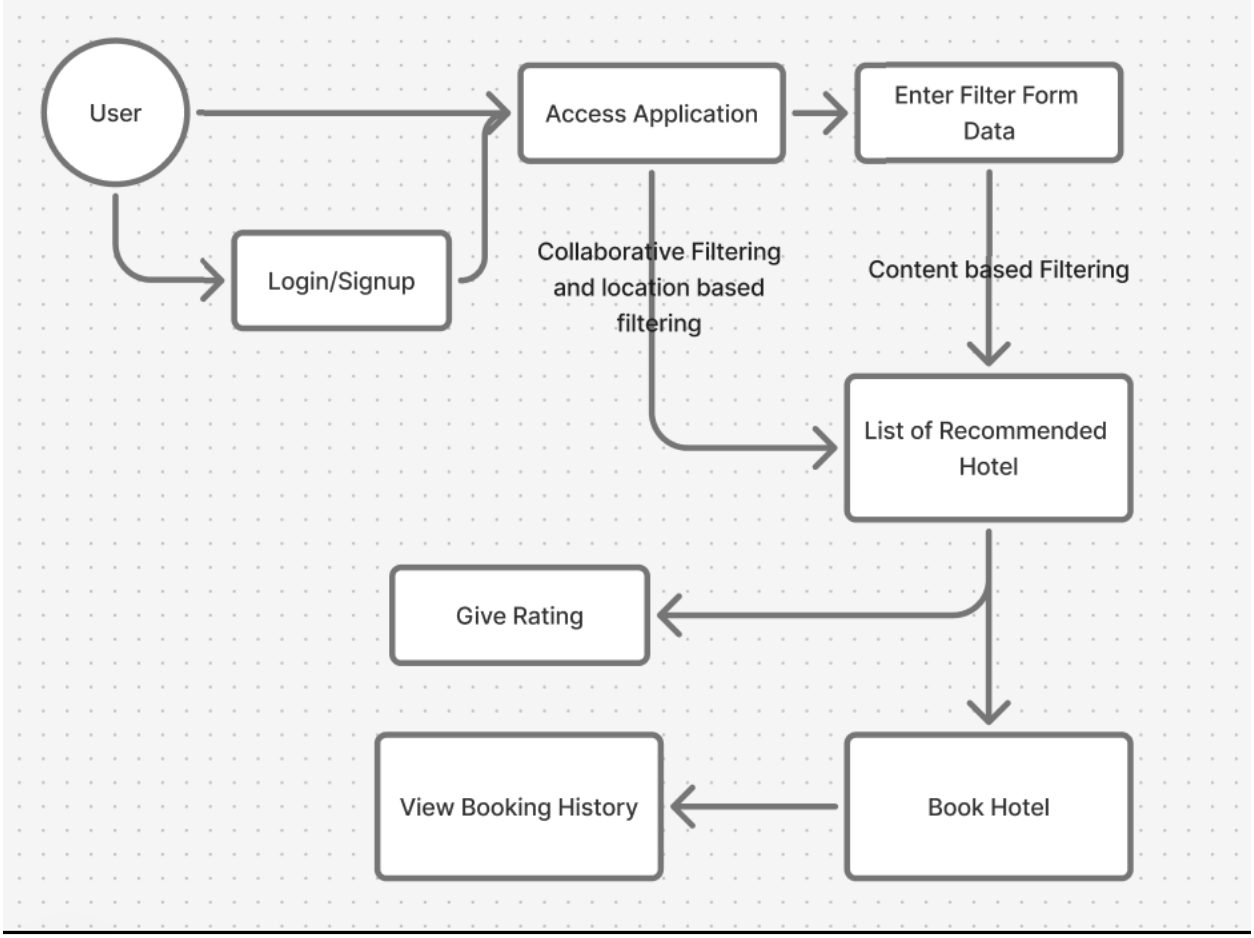
HOTEL RECOMMENDATION SYSTEM

System Purpose:

The Hotel Booking Recommendation System is an intelligent web-based platform that transforms the traditional hotel booking experience through advanced machine learning algorithms. The system serves as a comprehensive solution for travelers seeking personalised accommodation recommendations while providing hotel operators with enhanced visibility and booking management capabilities.

Application Flow:



User Flow Explanation

1. Register/Login → Set Preferences

Registration Process:

- Users create accounts with personal information and travel history
- System captures initial preferences during onboarding
- Authentication system provides secure access with session management

Preference Setting:

- Users define preferred amenities (pool, gym, spa, WiFi)
- Set typical price ranges and star rating preferences
- Specify location types (city centre, airport, beachfront)
- These preferences feed into the ML recommendation algorithms

2. Search Hotels → View PersonaliSed Recommendations

Search Process:

- Users input destination, check-in/check-out dates, guest count
- System processes search criteria against hotel inventory

Personalised Recommendations:

- Collaborative Filtering: System finds users with similar booking patterns and suggests hotels they liked
- Content-Based Filtering: Matches user's stated preferences with hotel characteristics
- Hybrid Approach: Combines both methods using weighted algorithms
- Recommendations appear alongside search results with "Recommended for You" labels

3. Compare Options → Book Reservations

Comparison Tools:

- Side-by-side hotel comparisons showing amenities, prices, ratings
- Similar hotel suggestions using item-based collaborative filtering

Booking Process:

- Room type selection with real-time availability
- Guest information capture and special requests
- Confirmation with detailed itinerary

4. Manage Bookings → Leave Reviews

Booking Management:

- View booking history and its details

Review System:

- Post-stay review and rating submission (1-5 stars)
- Detailed feedback on amenities, service, location
- Reviews feed back into the recommendation engine for future suggestions

Key Features Explanation

1. Advanced Search with Filters

Location Filtering:

- Geographic search with map integration
- Neighbourhood and landmark-based filtering
- Distance from specific points of interest

Price and Rating Filters:

- Dynamic price range sliders with real-time results
- Star rating filters (1-5 stars)
- Value-for-money scoring and filtering

Amenity Filtering:

- Comprehensive amenity checklist (pool, gym, spa, business centre)
- Accessibility features and pet-friendly options
- Room-specific amenities (balcony, kitchen, WiFi)

2. ML-Powered Recommendations

SVD (Singular Value Decomposition):

- Matrix factorisation technique that identifies hidden patterns
- Decomposes user-hotel rating matrix into latent factors
- Predicts ratings for unvisited hotels based on similar user patterns

KNN (K-Nearest Neighbours) Variants:

- KNN Basic: Finds most similar users/hotels based on rating patterns
- KNN With Means: Adjusts for user rating biases
- KNN With Z-Score: Normalises different user rating scales

Clustering:

- K-Means: Groups users with similar preferences into segments
- Co-Clustering: Simultaneously clusters users and hotels
- Enables targeted recommendations for specific user segments

3. User Reviews and Ratings System

Review Collection:

- Post-stay review prompts with structured rating categories
- Photo uploads and detailed written feedback
- Verification system to ensure authentic reviews

Review Processing:

- TF-IDF Vectorisation: Analyses review text for important keywords
- Sentiment Analysis: Determines positive/negative sentiment scores
- Review Aggregation: Calculates overall hotel ratings and category scores

The user flow and features are powered by:

- Django Framework: Handles user authentication, search processing, and booking management
- scikit-surprise: Implements collaborative filtering algorithms (SVD, KNN)
- pandas: Processes user interaction data and hotel features
- scikit-learn: Provides clustering algorithms and similarity calculations