

A Survey on Reader's Society : New Social Network of Book Swapping Platform

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Abstract— A large portion of the population routinely reads books and uses various methods to do so. Some people purchase books outright, while others borrow them from libraries, which use resources more sparingly overall. A portion of readers frequently buys books as well as borrow them. While some readers use the library system to borrow books for a brief time, many also have a small group of pals with whom they exchange books. In this manner, rather than being centralized, book movement is more diffused. Additionally, because there are so few of these libraries, they are not readily accessible. The best way to consume this finite resource is to make it as efficient as possible. It entails making use of the purchasing behavior and its disposal while considering the length of time the book is left unused. This results in collecting these available books, completing the circular economy by making it easier to swap them with nearby or accessible readers. We recognize that creating a tiny, autonomous community for something as simple as book sharing could significantly negatively influence the economy, society, and environment. Our goal is to set up a platform allowing readers to swap books reasonably and equally while maintaining ownership with no additional costs.

Keywords—Collaborative Learning; Book Swapping; IoT; Recommendation System; Learning Platform

I. INTRODUCTION

Books are a hidden doorway to a place that is yet to be discovered, opening up many universes as the pages turn. Books are artefacts that have existed for thousands of years and continue to survive today, despite the technological advancements that have taken place. Consequently, we also have several book-selling and book-lending libraries that exist in many places all around the globe. Their cardinal purpose is to distribute the books and make them available to the end user. Lending libraries have taken this concept to a new level by reusing the same resource to satisfy the customers by costing an affordable amount [1]. However, there is also a segment of people who like to own a physical book instead of renting one, as an owned one is available to them whenever they need it. Furthermore, surveys indicate that the majority of people still prefer to read physical books over electronic ones, despite the popularity of e-books. Publishers use facts and statistics from a 2019 Pew Research Centre survey to determine the most popular reading formats. People read short-form writing today, whether it be a social network post

or a blog piece, on smartphones and tablets. However, when they want to read anything lengthier, they resort to books.

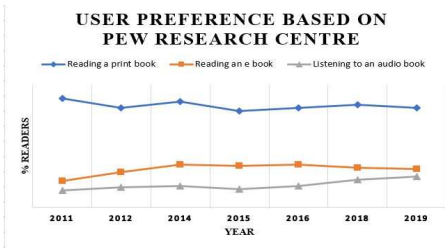


Fig. 1. User preferences based of PEW Research Centre

It is evident from the graph given that the printed physical copy of a book is widely preferred over the e-copy or an audio book. Thus, it is important to meet the demands and preferences of the book readers in an optimal way. Several applications enable users to sell their books, buy books from e-commerce sites, and rent a book with a minimal cost overhead. However, there are restrictions because of the financial overhead that still exists or the fact that the owner loses possession of the book in return for receiving a new one. Sharing books is an easy task in a situation with only two friends [2]. For example, friend A borrows a book he requires from Friend B when He is not reading it. Likely, Friend B can also borrow books from Friend A and read them, and once done, they can return the book to Friend A. This way, they can share their books with no money transaction while also ensuring they both get their books back. Things become more complicated when another person is added to the group. Friend B can only lend a book to Friend A if it is available to Friend B and has not already been offered to the third friend. Then, friend A can request a book from Friend B. (Friend C). If more friends are added to the friend's circle or Friend A has a separate circle that the other friends in the present circle are unaware of, the situation may get more complicated.

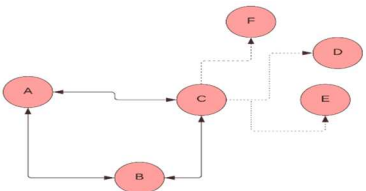


Fig. 2. User Scenario

All these factors could hinder the effective collaboration between the readers and make book reading tedious. It raises the necessity of a stable and scalable system that allows users to efficiently communicate between themselves, lend books, borrow books they need, and is free of money transactions while uplifting the law of equivalent exchange with the help of certain constraints [3]. One possible issue that could arise is unequal exchanges. For example, the current system would allow a user to give a book of meagre cost and get a very high-cost book from the other person. Such an operation should not be allowed.

II. LITERATURE SURVEY

This section provides a set of comprehensive projects for the book management, exchange, and swapping system. It includes various applications which aim at reducing the complexity involved in the transfer or exchange of books, from a library management system whose objective is to reduce the tediousness of a reader's hour at a library to an application where the books are sent and received worldwide. The series of applications have evolved to satisfy the cause but still has its unresolved pain points and complications. These are discussed in this section by comparing different comprehensive applications.

A. Book Management Using LibraryManagement Platform

Standard libraries can be converted into digital libraries using an LMS, a tool that takes the shape of a management system. There is no need to wait in line to return or check out a book from the Library. One computer is used to store all the data. The library management system daily supports many users, yet many need help accessing books. In order to use LMS to locate the book on the bookshelves, it is the librarian's responsibility to evaluate the system and submit information. The LMS was created to give librarians access to fundamental functionality, including adding, viewing, updating, and deleting books and student information; the system enables them to change any data in the database. The LMS system can be accessed only by the authorized individual after authentication [4]. The LMS streamlines the process and lessens human resources requirements.

Furthermore, a system that can predict the potential availability of the supplied books will be much more helpful to a user. This study aimed to estimate when books will be available by using machine learning on library data. Using Keras and Sklearn, the outcome trend is compared, and three distinct networks—random forest, support vector, and neural—are utilized [5]. Improved prediction models were tested using real-world library data acquired from the Central Library of the Central Institute of Technology Kokrajhar (CLCITK). Today, library automation is the hottest topic in the industry and is a requirement for all libraries. A manual library cannot correctly maintain itself or offer its patrons more excellent services than an automated library. In an automated library system, record-keeping procedures and generating various reports become relatively simple. However, the effectiveness of any library automation program depends on how well it is planned and implemented. Therefore, library professionals need to move forward with the proper measures [6]. Even though the Library mentioned above Management

System simplifies the process and reduces the tediousness involved, there are more effective ways of lending or borrowing books. However, it focuses on one particular Library and books currently in that particular Library. Therefore, it narrows down the options available to the users.

B. Tracking of Books using IoT Platform

With computer networking, this library system provides numerous connected services. By connecting, libraries and information centers can access resources and services from anywhere. Sensors can control library materials. It is possible to follow each item's motions by connecting the sensor to the internet. Real-time information can be provided in this way, improving inventory management. The Internet of Things is a ground-breaking technology that may be the quickest and most effective way to track and locate library services. Additionally, it can link people to the library system, enabling higher degrees of security and authentication for system access. Users could be guided to their exact place for reading material using an app with the help of IoT [11]. IoT could gather data from the internet, Wi-Fi, or Bluetooth and communicate with people in a targeted way. For example, users might identify items from their favorite lists and receive notifications by connecting their phones to sensors. IoT technologies can facilitate library decision-making and management processes through interconnected objects and the IoT. Libraries with IoT devices will enable libraries to minimize loss and introduce safety techniques. Libraries will be able to add more value in addition to their services. Taking this view, we can use library computers to use IoT to know everything, obtain data, and collect things without anyone's help. As a result, we could count and track more things, reducing waste, loss, and costs while increasing security simultaneously [12].

C. A Study of Consumer Behavior Concerning Online Book Selling in India

Finding specific consumer behavior in any industry or business has become exceedingly challenging. Researchers have attempted to pinpoint the key variables that affect consumer behavior in India's online book market using primary (184 Indian book publishers) and secondary sources. It includes the ability to shop online, website connections to other online shopping portals, a comfortable offline versus online shopping experience, a preference for online shopping for diversity, and preferences for offline versus online prices, discounts, and offers.

The following conclusions were drawn from the study:

- The majority of publishers of books provide online shopping.
- Without a website, publishing businesses have partnerships with Bookganga, Amazon, and Flipcart.
- Most buyers purchase books online because they find it more convenient than other retail types.
- Due to the diversity of books available on websites, most buyers prefer to use them.
- Most clients firmly believe that online books are more affordable than those found in physical stores.

D. E-commerce websites for books are a more optimal way of book distribution.

It is essential to talk about Amazon's general competitive positioning strategy within its industry to emphasize the company's innovative role in online book sales. At Amazon, there are neither bookshelves to explore nor salespeople to assist consumers, in contrast to conventional bookshops. Additionally, the company has a global presence and is open 24 hours daily for business. Customers have acquired the company's books in 100 different nations [7]. Additionally, the company has no fancy furnishings, and funds are used wisely. All books are cheap on Amazon.com. Bestsellers are discounted by 40%, while all other books are discounted by 10%. The business may offer steep discounts since it is less expensive than a traditional bookshop. Many established companies are starting to adopt Amazon's business model to remain competitive and comprehend the upheaval it has sparked [9].

E. Book Swapping & Exchange Libraries: The case of Greece

Greece was affected by the financial crisis, which resulted in a decline in income and an apparent increase in book prices [2]. The public has performed the following actions in reaction to the crisis:

Utilizing the services provided by municipal and public libraries, both of which are in danger due to the crisis. As a result, they strive to develop a refined, revised side of themselves. We are reading e-books, in-stock books, and used/second-hand books. We are using the internet to trade books. Buying or trading books at book fairs run independently or as part of more significant events by people or groups (such as nonprofits, cultural institutions, solidarity networks, etc.) According to bookcrossing's guidelines, book owners must give away a book in a public setting. The user specifies on the related webpage where, when, and how long they want to leave it so that anyone interested in taking it or borrowing it can do so. A book exchange facilitates a broader distribution of books, but flexible policies govern the exchange, making it less reliable and complicated. In addition, there is no agreement; the book is available on a first-come, first-served basis, and anyone can take it [8].

F. Online book exchange systems

A community can share books through the Online Book Exchange System, a website. This procedure was developed to make lending and borrowing books simpler for users. Anyone looking for a book or finding out who the owner is can register. It was implemented within a community of students from a particular institution to exchange course books. It is available only within the college system [10]. It lacks a delivery procedure, as a consequence of which only students or readers belonging to the particular institution can be an active part of the system. Even though it provides a great deal of security since an institution is involved, this is also a considerable trade-off.

An Android app called Swap a Book can exchange books among neighbors. In order to make book shifting between users more accessible, it keeps track of user data and book lists. Users of the software can add books and do internal

searches for books of interest. A user can get in touch with another user and trade the book directly with them if their interest matches one of the books specified [13]. Every user receives a search feed based on their interests, which helps the book exchange system and gives them suggestions for books that suit their needs. This application is based on a rare condition where user A's needs match with user B's possessions, and user B's needs match with user A's possessions within a particular geographical location. A significant number of transactions are filtered out even before these criteria are satisfied, which makes the application less usable.

Paperbackswap is an application where users receive "startup" credits after posting the first "10" books on the bookshelf. The user can then send books to others in order to gain credits. The user can add a book to their wishlist if they want to purchase one that is not in stock. When the book is prepared, they will be alerted by email. The books the user borrows from the club become his or her property. The book will be reposted for sharing with other members after the new owner has finished buying it. They are free to either retain it or give it away, in any case. The sender covers the cost of postage for sending books [14]. Since this is more of a charity than a platform for exchanging books, the incentive to give books out might be lower, and the fact that the giver will have to pay postage is not helpful either.

Users of BookMooch can swap books with one another by using the points system. Members accumulate points by adding books to their inventory, sending books to other members, and giving feedback after receiving books. Members can thus "purchase" books from one another using their accumulated points. As a result, all books "cost" the same points. In contrast, Mooches from international Mooches cost numerous points. ReadItSwapIt operated a "direct swap" method of exchange, where a single book belonging to one member was exchanged for a single book belonging to another member. It contrasts with other book swap sites, which offer a credit-based exchange system [15]. However, this system does not necessarily contribute to making the system encourage an equivalent exchange since the user would still be able to give out a very cheap book and use the retrieved points to get high-cost books. The users also cannot retrieve the books they have sent to others.

G. Pop-Ups and LittleFreeLibrary

The pop-up is a global trend that is spreading in many different industries. Businesses, governments, institutions, community organizations, individuals, or brands create pop-ups when they temporarily reactivate public venues for advertising, testing new ideas, or resource sharing. The discovery component is crucial for pop-ups. In the end, they aid in discovering fresh approaches to participation, interaction, and development. It entails regular people putting together a container—typically a small box on their property near their mailbox so the public can access it—and filling it with books available for takeaway by onlookers. Some companies follow the take one, leave one principle. However, the movement has evolved into a philanthropic organization that supports and encourages reading for kids, adult literacy, and the appreciation of libraries worldwide. Around the world,

more than 15,000 Little Free Libraries have registered. A nonprofit organization called Little Free Library is situated in St. Paul, Minnesota. Through a worldwide network of volunteer-run Little Free Libraries, their goal is to inspire readers, foster community, and increase everyone's access to books. To assist in storing books being relocated, they employ a box system in which boxes are put up in various locations. Anyone can retrieve these books from the storage [16].

H. Book recommendation systems using various algorithms

In order to provide efficient and practical recommendations, this work introduces the Book Recommendation System (BRS), which combines characteristics of collaborative filtering (CF), association rule mining, and content-based filtering (CBF) [7]. In order to aid the recommendation system, recommend the book depending on the buyer's interest, they have therefore devised a hybrid algorithm in which they integrate two or more algorithms. A content-based filtering system bases its selection and determination of items on linkages and correlations between the content of items in the dataset. In this instance, papers describe the book's content and the user's history of book purchases. In order to suggest other books with similar content, it draws on several traits from the book. However, the quality of the book's content cannot be determined using a content-based screening approach. Collaborative filtering can be used to solve this issue. This method creates a model for book recommendations based on several factors, including the ratings provided by other users for a particular book and previous interactions between the user and the system, which includes books the user has read previously [18]. People need help finding the correct information, which takes more time. The association rule is used in this study to create a user profile-based recommendation system for library books. The result shows that the new association rule algorithm is suitable to apply for recommender books in the library. The criteria are categorized by examining the features in light of the user feedback gathered. Then, according to their usage and relevance, weights are assigned to the categorized features, their weights determine a rank, and the top 10 books are listed. This method will be helpful to millions of users who are looking for specific books [17].

The Personal Logic recommender system offers a dialogue that successfully guides the user through a hierarchy of product features. Others have altered quantitative decision support systems to achieve this objective. The case-based reasoning (CBR) research serves as the foundation for the class of systems that this study focuses on. For example, the restaurant recommender Entry looks for eateries in unfamiliar cities that resemble eateries the user is acquainted with and enjoys recommending [20]. By indicating their preferences for a particular restaurant, users can use the system to navigate and reduce the number of results returned in their search. It does not have a ramp-up problem because its suggestions are independent of a base of user ratings. Gathering information about a single user is optional because the user's preferences do not influence its assessments. Knowledge-based recommender systems are valuable in and of themselves and considerably improved over other types of recommender systems because of these features [21].

I. Likability prediction in the book exchange

Predicting a book's likeability has various applications. The publishing industry, authors, and readers can use all gained from automated book likeability prediction algorithms. These systems must intelligently assimilate data from various parts of a book in order to make trustworthy choices. They suggest a unique multimodal neural architecture that uses genre supervision to give specific feature types weights. Their suggested approach can dynamically adjust the weights assigned to feature types following the properties of each book. For this task, their design performs competitively and even better than state-of-the-art [25].

Communities can trade things without picking them out by hand using an online exchange system, saving users time and effort. However, the services provided by online book exchange systems can still be improved by reducing the stress placed on their users. For example, EasyEx is a recommendation-based book exchange system that locates potential trades for a user solely based on a list of items the user is willing to part with, to do this. Since it does not need users to create and maintain wish lists, EasyEx is a novel and unique book exchange system. Additionally, EasyEx leverages OptaPlanner as a part of the recommendation-based exchange process to create exchange cycles, which successfully address constraint satisfaction problems. Experimental results show that EasyEx supports the item-exchange mechanism with a novel design and offers books to users based on their interests [24].

J. Social cataloging book websites ensure the healthy practice of book reading.

Users can engage with other readers and share books on Goodreads, an Amazon-run social networking site dedicated to literature. Most of the features on Goodreads are frequently used by super users and librarians. Since there are no clear correlations between book-based and social usage statistics, users decide how much time they want to spend reading and social activities. They only sometimes choose one over the other (e.g., numbers of friends, followers, books, reviews, and ratings). As a result, Goodreads is a genuine hybrid social navigation platform that is neither primarily a website focused on books nor a social networking platform [22]. The number of time users has spent reading is tangibly reflected in Bookly, an interactive artifact that uses abstract volumetric alterations. Bookly gives a dedicated section for the book that is currently being read and keeps account of the actions users perform while reading (such as picking up and putting down books). Users could better understand their unpredictable reading habits when regularly exposed to volumetric changes representing the overall amount of time spent engaged in reading activities [23]. Libib is a home library management tool that may be used to arrange media, including books, movies, video games, and music. It comes in a free basic edition and a paid version. Users can also export the existing Goodreads library to a CSV file, which can then be uploaded to Libib if they already have a sizable library of books on Goodreads but want to arrange them better [26].

We can find countless numbers of book-related photographs posted by individuals worldwide using the

hashtag #bookstagram. It is an online community of book lovers who enjoy sharing images of the books they are reading, their bookshelves, the libraries and bookshops they are visiting, and other things. Given its evident and broad appeal, #Bookstagram has changed how books—especially fictional works—are advertised, read, and evaluated. Of course, publishers still send tones of books to traditional media outlets for reviews [27]. However, they also work with book lovers on various online platforms to promote books in exciting ways.

K. A study on customer-to-customer delivery service

Compared to older delivery services, delivery today bears little relation. The industry had advanced into the digital era of technology by using networks to assure safer and faster delivery since many years ago when parcel post service first started. The market size is growing as more individuals, particularly older generations, start using online ordering and delivery services [28]. Done began as a WhatsApp group before evolving into an app-based, hyperlocal service. With the help of this app, we can place orders and have products picked up and delivered from any restaurant or store, as well as from other users, and it will connect us with the nearest delivery partner.

III. DEMERITS OF THE EXISTING SYSTEM

This section will discuss some gaps within the state-of-the-art and possible future work within the field. Based on the above applications discussed, some of the common deficiencies are,

- Lack of equivalent exchanges in terms of their monetary value.
- There is no guarantee that the owner will get their book back.
- Most potential transactions are filtered out by some criteria that meet the needs of both buyers and sellers.

Even though some applications satisfy significant constraints for an efficient collaborative management system, there are some exclusive problems for those individual applications, such as the absence of rules governing the exchange. Furthermore, due to the lack of delivery methods, user criteria, the possession trade-off, and the participation of mailing fees, the process becomes less dependable and more complex.

III. PROPOSED SOLUTION

The idea we propose is an application that uses a virtual shelf in the backend [29]. As users add their books to the bookshelf, they can retrieve other books from the shelf, provided some constraints are satisfied. This way, the books can be reused again without any cost overhead for the end-user while they can also get their books back using an event queue. It enhances the allocation of the books on a much denser scale than it currently is, and the model of approach can be used to attract more readers to the club. The advantage of the current system is that it provides a way to transact books while also ensuring that the book owner can get their book back when required [30]. We can use two fields, "in-Val" and "out-Val," which are the sum of the prices of all the

books the user has added to the virtual shelf. The sum of the prices of all books the user has retrieved from the virtual shelf enables the readers to have an equivalent transaction.

A. Requesting for a book exchange

Users who upload the books to the virtual shelf in the backend would accept book requests from the users who require the book. On acceptance of the requests, the receiver gets the address of the book, from where they can borrow it. If the owner chooses to reject the request, their 'inval' is reduced by a percentage, to avoid the denial of request due to the false claim of possession of book.

B. Set of constraints for a book exchange

Any user can retrieve a book only if the borrowing constraints are met. These conditions ensure an equivalent exchange of books and dismiss false claims and retrievals. Lost in transaction problems can be regulated by reducing the inval of the borrower and adding it to the inval of the lender. If the inval contributed by the book is reduced to 0 due to the rejection of the request multiple times, the book is invalidated from the shelf and the same user would not be able to upload the same book into the shelf unless it is verified and approved by another geographically nearby user. The same scenario takes place if the book has not undergone any transaction in the past 4 months but if the book is verified and approved by a nearby user, it will not be invalidated again. This is done to validate the authenticity of the claim of having the book, thus providing a fair and equivalent trade of books.

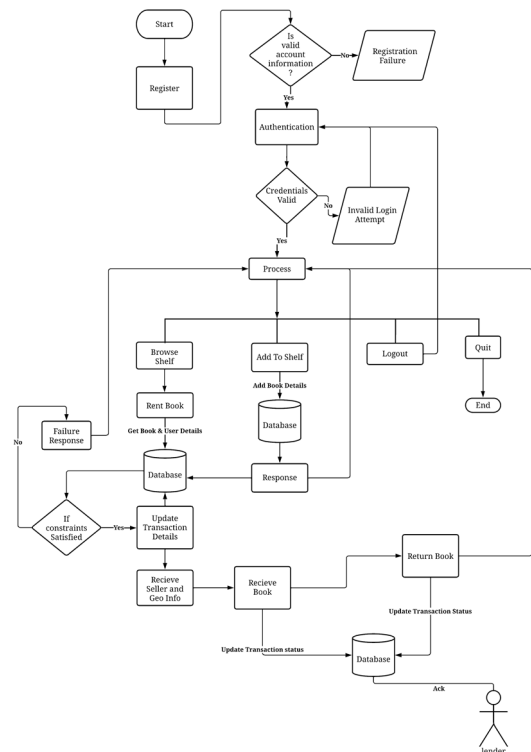


Fig. 3. User Flow Diagram

C. Transaction feedback

After every transaction, quality of the book is validated, once it has been received back by the owner of the book. So, per each transaction, the owner of the book and the borrower review the transaction, which would be influenced by the condition of the book after being used by the reader. This is done to ensure the safety of the book during the process of exchange.

D. Recommendation systems

Item-Item Collaborative filtering can be performed with the constructed user-rating matrix. The vectorized version of a particular item can be compared with the vectorized versions of other similar items using a similarity metric such as cosine similarity or Pearson's Correlation.

IV. CONCLUSIONS

This paper aims to present the notion of book exchange systems adequately. The evolution of applications to ease the processes involved in book management, exchange, and swapping, is discussed along with the criteria and rules that give the application an upper hand. We also discussed the complications and risks involved in the comprehensive systems and the measures that can be taken to mitigate them. Finally, we outlined the suggested system and discussed its characteristics, thus further evolving the series of applications by taking the user experience to the next level. The usage of this framework can be diversified into different domains of products which could be shared, complementing the circular economy.

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