What the system aims to achieve:

1. **Personalized Book Recommendations**
    - Recommend books tailored to individual customer preferences.
    - Leverage past purchase history, user ratings, and behavior to enhance recommendations.

2. **Sentiment-Based Insights from Customer Reviews**
    - Automatically analyze and classify customer reviews as positive, neutral, or negative.
    - Extract common themes and satisfaction levels from review data.

3. **Real-Time Book Performance Analysis**
    - Identify best-selling books based on sales volume and customer engagement.
    - Detect low-rated or poorly performing books for catalog optimization.
    - Highlight neutral-rated books for further assessment and improvement.
    - Promote highly-rated books through targeted marketing.

4. **Data-Driven Growth Strategy**
    - Leverage large volumes of data to make informed, strategic decisions.
    - Increase customer retention, satisfaction, and sales conversion through targeted actions.
    - Visualize key metrics using an interactive dashboard.

Similar systems and their deliverables

Platform Name	**Key Features**
Amazon	Personalized book recommendations, "Customers who bought this also bought", real-time sentiment insights from reviews.
Goodreads	AI-driven suggestions based on reading history, genre preferences, and user reviews. Sentiment tagging in reviews.
Scribd	Machine learning to recommend books and audiobooks tailored to reader behavior.
Google Books	Offers personalized suggestions using user data, browsing history, and ratings.
Audible	Recommends audiobooks based on listening patterns and integrates review sentiment for suggestions.
Barnes & Noble	Uses basic recommendation systems and integrates user reviews and ratings to influence purchase suggestions.

Functional requirements

1. **User Registration & Profile Management:** Users should be able to sign up, log in, and manage their profiles.
2. **Browsing for Books:** Users should be able to browse books, receive personalized recommendations, and view trending books.
3. **Search and Filtering:** Users should be able to search for books using keywords and apply filters.
4. **Interaction and Book Purchase:** Users should be able to view book details, add books to their cart, complete purchases, and receive order updates.
5. **Rating and Reviewing:** Users should be able to rate and review books and view sentiment analysis of reviews.
6. **Book Performance Dashboard:** Admins should be able to track book sales, engagement metrics, and customer sentiment.
7. **AI-Powered Recommendation System:** The system should provide personalized book recommendations based on user data.
8. **Sentiment Analysis:** The system should automatically classify customer reviews into positive, neutral, or negative sentiments.
9. **Book Performance Analysis:** The system should track and analyze book performance metrics, including sales, ratings, and reviews

Non-functional requirements

1. **Scalability:** The system should handle a growing number of users and books.
2. **Performance:** The system should provide fast and efficient responses, especially for real-time recommendations.
3. **Reliability:** The system should have high uptime with minimal crashes and provide accurate and dependable analytics and recommendations.
4. **Security:** The system should ensure secure user registration, login, and data privacy and role-based access for admins and users.
5. **Maintainability:** The system should be designed for easy update of UI components and machine learning models. It should have modular design for future feature additions.
6. **Usability:** The system should have a user-friendly interface for both customers and administrators and be easy to navigate.
7. **Data Privacy:** The system should address data privacy concerns related to user data collection and usage.
8. **Compatibility:** The system should support across different devices.

Measurable success indicators

1. **Improved Recommendation Accuracy**
    a. **Click-Through Rate (CTR) on Recommendations:** Percentage of users who click on recommended books. A higher CTR indicates more relevant recommendations.

    b. **Conversion Rate of Recommendations:** Percentage of users who purchase a recommended book after clicking on it. This directly measures the system's impact on sales.

    c. **Recommendation Adoption Rate:** Percentage of total purchases that originate from recommendations. This shows how much users rely on the system.

    d. **User Rating of Recommendations:** Collect feedback on how satisfied users are with the recommendations they receive.

2. **Increased User Engagement**
    a. **Time Spent on Site:** Increased time spent browsing books, especially within the recommendation sections.

    b. **Number of Books Viewed Per Session:** Users explore more books due to better recommendations.

    c. **Increase in User Ratings and Reviews:** More users are encouraged to interact with the community by rating and reviewing books.

    d. **Return Visit Rate:** Users come back to the site more frequently due to a more engaging experience.

3. **Higher Sales & Conversion**
    a. **Overall Sales Increase:** Track the total sales revenue and the number of books sold after implementing the new system.

    b. **Conversion Rate:** The percentage of users who make a purchase out of the total number of visitors.

    c. **Average Order Value:** The average amount spent per transaction. Recommendations can encourage users to buy more books.

4. **Effectiveness of Sentiment Analysis**
    a. **Accuracy of Sentiment Classification:** Measure how accurately the system categorizes reviews (positive, neutral, negative) by comparing it to manual classification of a sample set.

    b. **Correlation Between Sentiment and Sales:** Analyze if books with more positive sentiment tend to have higher sales.

    c. **Usefulness of Sentiment Data for Decision-Making:** Track how often admins use the sentiment data to make decisions about inventory, marketing, etc.

5. **Optimized Book Collection**
    a. **Reduction in Low-Rated Book Inventory:** Measure the decrease in the number of low-rated books in the catalog.
    b. **Increased Sales of Top-Rated Books:** Track if marketing efforts based on sentiment analysis led to higher sales of positively rated books.
    c. **Inventory Turnover Rate:** Analyze how quickly books are selling, indicating better inventory management.
6. **Data-Driven Decision Making**
    a. **Admin Dashboard Usage:** Track how frequently admins use the dashboard and its features.
    b. **Number of Data-Driven Decisions:** Record how often the reports and analytics from the system are used to make business decisions.
    c. **Impact of Data-Driven Decisions:** Evaluate the outcomes of decisions made using the system's data.

Requirement prioritization based on client needs

1. Improve customer experience
2. Increase sales & engagement
3. Make data-driven decisions
4. Optimize book collection
5. Ensure smooth usage and system longevity

Key performance metrics

1. **Recommendation System Effectiveness**
    a. **Click-Through Rate (CTR):** Measures how often users click on recommended books.
    b. **Conversion Rate:** Tracks how often a recommendation leads to a purchase.
    c. **Adoption Rate:** Shows the proportion of purchases influenced by recommendations.
    d. **Relevance Score:** A metric assessing how well recommendations match user preferences, can be calculated using user ratings or feedback.
2. **User Engagement**
    a. **Session Duration:** Average time users spend on the site.
    b. **Page Views per Session:** Number of books or pages viewed during a session.
    c. **Interaction Rate:** Frequency of user actions like ratings, reviews, or adding books to wishlists.

d. **Return Visit Rate:** Percentage of users who come back to the site.

3. **Sales and Business Impact**
   a. **Overall Sales Revenue:** Total revenue generated from book sales.
   b. **Sales Conversion Rate:** Percentage of visitors who make a purchase.
   c. **Average Order Value:** Average amount spent per transaction.
   d. **Inventory Turnover:** How quickly books are sold and replaced.
4. **Sentiment Analysis Performance**
   a. **Sentiment Accuracy:** Precision of the sentiment analysis model in classifying reviews (positive, neutral, negative).
   b. **Sentiment Coverage:** Percentage of reviews successfully analyzed.
   c. **Correlation:** The relationship between sentiment scores and book sales or ratings.
   d. **Sentiment Trend Analysis**: Distribution and trends of customer sentiments over time, used to monitor changes in customer satisfaction.
5. **Book Catalog Optimization**
   a. **Low-Rated Book Reduction:** Decrease in the number of books with consistently low ratings.
   b. **Top-Rated Book Sales:** Increase in sales of books with high ratings and positive sentiment.
6. **System Usage and Efficiency**
   a. **Dashboard Usage:** How frequently admins use the analytics dashboard.
   b. **Report Generation:** Number of reports generated and used for decision-making.
   c. **System Response Time:** Speed of the system in providing recommendations and search results.

Different user personas

1. **Avid Reader**
   - Creates a user account for personalized experiences.
   - Browses books based on recommendations or personal preferences.
   - Uses search and filters to find specific books.
   - Views book details, reads descriptions and reviews, and purchases books.
   - Rates and reviews books to share opinions.

2. **Engaged user or reviewer or contributor**
   - Rates and reviews books.
   - Potentially interacts with other users through review feedback.

3. **Casual Buyer**
    - Uses search and filtering to quickly locate specific books.
    - Purchases books with a streamlined checkout process.

4. **System Administrator**
    - Monitors book sales, engagement metrics, and customer sentiment through the admin dashboard (book performance dashboard).
    - Analyzes customer reviews to understand feedback and trends (sentiment & review analysis).
    - Manages book catalog, inventory, pricing, and marketing strategies (inventory & marketing optimization).
    - Generates reports for data-driven decision-making (book performance dashboard).

5. **Business Analyst / Marketing Manager**
    - Identify sales trends and customer preferences.
    - Improve marketing strategies using data-driven insights.
    - Optimize inventory and promotional planning.

Interaction of stakeholder with system

1. **Avid Reader**
    a. **Interaction:**
        - Creates a user account for personalized experiences.
        - Browses books based on recommendations or personal preferences.
        - Uses search and filters to find specific books.
        - Views book details, reads descriptions and reviews, and purchases books.
        - Rates and reviews books to share opinions.

    b. **Value:**
        - Discovers new and relevant books effortlessly.
        - Enjoys a personalized and efficient book shopping experience.
        - Makes informed purchase decisions through reviews and recommendations.
        - Connects with a community of readers.

2. **Reviewer**
    a. **Interaction:**
        - Rates and reviews books (rating and reviewing).
        - Potentially interacts with other users through review feedback.

    b. **Value:**
        - Shares their passion for reading and influences other readers.

- Contributes to the community and helps others discover books.
- Gains recognition for insightful reviews.

3. **Casual Buyer**
   a. **Interaction:**
      - Uses search and filtering to quickly locate specific books (search and filtering).
      - Purchases books with a streamlined checkout process (interaction and book purchase).

   b. **Value:**
      - Efficiently finds and buys desired books.
      - Enjoys a quick and convenient shopping experience.

4. System Administrator

   a. **Interaction:**
      - Monitors book sales, engagement metrics, and customer sentiment through the admin dashboard (book performance dashboard).
      - Analyzes customer reviews to understand feedback and trends (sentiment & review analysis).
      - Manages book catalog, inventory, pricing, and marketing strategies (inventory & marketing optimization).
      - Generates reports for data-driven decision-making (book performance dashboard).

   b. **Value:**
      - Gains insights into customer behavior and market trends.
      - Optimizes book inventory and marketing strategies.
      - Improves business performance and profitability.
      - Makes informed decisions based on data analysis.

5. Business Analyst / Marketing Manager

   a. **Interaction**
      - Viewing sales reports and KPIs.
      - Analyzing customer behavior and trends.
      - Monitoring marketing campaign performance.

- Generating custom reports.

b. **Value:**
   - Data-driven insights to understand sales trends and customer preferences.
   - Improved marketing strategies and campaign ROI.
   - Optimized inventory and promotional planning for cost efficiency and increased revenue.

Use case descriptions

1. **User Registration**

   a. **Actors:** User
   b. **Goal:** To create a user account to access personalized features and purchase books.
   c. **Preconditions:** User is a new user and has not yet registered.
   d. **Basic Flow:**
      i. The user navigates to the registration page.
      ii. The user enters their phone number, email, and desired password.
      iii. The system validates the provided information.
      iv. The system creates a new user account.
      v. The user is logged in to their new account.
   e. **Alternative Flows:**

      i. If the phone number or email is already registered, the system displays an error message and prompts the user to log in or recover their password.
      ii. If the user provides invalid information (e.g., incorrect email format), the system displays an error message and prompts the user to correct the information.

2. **Browse Books**

   a. **Actors:** User
   b. **Goal:** To explore and discover books based on various criteria.
   c. **Preconditions:** User is logged in.
   d. **Basic Flow:**
      i. The user navigates to the book browsing page.
      ii. The system displays a list of books, including personalized recommendations, trending books, and bestsellers.
      iii. The user can view book covers, titles, authors, and brief descriptions.
      iv. The user can select a book to view its detailed information.
   e. **Alternative Flows:**
      i. The user can filter the book list by genre, rating, or price.

3. **Search for Books**

   a. **Actors:** User

b. **Goal:** To find specific books quickly.
c. **Preconditions:** User is on the book browsing page.
d. **Basic Flow:**
    i. The user enters a search query (title, author, keywords) in the search bar.
    ii. The system displays a list of books that match the search query.
    iii. The user can view book covers, titles, authors, and brief descriptions.
    iv. The user can select a book to view its detailed information.
e. **Alternative Flows:**

    i. The user can apply filters to the search results, such as genre, rating, or release date.
    ii. The user can sort the search results by popularity, price, or rating.

4. View Book Details

a. **Actors:** User
b. **Goal:** To get comprehensive information about a book before making a purchase decision.
c. **Preconditions:** User has selected a book from a list.
d. **Basic Flow:**
    i. The system displays detailed information about the selected book, including the title, author, description, reviews, ratings, price, and availability.
    ii. The user can view customer reviews and sentiment analysis of those reviews.

5. Purchase Books

a. **Actors:** User
b. **Goal:** To buy selected books.
c. **Preconditions:** User has added books to their cart.
d. **Basic Flow:**
    i. The user navigates to the shopping cart.
    ii. The system displays the list of books in the cart and the total price.
    iii. The user proceeds to checkout.
    iv. The user provides shipping and payment information.
    v. The system processes the payment and creates an order.
    vi. The system displays an order confirmation to the user.
e. **Alternative Flows:**
    i. The user can remove books from the cart.
    ii. The user can choose from multiple payment options.

6. Rate and Review Books

a. **Actors:** User
b. **Goal:** To share opinions and feedback on purchased books.
c. **Preconditions:** User has purchased and read a book.
d. **Basic Flow:**
    i. The user navigates to the book details page.
    ii. The user provides a rating for the book.
    iii. The user writes a review of the book.
    iv. The system saves the rating and review.

7. **Admin: Monitor Book Performance**

   a. **Actors:** Admin
   b. **Goal:** To track sales, engagement, and customer sentiment for books.
   c. **Preconditions:** Admin is logged in to the admin dashboard.
   d. **Basic Flow:**
      i. The admin accesses the book performance dashboard.
      ii. The system displays key metrics such as sales volume, ratings, review sentiment, and engagement metrics.
      iii. The admin can filter and sort the data to identify trends and patterns.
   e. **Alternative Flows:**
      i. The admin can generate reports on book performance.
      ii. The admin can identify low-rated books.

Dataflow diagram