

- They express the need for reporting features that allow them to analyse trends, such as common locations or times of card loss, and identify areas for improvement in the university's ID card management processes.

7. Requirement: Integration with Student/Staff Systems:

- The administration wants the lost ID card system to integrate smoothly with existing student or staff databases.

- They emphasize the need for seamless data synchronization between the ID card system and other university systems, such as enrolment databases, to ensure accurate and up-to-date information about individuals.

8. Requirement: Data Security and Privacy:

- The administration is concerned about the security and privacy of the personal information associated with lost ID cards.

- They prioritize a system that employs robust security measures, including data encryption, access controls, and compliance with relevant data protection regulations, to safeguard sensitive information.

By addressing these interview requirements, a system can be tailored to meet the specific needs of a university administration focused on lost ID cards, enhancing efficiency, security, and communication in the management of lost ID card incidents.

**Brainstorming**

1. Requirement: Mobile Application Interface

- The system should have a user-friendly mobile application interface that allows users to easily capture and upload images of missing objects.

- The interface should provide clear instructions and guidance for capturing high-quality images.

2. Requirement: Image Capture and Processing

- The system should utilize advanced image capture technology to capture clear and detailed images of missing objects.

- It should include features like auto-focus, image stabilization, and image enhancement to improve image quality.

3. Requirement: Image Recognition and Analysis

- The system should incorporate image recognition and analysis algorithms to identify and classify missing objects accurately.

- It should utilize machine learning or computer vision techniques to match captured images with existing object databases or reference images.

4. Requirement: Object Archival and Database Management

- The system should have a centralized database to store and manage archived images and related information of missing objects.

- It should support efficient indexing, searching, and retrieval of archived objects based on various criteria such as category, location, or time.

5. Requirement: User Notification and Alerts

- The system should provide real-time notifications and alerts to users when a missing object is found or identified.

- It should enable users to receive updates on the status and location of the missing object through push notifications or email.

6. Requirement: Secure Data Storage and Privacy

- The system should ensure the secure storage and handling of sensitive data, including captured images and personal information.

- It should comply with data protection regulations and implement encryption, access controls, and secure data transmission protocols.

7. Requirement: Integration with External Systems

- The system should integrate with external platforms or databases used by law enforcement agencies, community organizations, or other relevant stakeholders.

- It should allow for data sharing, collaboration, and information exchange to enhance the chances of finding missing objects.

8. Requirement: Offline Functionality

- The system should support offline functionality, allowing users to capture and store images of missing objects even in areas with limited or no internet connectivity.

- It should synchronize data and upload captured images once the internet connection is restored.

9. Requirement: User Feedback and Reporting

- The system should provide a mechanism for users to provide feedback and report any issues or inaccuracies in the image recognition or object identification process.

- It should allow users to flag false positives/negatives or update information related to missing objects.

10. Requirement: Analytics and Reporting

- The system should offer analytics and reporting capabilities to generate insights on missing object patterns, trends, or demographics.

- It should provide statistical reports and visualizations to aid decision-making and resource allocation.

11. Requirement: Geolocation and Mapping

- The system should incorporate geolocation capabilities to capture and store the location information of missing objects.

- It should integrate with mapping services to display the location of missing objects on a map, aiding in search and retrieval efforts.

12. Requirement: User Profile and Account Management

- The system should allow users to create profiles and manage their accounts securely.

- It should include features for users to update personal information, manage privacy settings, and track their contributions and interactions within the system.

13. Requirement: Collaboration and Social Sharing

- The system should facilitate collaboration and social sharing among users, enabling them to share information and images of missing objects through social media platforms or within the system's community.

- It should include features like comments, likes, and the ability to tag and share missing object profiles.

14. Requirement: Language Support

- The system should support multiple languages to accommodate users from diverse linguistic backgrounds.

- It should provide language options for the user interface, image tags, and search functionality, enhancing usability and accessibility.

15. Requirement: Accessibility Features

- The system should incorporate accessibility features to ensure inclusivity for users with disabilities.

- It should comply with accessibility guidelines, offering features such as text-to-speech, high contrast mode, and alternative text for images.

16. Requirement: Historical Data and Archiving

- The system should have the capability to maintain historical records of missing objects, even after they have been found or resolved.

- It should allow users to access and review past cases, providing valuable information for future reference or analysis.

17. Requirement: Data Backup and Recovery

- The system should regularly back up archived data to prevent data loss in the event of system failures or disasters.

- It should have mechanisms in place for data recovery and restoration, ensuring the integrity and availability of archived object information.

18. Requirement: User Training and Support

- The system should offer user training resources, tutorials, and support documentation to help users understand and effectively utilize the system's features.

- It should provide a support system, such as a help desk or community forums, for users to seek assistance or report issues.

19. Requirement: Image Privacy and Consent

- The system should incorporate features to address image privacy concerns and obtain user consent for capturing and storing images of missing objects.

- It should include options for users to control the visibility and accessibility of their submitted images and related information.

20. Requirement: System Performance Monitoring and Optimization

- The system should include monitoring tools to track system performance, identify bottlenecks, and optimize resource utilization.

- It should have mechanisms for performance tuning and capacity planning to ensure optimal system operation.

**Extraction**

Law enforcement Agencies:

1. Requirement: Enable integration with existing case management systems used by law enforcement agencies to ensure seamless data exchange and avoid duplication of efforts.

2. Requirement: Provide comprehensive reporting capabilities, including the ability to generate detailed reports on missing objects, investigations, and case progress for use in legal proceedings or internal documentation.

3. Requirement: Implement secure user authentication and access controls to ensure that only authorized personnel can access sensitive case information and system functionalities.

4. Requirement: Enable the attachment and storage of supporting documents, such as witness statements, evidence photos, or forensic reports, to enhance the completeness and organization of case files.

5. Requirement: Incorporate a centralized evidence management system within the platform to enable law enforcement to securely store, track, and analyse evidence related to missing object cases.

6. Requirement: Integrate with external systems or databases that contain relevant information, such as criminal records, previous case data, or known suspects, to assist in the investigation and identification of missing objects.

7. Requirement: Provide data analytics and visualization capabilities to help law enforcement agencies identify patterns or trends related to missing objects, potentially aiding in the identification of suspects or recovery strategies.

8. Requirement: Support collaboration and information sharing among different law enforcement agencies by allowing secure data exchange and communication channels within the system.

9. Requirement: Implement secure data storage and transmission protocols to protect sensitive case information from unauthorized access or data breaches.

10. Requirement: Offer training and support resources specifically tailored for law enforcement personnel to ensure effective system utilization and maximize the benefits of the platform in their investigations.

These requirements reflect the specific needs of law enforcement agencies and focus on areas such as integration, reporting, authentication, evidence management, data analysis, collaboration, security, and training.

**Private investigators:**

1. Requirement: Access to comprehensive databases and information sources:

- Private investigators often require access to a wide range of databases, such as public records, criminal records, financial records, and social media data.

- the need for a system that provides seamless integration with these databases, allowing them to retrieve relevant information efficiently.

2. Requirement: Advanced search and filtering capabilities:

- Private investigators frequently need to sift through vast amounts of data to find specific information related to their cases.

- the need for a system that offers robust search and filtering functionalities, enabling them to quickly locate relevant records based on various criteria, such as names, addresses, dates, or keywords.

3. Requirement: Secure data storage and privacy protection:

- Private investigators handle sensitive and confidential information during their investigations.

- the importance of a system that ensures secure data storage, encryption, and access controls to protect the privacy and integrity of their clients' information.

4. Requirement: Case management and documentation:

- Private investigators often work on multiple cases simultaneously and need a system to help them organize and track the progress of each case.

- the need for a system that offers case management features, including the ability to create case files, log investigative activities, attach documents or evidence, and generate reports.

5. Requirement: Communication and collaboration tools:

- Private investigators frequently collaborate with clients, legal professionals, or fellow investigators.

- the importance of a system that facilitates secure communication channels, such as messaging or file sharing capabilities, to streamline collaboration and enhance information exchange.

6. Requirement: Mobile accessibility and remote capabilities:

- Private investigators often work in the field and require access to case information and investigative tools while on the go.

- the need for a system that is mobile-friendly, allowing them to access and update case information from smartphones or tablets, even in remote locations.

7. Requirement: Integration with surveillance and evidence gathering tools:

- Private investigators rely on various surveillance and evidence gathering techniques, such as video or audio recording devices, GPS trackers, or covert cameras.

- the need for a system that integrates with these tools, allowing them to seamlessly collect, store, and manage the evidence obtained during their investigations.

8. Requirement: Compliance with legal and ethical standards:

- Private investigators must adhere to legal and ethical guidelines while conducting their investigations.

- the need of a system that provides features or prompts to ensure compliance with applicable laws and ethical standards, such as data protection regulations or guidelines for evidence handling.

1. **TYPES OF REQUIREMENTS**
2. **User Requirements**

User requirements represent the needs, preferences, and expectations of the end-users who will interact with the app. These requirements are derived from user research, feedback, and usability testing. Examples include:

* Intuitive and user-friendly interface design.
* Quick and easy access to frequently used features.
* Customization options to tailor the app to individual preferences.
* Responsive customer support and assistance.

1. **System Requirements**

System requirements specify the technical specifications and constraints that the app must adhere to in terms of hardware, software, and infrastructure. These requirements ensure that the app can be deployed and operated effectively within the intended environment. Examples include:

* Compatibility with various operating systems and devices.
* Scalability to accommodate growth in user base and data volume.
* Integration with external systems and APIs.
* Performance benchmarks and service level agreements (SLAs).

1. **Functional requirements**
2. **User Registration and Authentication:**

* Allow users to create accounts and log in securely.
* Implement authentication mechanisms to verify users' identities and protect their information.

1. **Image Upload and Storage:**

* Enable users to capture and upload images of missing objects.
* Store uploaded images securely in the database with associated metadata (e.g., object type, location, date).

1. **Image Matching and Retrieval:**

* Implement an image matching algorithm to compare uploaded images with the database.
* Retrieve and display matching results, including similar or potentially matching objects based on the image analysis.

1. **Search and Filter Functionality:**

* Provide users with search and filter options to easily locate missing objects by object type, location, date, or other relevant criteria.
* Display search results in a clear and organized manner, allowing users to view details and images of matching objects.

1. **User Profile and Management:**

* Allow users to manage their profiles, update information, and track their uploaded images and search history.
* Provide features to edit, delete, or archive uploaded images as needed.

1. **Notification and Alerts:**

* Implement notification and alert mechanisms to inform users about potential matches or updates related to their uploaded images.
* Enable users to receive notifications via email, SMS, or within the app.

1. **Reporting and Feedback:**

* Enable users to report false positives, provide feedback on search results, or request assistance.
* Implement a system to handle user reports, feedback, and inquiries efficiently.

1. **Privacy and Security:**

* Implement privacy controls and security measures to protect users' personal information and uploaded images.
* Comply with data protection regulations and standards to ensure confidentiality, integrity, and availability of data.

1. **User Guidance and Support:**

* Provide users with guidance, instructions, and tips on using the app effectively.
* Offer customer support and assistance through FAQs, help articles, or direct contact options.

1. **Speed Up Robust Feature(SURF) Matching Algorithm**

* extract the feature vectors from a query image of a lost item and compare it to those of the existing found items images in our database.

1. **Non-functional requirement**

Non-functional requirements focus on the qualities and characteristics of the app, rather than its specific functionalities. These requirements address aspects such as performance, usability, security, and reliability. Examples include:

* Performance:
* Response Time:Ensure quick and efficient image upload, matching, and retrieval processes.
* scalability: Handle increasing numbers of users, images, and data without compromising performance.
* Resource Utilization: Optimize memory, CPU, and bandwidth usage to maximize efficiency and minimize resource consumption.

Tools:

- Performance monitoring tools (e.g., New Relic, Dynatrace)

- Load testing tools (e.g., JMeter, LoadRunner)

* Usability:
* User Interface: Design an intuitive, user-friendly, and accessible mobile interface.
* User Experience: Provide clear instructions, guidance, and feedback to users during image upload, search, and retrieval processes.
* Accessibility:\*\* Ensure the application is accessible to users with disabilities, supporting features like screen readers, voice commands, and text-to-speech.

Tools:

- User experience (UX) design tools (e.g., Adobe XD, Sketch)

- Accessibility testing tools (e.g., AXE, WAVE)

* Reliability:
* Availability:\*\* Ensure high availability and uptime of the application to support users' needs and demands.
* Fault Tolerance:\*\* Implement mechanisms to handle and recover from failures, errors, or issues without data loss or service interruption.
* Backup and Recovery:\*\* Regularly backup data, images, and configurations, and implement effective recovery strategies in case of data loss or system failures.

Tools:

- Monitoring and alerting tools (e.g., Nagios, Prometheus)

- Backup and recovery solutions (e.g., Acronis, Veeam)

* Security:
* Data Protection:\*\* Implement encryption, data masking, and secure transmission protocols to protect users' personal information, images, and data.
* Authentication and Authorization:\*\* Ensure secure user authentication, authorization, and access control mechanisms to protect against unauthorized access, misuse, or malicious activities.
* Compliance:\*\* Comply with relevant privacy laws, regulations, and standards (e.g., GDPR, CCPA) to ensure confidentiality, integrity, and security of users' data and information.

Tools:

- Security scanning and vulnerability assessment tools (e.g., OWASP ZAP, Nessus)

- Identity and access management solutions (e.g., Okta, Auth0)

* Compatibility:
* Platform Support:\*\* Ensure compatibility and support for various mobile platforms, devices, and operating systems.
* Integration:\*\* Enable seamless integration with other systems, services, or platforms to enhance functionality, interoperability, and user experience.

Tools:

- Cross-platform development frameworks (e.g., React Native, Flutter)

- API management and integration platforms (e.g., MuleSoft, Apigee)

* Maintainability:\*\*
* Code Quality:\*\* Maintain high code quality, readability, and maintainability through clean coding practices, code reviews, and refactoring.
* Documentation:\*\* Provide comprehensive documentation, guidelines, and resources to support development, deployment, and maintenance activities.
* Updates and Upgrades:\*\* Ensure ease of updates, upgrades, and modifications to adapt to new technologies, features, or requirements over time.

Tools:

- Version control systems (e.g., Git, SVN)

- Continuous integration and continuous delivery (CI/CD) tools (e.g., Jenkins, GitLab CI/CD)

These non-functional requirements and tools form the foundation for developing a robust, secure, and scalable Mobile-Based Archival and Retrieval of Missing Objects Application using Image Matching. By addressing these requirements and leveraging appropriate tools and technologies, developers can ensure the application meets users' needs, performs effectively, and maintains high standards of quality, reliability, and security throughout its lifecycle.

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