

# Mini Project-I (K24MCA18P) Odd Semester Session 2024-25

## Image Recommendation System

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# Content

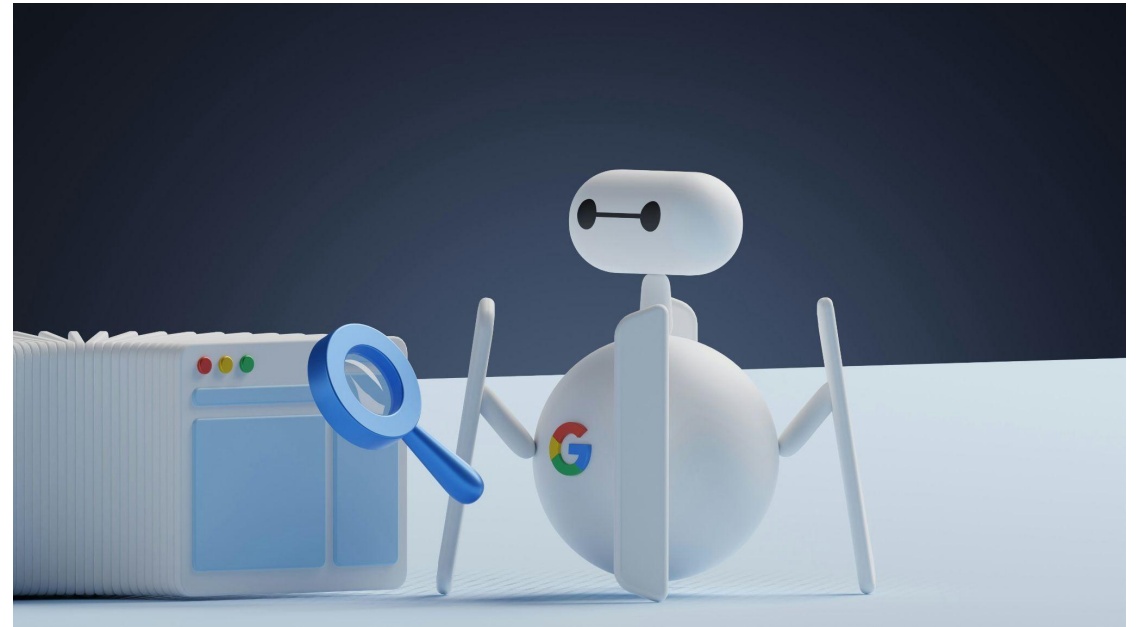
- Introduction (1 slide)
- Literature Review (2 slides)
- Objective of the Project (1 slide)
- Technology
  - Hardware Requirements (Development Environment, Server requirement (if required), Client requirement (if required).
  - Software Requirements (Language and Platforms like Frameworks, VS code, Android Studio and Jupyter notebook etc. )
- Modules (2-3 slides)
- Workflow (1 slide)
- Reports (For Example: Project : Student Monitoring System, so reports like: Student Marks, Subjects, companies visit, and student appears in placement etc.)
- References (1 slide)

# Introduction

## IMAGE RECOMMENDATION SYSTEM

Are you tired of endlessly searching for the perfect images? Our app is here to make your life easier! By leveraging advanced machine learning algorithms, our system understands your preferences and delivers the best-suited images directly to you. Whether you need personalized recommendations for art, photography, or just the right visual inspiration, we've got you covered.

With features like Image Similarity Search, Searching trending & Popular Images, Curated Collections and User Interaction, we provide everything you need to boost up your confidence.



# Literature Review

## Overview of Image Recommendation System

1. **Data Collection:**
  - **User Data:** Information about user preferences, interactions, and demographics.
  - **Image Data:** Metadata (tags, descriptions) and visual features (color, texture) of images.
2. **Feature Extraction:**
  - **Content-Based Filtering:** Analyzes image features using techniques like computer vision (e.g., CNNs) to recommend similar images based on visual characteristics.
  - **Collaborative Filtering:** Uses user behavior (likes, shares) to find patterns and suggest images that similar users liked.
3. **Recommendation Algorithms:**
  - **Matrix Factorization:** Decomposes user-item interaction data to discover latent factors influencing preferences.
  - **Deep Learning:** Employs neural networks for complex feature extraction and recommendation tasks.

# Literature Review (Contd.)

## **Improving Cold Start Solutions:**

- Develop better algorithms that leverage demographic data, social networks, or content similarity to mitigate cold start issues.

## **Context-Aware Recommendations:**

- Research methods to integrate contextual information (e.g., situational, emotional) to enhance relevance and personalization.

## **Explainable Recommendations:**

- Focus on creating interpretable models that provide clear reasons for recommendations, improving user trust and satisfaction.

## **Bias Mitigation Techniques:**

- Explore strategies to identify and reduce biases in datasets and algorithms, promoting fairness and diversity in recommendations.

# Objective of the Project

## 1. Personalization

- **Tailored Recommendations:** Provide users with image suggestions that match their individual preferences and past behaviors.

## 2. User Engagement

- **Increase Interaction:** Encourage users to spend more time interacting with the platform by presenting relevant images that attract their attention.

## 3. Content Discovery

- **Explore New Images:** Help users discover new and interesting images they might not have found otherwise, broadening their exposure to diverse content.

## 4. Improving Satisfaction

- **Enhance User Experience:** Increase user satisfaction by delivering high-quality recommendations that resonate with their tastes.

## 5. Conversion Rate Improvement

- **Boost Sales or Actions:** In e-commerce contexts, recommend images of products that lead to higher conversion rates, encouraging purchases or other desired actions.

# Technology (Hardware Requirements)

## ➤ Hardware Requirements

- **Processor:** A dual-core processor or higher to handle the demands of running the application smoothly.
- **RAM:** At least 4GB of RAM for optimal performance, particularly when generating images or handling multiple notes.
- **Storage:** Sufficient local storage for users to save their notes, images, and application data securely.
- **Server-Side (if applicable for any backend services):**
- **Processor:** Quad-core processor to efficiently handle incoming requests and manage application logic.
- **RAM:** Minimum of 8GB for smooth server operation and to support concurrent users.
- **Storage:** SSD storage for faster data retrieval and application performance.

## ➤ Client Requirements

- To use Our Software, users will need:
- A modern web browser (Chrome, Firefox, Safari, or Edge) to access the application.
- An internet connection for initial setup and to utilize AI generation features (if applicable).
- Compatible operating system: Windows, macOS, or Linux, as the app is designed to be cross-platform

# Technology (Software Requirements)

## Software Requirements

### Frontend Technologies:

- **HTML:** HTML is the standard markup language used to create the structure of web pages.
- **React.js:** React.js is a JavaScript library for building user interfaces, particularly single-page applications.
- **CSS:** CSS is a stylesheet language used to describe the presentation of HTML elements. It controls the layout, colors, fonts, and overall visual aesthetics of web pages.

### Backend technologies:

- **Node.js:** A JavaScript runtime environment used for server-side development, enabling the creation of a robust backend to support application logic.
- **Express.js:** A web application framework for Node.js, facilitating the development of APIs and server-side logic.

### Database

- **Mongodb:** MongoDB is a NoSQL database that uses a flexible, document-oriented data model. It is designed for scalability and performance, supporting high availability and large volumes of data, which makes it a popular choice for modern web applications.



# Modules

- **User Interface Module (Frontend):**  
Display images and recommendations to the user.
- **Admin Module:**  
Admins can Sign Up or Sign In to create and update images.
- **User Module:**  
Users can Sign Up or Sign In to read or explore images by their genre, posted by our admins.

# Modules (Contd.)

## Authentication Module

- This module helps users secure their sensitive data from hackers or any potential data leaks.
- It also helps developers identify a particular user to restrict or block them.

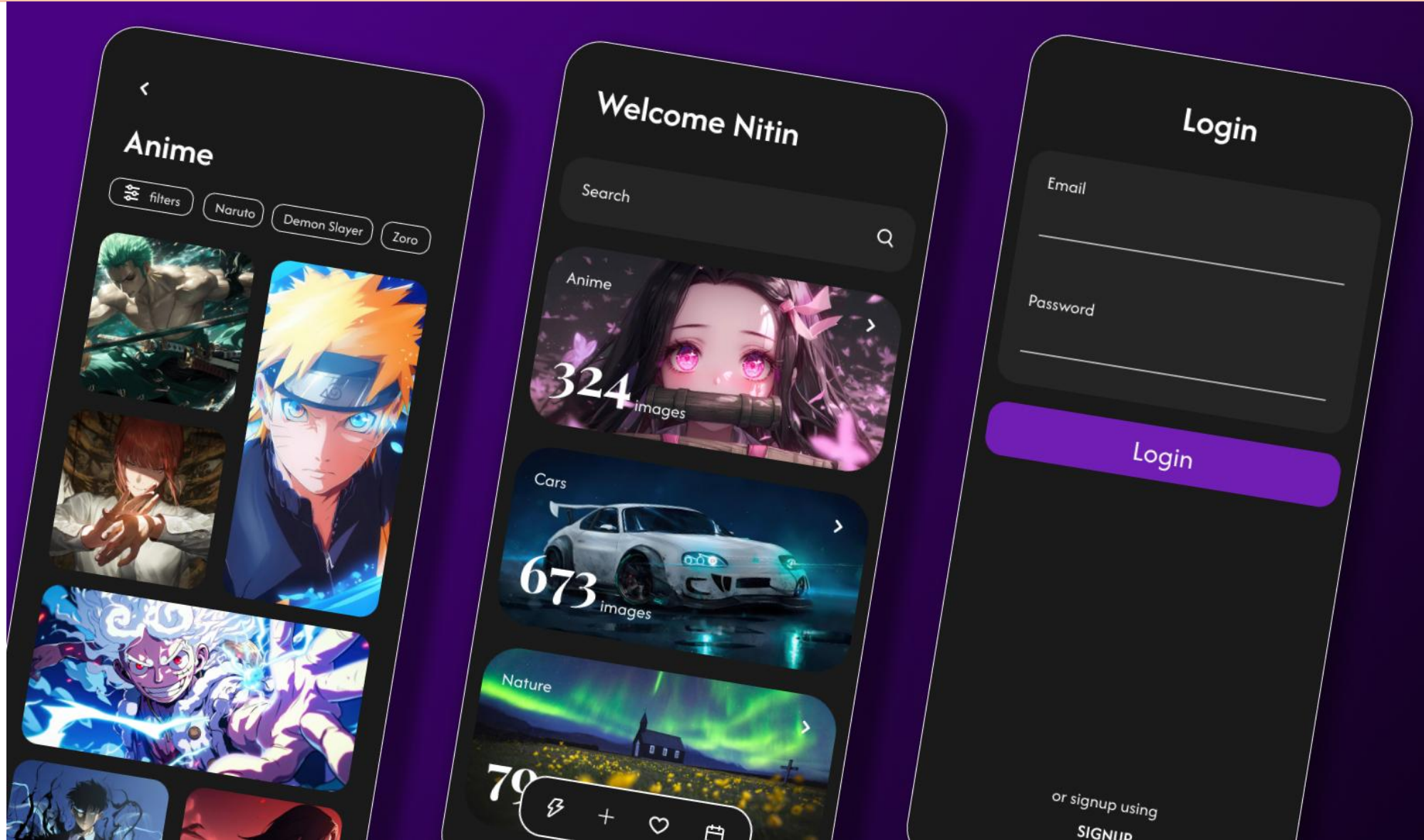
## Similarity Calculation Module

- This module helps users to compare image features to find similar images.

# Workflow/Gantt Chart

- **Sign Up/Sign In** : Both users and admins can sign up or sign in using their credentials.
- **Admin Dashboard:**
  - **Create images:** Admins can compose and publish new images posts.
  - **Update images:** Admins can edit existing images to correct or add new information.
- **User Access:**
  - Users can sign in to explore the blog section.
  - **Read images:** Users have access to all available posts and can read images by genre or category.
- **image Management:** :
  - Admins can view and manage all published Images, with options to update or remove them as needed.

# Reports



## Prototype Link

<https://www.figma.com/proto/2mH2s8n0Oki61tlwpe44eU/Image-Recommendation-System?node-id=0-1&t=ecMKoyaT8tZqDnjX-1>

# References

## 1. Collaborative Filtering:

- Sarwar, B., Karypis, G., Konstan, J. A., & Riedl, J. (2001). "Item-based collaborative filtering recommendation algorithms." *Proceedings of the 10th International Conference on World Wide Web (WWW)*.

## 2. Content-Based Filtering:

- Salton, G., & McGill, M. J. (1986). *Introduction to Modern Information Retrieval*. McGraw-Hill.

## Deep Learning Approaches

## 3. Deep Learning for Recommendations:

- He, X., Liao, L., Zhang, H., Nie, L., & Hu, X. (2017). "Neural Collaborative Filtering." *Proceedings of the 26th International Conference on World Wide Web (WWW)*.

## 4. Visual Feature Extraction:

- Simonyan, K., & Zisserman, A. (2014). "Very Deep Convolutional Networks for Large-Scale Image Recognition." *arXiv preprint arXiv:1409.1556*.

## Recent Advances

## 5. Multimodal Learning:

- Liu, Z., et al. (2021). "Multi-modal recommendation with heterogeneous information networks." *Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval*.