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SDM COLLEGE OF ENGINEERING AND TECHNOLOGY DHAVALGIRI, DHARWAD-580002

(AFFILIATED TO VISHVESVARYAS TECHNOLOGICAL UNIVERSITY)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Minor Project SRS On

FACE RECOGNITION TO MOVIE RECOMMENDER

SUBMITTED BY,

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Chapter 1. Introduction

In this digital era, we're witnessing the fusion of facial recognition technology with entertainment platforms, specifically in movie recommendation systems. By incorporating facial recognition into user registration and login processes, coupled with a dataset users can seamlessly authenticate themselves and access personalized movie recommendations tailored to their preferences. This integration not only enhances user convenience but also ensures a secure and engaging experience, offering a glimpse into the future of personalized entertainment discovery. The proposed system integrates facial recognition technology with a movie recommendation system. Users are required to register on the web platform, where their facial features are captured and stored securely. Upon subsequent login attempts, the system verifies the user's identity using facial recognition. Upon successful authentication, users are redirected to the movie recommendation system. This system utilizes a dataset of movies categorized by genre and unique identifiers. Users can search for movies based on genre preferences and unique IDs assigned to each film. The integration of facial recognition enhances user authentication and provides a seamless transition to the movie recommendation functionality, offering personalized movie suggestions based on individual preferences.

1.1 Purpose

The purpose is to seamlessly authenticate users through facial recognition while providing personalized movie recommendations based on their preferences and facial features using machine learning Algorithms.

1.2 Scope

This project involves creating a system where users can log in using facial recognition and receive movie recommendations tailored to their preferences and facial features.

1.2 Definitions, Acronyms, and Abbreviations

This project aims to develop a system that utilizes facial recognition technology for user authentication and machine learning algorithms to recommend movies based on individual preferences, ultimately enhancing the user experience and security of movie-watching platforms.

Facial Recognition Algorithm:

FaceNet: It's a deep convolutional neural network (CNN) trained to generate a numerical embedding of a face. It maps facial images into a high-dimensional space where distances between points represent similarities between faces.

Movie Recommendation Algorithm:

Collaborative Filtering: This algorithm recommends movies based on similarities between users' preferences or items' characteristics. It can be user-based or item-based.

Content-Based Filtering: This method recommends movies similar to those a user has liked in the past, based on attributes such as genre, actors, directors, etc.

Hybrid Methods: Combining collaborative and content-based filtering to leverage the strengths of both approaches.

1.4 References

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[3]. Hapsari, Gita Indah, Giva Andriana Mutiara, and Husein Tarigan, "Face recognition smart cane using Artificial Intelligence ," TELKOMNIKA (Telecommunication Computing Electronics and Control), vol. 17, no. 2, pp. 973-980, 2019.

1.5 Overview

The system integrates facial recognition technology with a movie recommendation system. Users are required to register on the web platform, where their facial features are captured and stored securely. Upon subsequent login attempts, the system verifies the user's identity using facial recognition. Upon successful authentication, users are redirected to the movie recommendation system.

The SRS will include two sections, namely:

Overall Description:

The project aims to develop a sophisticated system that seamlessly integrates facial recognition technology with a movie recommendation engine. Users will be able to log in securely using facial recognition, and the system will leverage machine learning algorithms to provide personalized movie recommendations based on their individual preferences and facial features.

Specific Requirements:

Facial Recognition System, User Authentication, Movie Recommendation Engine, Develop collaborative filtering and content-based recommendation algorithms, Machine Learning Models, User Interface and Experience.

Chapter 2. The Overall Description

2.1 Product Perspective

From a product perspective, this project presents an innovative solution that combines cutting-edge technology with user-centric features to enhance the movie-watching experience. By leveraging machine learning algorithms, the product delivers personalized movie recommendations tailored to each user's preferences and viewing history. This personalized approach enhances user satisfaction and encourages continued usage.

2.1.1 System Interfaces

The system interfaces for the project encompass various components that facilitate interaction between users, the application, and external services. Here are the key system interfaces:

Login Screen: The UI for facial recognition login, where users can enroll their facial biometrics and authenticate themselves during subsequent logins.

Dashboard: A user-friendly interface displaying personalized movie recommendations, browsing options, user profiles, and settings.Movie

Details: Interface to view detailed information about recommended movies, including synopsis, cast, ratings, and trailers.

Camera Integration: Interface with the device's camera module to capture facial images for enrollment and authentication purposes. Face Detection and Alignment: Integration with facial detection and alignment algorithms to accurately identify and align facial features during enrollment and recognition.

2.1.2 Interfaces

The user-friendly interface accessible through web is designed to be visually appealing, intuitive, and easy to navigate. It incorporates design principles such as clear navigation menus, interactive elements, and consistent layout, ensuring a positive user experience across different devices.

2.1.3 Hardware Interfaces

The hardware interface for the project primarily involves components for capturing and processing facial images, as well as devices for user interaction. Here are the key hardware interfaces:

Camera Module, Device with Camera, Processing Unit, Display Screen, Microphone (Optional), Internet Connectivity, Storage Device.

2.1.4 Software Interfaces

Software interfaces are essentially the points of interaction between a user and a software application. Examples include the interfaces of operating systems like Windows, macOS, and Linux, as well as software applications like web browsers and word processors.

2.1.5 Communications Interfaces

A communication interface in the context of software refers to the mechanism through which different software components or systems exchange information or interact with each other. These interfaces facilitate communication between software entities, allowing them to work together seamlessly.

2.1.6 Memory Requirements

1. Primary Memory (RAM):

- Constraint: The application should operate efficiently within the available primary memory constraints.
- Target: The design should consider machines with a minimum of 128GB of RAM for optimal performance.

- Rationale: The specified memory constraint aligns with the hardware capabilities of modern computing systems, ensuring the application's smooth execution without excessive resource utilization.

2. Secondary Memory (Storage):

- Constraint: No specific constraints on secondary memory (storage) are imposed.

- Target: The application should be adaptable to various storage configurations.
- Rationale: While primary memory is specified for operational efficiency, the application is designed to be flexible regarding secondary memory, accommodating a range of storage capacities based on user configurations.

2.1.7 Operations

The website supports both interactive and unattended operations.Backup and recovery operations are essential to ensure data integrity and availability.

2.1.8 Site Adaptation Requirements

No specific site adaptation requirements are needed for the website. However, certain data sets initialization sequences may be specific to individual installations or missions.

2.2 Product Functions

- User Registration and Authentication: Allow users to create accounts, sign in securely, and manage their authentication credentials.
- Profile Management: Enable users to update their profile information, manage preferences, and customize their experience.
- Content Management: Provide tools for creating, editing, and organizing content such as articles, posts, images, and videos.
- Search Functionality: Implement a robust search feature that allows users to use easily

2.3 User Characteristics

The user is crucial for designing a product that meets their needs and preferences effectively. Demographics: Consider factors such as age, gender, location, occupation, education level, and income. Demographic information can help tailor the product's features, content, and user experience to specific audience segments. Technical Proficiency: Assess users' technical skills and familiarity with technology. This includes their experience with similar products or platforms, comfort level with using digital tools, and ability to navigate complex interfaces. Accessibility Needs: Identify any accessibility requirements or limitations among users, such

as visual or hearing impairments, motor disabilities, or cognitive challenges. Ensure that the product is inclusive and accessible to users with diverse needs. User Feedback and Insights: Gather feedback from users through surveys, interviews, usability testing, and analytics. Use this feedback to iterate on the product, address pain points, and improve the user experience over time. By understanding and considering these user characteristics, you can design a product that resonates with its intended audience, drives engagement, and delivers value effectively. Continuously monitoring user behavior and gathering feedback allows for ongoing optimization and refinement to meet evolving user needs.

2.4 Constraints

Constraints for a project are limitations or restrictions that may affect its planning, execution, or outcome. Identifying and addressing these constraints early in the project lifecycle is crucial for managing expectations, mitigating risks, and ensuring successful delivery, which includes the terms like Budget, Time, Scope, Resources, Quality Standards, Regulatory Compliance Risk Tolerance, Stakeholder Expectations. Identifying and documenting these constraints early in the project planning process allows project managers and teams to develop strategies and contingency plans to address them effectively. It also helps stakeholders understand the limitations and trade-offs involved in achieving project objectives.

2.5 Assumptions and Dependencies

Assumptions and dependencies for a project are critical factors that are not entirely within the project team's control but can significantly impact its planning, execution, and success. Identifying these assumptions and dependencies helps project managers and teams anticipate risks, allocate resources effectively, and manage stakeholder expectations

2.6 Apportioning of Requirements

Requirements may be prioritized based on project timelines and resource availability.User feedback and input play a crucial role in shaping future versions of the website. Incorporating user suggestions and addressing pain points identified through feedback channels can drive continuous improvement and enhance user satisfaction.on user feedback and technological advancements.

Chapter 3. Specific Requirements

3.1 External Interfaces

Movie Database API:

Interface with external movie databases (e.g., IMDb, The Movie Database) to fetch movie metadata, including titles, genres, cast, ratings, and reviews.

Cloud Storage Service:

Interface with cloud storage services (e.g., AWS S3, Google Cloud Storage) to store and retrieve facial images, embeddings, user profiles, and other relevant data securely.

Authentication Service:

Interface with third-party authentication services (e.g., OAuth providers) for user authentication and identity verification.

Machine Learning Frameworks:

Interface with machine learning frameworks (e.g., TensorFlow, PyTorch) for training and deploying machine learning models used in facial recognition and movie recommendation.

Analytics and Monitoring Tools:

Interface with analytics and monitoring tools (e.g., Google Analytics, New Relic) for tracking user engagement, system performance, and usage metrics.

3.2 Functions

- **Facial Enrollment:**

  Allow users to enroll their facial biometrics by capturing multiple images from different angles.

  Process and store the facial features securely for future authentication.

- **Facial Recognition Login:**

  Authenticate users securely using facial recognition technology.

  Compare live facial images captured during login with the stored facial biometrics to verify the user's identity.

- **Movie Recommendation Generation:**

Analyze user preferences, viewing habits, and historical data to generate personalized movie recommendations.

Utilize machine learning algorithms (e.g., collaborative filtering, content-based filtering) to enhance recommendation accuracy.

- **Browsing and Search Functionality:**

  Provide users with the ability to browse and search for movies based on various criteria (e.g., genre, release date, actor).

  Offer filters and sorting options to facilitate movie discovery and exploration.

- **User Interaction and Feedback:**

  Enable users to interact with the system by providing feedback on recommended movies (e.g., ratings, likes, dislikes).

  Incorporate user feedback into the recommendation algorithm to improve future recommendations.

- **Security Features:**

  Implement robust security measures to protect user data and ensure secure authentication.

  Encrypt sensitive information (e.g., facial biometrics, user profiles) to prevent unauthorized access.

- **Analytics and Reporting:**

  Track user interactions, engagement metrics, and system performance through analytics.

  Generate reports and insights to assess user behavior, preferences, and system effectiveness.

3.3 Performance Requirements

1.Facial Recognition Speed

2. System Response Time

3. Accuracy of Recommendations

4. Data Processing Speed

3.4 Logical Database Requirements

Movie Metadata Database and User Profile Database to store the login credentials and set of movie to recommend to the users.

3.5 Design Constraints

3.5.1 Standards Compliance

- The System should comply with all relevant web design guidelines and best practices
- The System should be accessible to all users
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3.6 Software System Attributes

Software system attributes, also known as quality attributes or non-functional requirements, define the desired properties and characteristics of the software system beyond its functional behavior. Here are the key software system attributes relevant to the project:

3.6.1 Reliability:

The system should consistently perform its intended functions accurately and reliably. Users should be able to trust the system's facial recognition authentication and movie recommendation capabilities without encountering frequent errors or failures.

3.6.2 Security:

The system should protect user data, including facial biometrics, personal information, and authentication logs, from unauthorized access, disclosure, and manipulation.

3.6.3 Usability:

The system should be intuitive, user-friendly, and easy to navigate for users of all skill levels.

3.6.4 Performance:

The system should respond promptly to user interactions, deliver personalized movie recommendations quickly, and authenticate users in real-time.

3.6.5 Scalability:

The system should be able to handle increasing numbers of users, movie data, and concurrent requests as the user base grows.

3.6.6 Availability:

The system should be highly available, with minimal downtime and service interruptions, to ensure uninterrupted access for users.

3.6.7 Maintainability:

The system should be easy to maintain, update, and extend over time to accommodate changes in requirements, technologies, and user needs.

3.6.8 Privacy:

The system should respect user privacy and comply with relevant data protection regulations (e.g., GDPR) when handling personal data, facial biometrics, and user preferences.

3.7 Organizing the Specific Requirements

To organize the specific requirements in the project effectively, we can categorize them into different sections based on their functional areas and characteristics. Here's a structured approach to organizing the specific requirements:

3.7.1 Authentication and User Management

- Facial Enrollment

  Allow users to enroll their facial biometrics securely.

- Facial Recognition Login

  Authenticate users using facial recognition technology.

- User Profile Management

- Enable users to create, update, and manage their profiles.

3.7.2 Movie Recommendation System

- Personalized Recommendations
- Generate personalized movie recommendations based on user preferences and viewing
- Utilize machine learning algorithms for accurate recommendations.
- Browsing and Search Functionality
- User Interaction and Feedback
- Allow users to provide feedback on recommended movies (e.g., ratings, likes, dislikes).
- Incorporate user feedback to improve future recommendations.

3.7.3 Security and Privacy

- Data Protection

-Encrypt sensitive data such as facial biometrics, passwords, and user profiles.

- Privacy Compliance
- Comply with relevant regulations (e.g., GDPR) for handling personal data.

3.7.4 Performance and Scalability

- Facial Recognition Speed
- Authenticate users within milliseconds for a seamless login experience.
- System Response Time
- Ensure fast response times for user interactions and recommendation requests.

3.7.7 Functional Hierarchy

Main Function:

- Provide information and foster user engagement about All type of Movies.

  Sub-functions:

Information Management:

- Dataset for the Movie Recommendation

Content Delivery:

- Retrieve and display detailed movie metadata, including titles, genres, ratings, cast, and release dates.
- Deliver notifications to users about new movie releases, recommended titles, account activities, and system updates.

User Interaction:

- Enable users to log in securely using facial recognition technology.
- Allow users to browse and search for movies based on various criteria, such as genre, release date, and actor.

  Enable users to provide feedback on recommended movies through ratings, likes, dislikes, and comments (Optional)

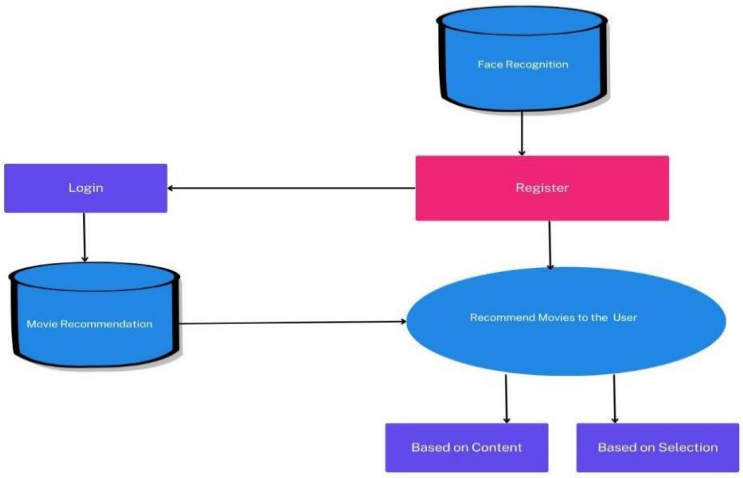

Fig 3.7.7

Flow Chart Hierarchy

Chapter 4. Change Management Process

The change management process of our website involves systematically planning, implementing, and monitoring changes to the website to ensure smooth transitions and minimize disruptions. This process typically includes identifying the need for change, assessing the impact of the change, obtaining stakeholder buy-in, planning the change implementation, testing the changes, and finally, deploying them. It is important to communicate effectively with all stakeholders throughout the process to manage expectations and address any concerns. Regular monitoring and evaluation of the changes are also essential to ensure that they meet the desired objectives.

Implementing change management for our website involves several steps to ensure successful outcomes.

1.Change Identification:

Establish a formal process for identifying potential changes to project scope, requirements, timeline, or resources.

Encourage stakeholders to submit change requests through designated channels, such as a change request form or project management tool.

Regularly review project progress, feedback, and emerging risks to identify areas where changes may be necessary.

2.Change Impact Assessment:

Evaluate the potential impact of proposed changes on project objectives, deliverables, schedule, budget, and stakeholders.

Assess the feasibility, risks, and benefits associated with each change request.

Engage relevant project team members, subject matter experts, and stakeholders in the assessment process to gather insights and perspectives.

3.Change Prioritization:

Prioritize change requests based on their importance, alignment with project goals, and potential impact on project outcomes. Use criteria strategic alignment, stakeholder value, and feasibility to prioritize changes effectively.

4.Change Implementation:

Develop an action plan for implementing approved changes, including tasks, timelines, responsibilities, and dependencies.

Communicate changes to relevant stakeholders, ensuring clarity regarding the rationale, scope, and expected outcomes of each change.

Monitor the implementation progress closely, addressing any issues or deviations from the plan promptly.

5.Change Communication:

Communicate change decisions, updates, and implications to all affected stakeholders in a timely and transparent manner.

Encourage open dialogue and feedback channels to address concerns, questions, or resistance related to changes.

6.Change Evaluation:

Evaluate the effectiveness and impact of implemented changes on project outcomes, stakeholder satisfaction, and organizational objectives.

Collect feedback from stakeholders to assess their perceptions, experiences, and satisfaction with the change management process.

7.Documentation:

Maintain comprehensive documentation of all change requests, decisions, approvals, and implementation activities.

Document the rationale, impact assessment, and outcomes of each change for future reference and audit purposes.

Update project documentation, plans, and baselines to reflect approved changes accurately.