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Web based library system for digital age

Suyash Dabhane
suyashdabhane@gmail.com
Pune District Education Association's College of Engineering, Pune, Maharashtra

Devendra Rawool
rawool.devendra138@gmail.com
Pune District Education Association's College of Engineering, Pune, Maharashtra

Rekha Dhaigude
rekhadhaigude777@gmail.com
Pune District Education Association's College of Engineering, Pune, Maharashtra

Shamali Malvadkar
m.shamli110@gmail.com
Pune District Education Association's College of Engineering, Pune, Maharashtra

ABSTRACT

The traditional Library System consists of large amount of data related to a number of books, the author of the book, type of book, and many more. The managing of such data in entry book is difficult and time-consuming. The technology has developed nowadays so that we can implement that technology in Library Management. The use of Data Mining in Library Management System allows identifying different users and books too. It will also provide much more facilities and services to users. Despite from saving time, it will also enhance the use of Library in a reliable way. The obtained benefits can improve and increase the access to information, enabling a significant advance in education. Some data mining techniques encompassed in this research include segmentation techniques to define the behavior of the users in Libraries, in addition to the use of recommendation techniques for more efficient interaction with users. The Digital Library is future of Library system, which provides multiple benefits and reduces the Human work.

Keywords: *Library, Books, Classification of books, QR code, GPS.*

1. INTRODUCTION

Then the name of the project itself says that it is a Web-Based Library System software use for Library Management for monitoring and controlling the transaction in a library. The software mainly focuses on the converting traditional system into the digital way. It performs the operation like adding new books, update the library, searching books and return book etc. The digital content may be stored in the system and accessed remotely via an android application which makes easy for the user to access Library easily efficiently.

This project of "WEB BASED LIBRARY SYSTEM" of gives us the complete information about the library. Admin can update the record, he can also add new books also he can have details of book retrieve, the client will get information about available books in Library. Admin can issue the books to the students and maintain their records and can also check how many books are issued and stock available in the library. In this project, we can maintain the late fine of students who return the issued books after the due date.

A student can search required book in the application from the database. The system will send book location in the form of section, rack, row number. The proposed system is more secure than the traditional system it provides security for data. When user login in the System he will get the address of Library by use of GPS it will tell the user the shortest path. Every new user has an option for sign-in in the system. After successfully registration user can access all services of propose system by login into the system. Every user has to register in order to use services of Library. Without login user cannot access any service of the library.

There is two option in Library. The user either can reserve his book using Physical Library or he can download the PDF format books using Digital Library. Throughout the project, the focus has been on presenting information and comments in an easy and intelligible manner. The project is very useful for those who want to know about Library Management System

2. PROBLEM STATEMENT

All libraries, large or small and regardless of type, perform the same functions of purchasing, cataloging, and loaning materials. Libraries are very record-intensive; that is, they must maintain acquisition records and bibliographic data of many specific materials. They also must record multiple transactions to keep track of each patron's and material's circulation status. The purpose of the Library Management system is to allow for storing details of a large number of books, magazines, Journals, thesis and allow for add, search, borrow, return facilities separately to administrator/Librarian, staff and students. Different privileges are given to different types of users. Since the system is a manual operation like searching book, issue book, returning the book, is time-consuming. The procedure of modification and deletion with the new transaction requires more man power. This causes a delay in the process.

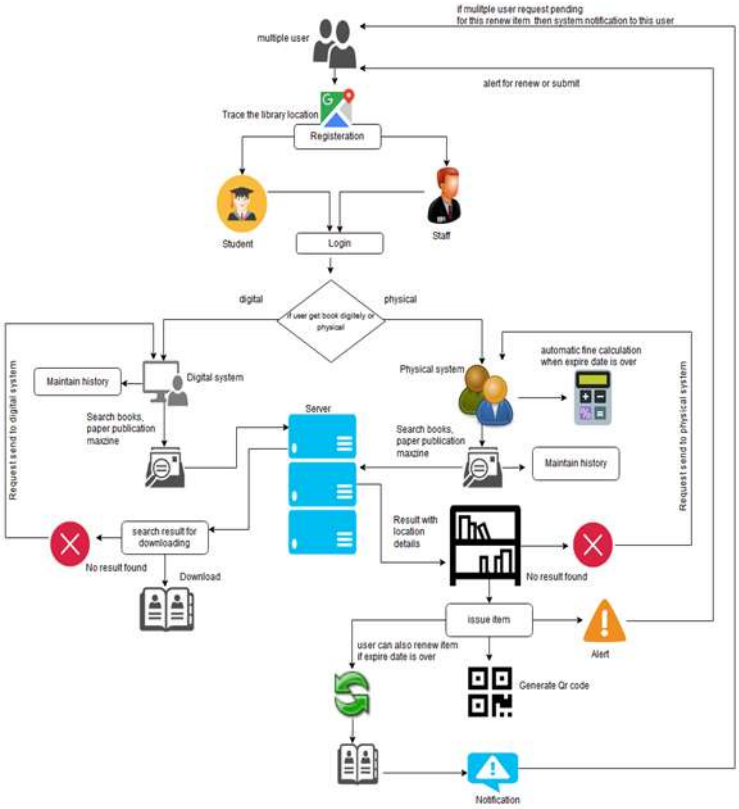
3. EXISTING SYSTEM

Nowadays, most of the manually working traditional systems are being replaced by the automatic digital systems. But still, most of the library systems are being operated manually and traditionally. So, the existing systems are not that much of efficient as they should be. These existing traditional systems still require a lot of energy to maintain the quality of the system and yet they still somehow fails to maintain a large amount of data and records as expected. Today's technology can make these systems more efficient and less time consuming bringing it to the optimization. By bringing the computer technology in this field can make these systems very optimized and efficient and can help to reduce the complexities in managing the data and records in the existing systems.

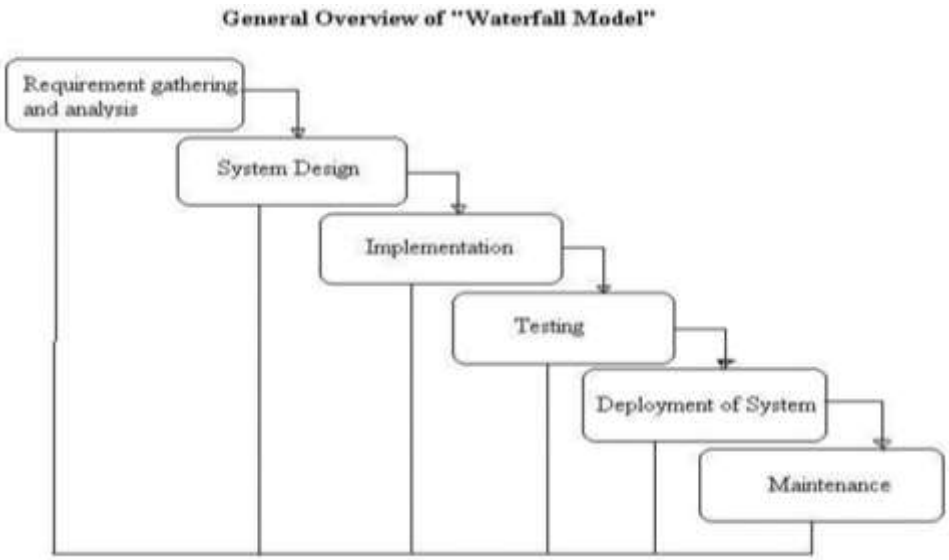
4. PROPOSED SYSTEM

To overcome the limitations and the disadvantages of the traditional existing library systems, we propose a client-server architecture based digital system, in which most of the operations, tasks and data changes can be automatically updated in the system so that the librarian would not have to take too much efforts to maintain all the records and data safely. So to implement this system, we propose an architecture of the system to be implemented. The architecture has been divided into two modules as Digital and Physical as shown in the figure below.

I. Architecture



II. Methodology



1) Requirement gathering and analysis:

In this step of the waterfall, we identify what are various requirements is a need for our project such are software and hardware required, database, and interfaces.

2) System Design:

In this system design phase, we design the system which is easily understood by the end user i.e. user-friendly.

We design some UML diagrams and data flow diagram to understand the system flow and system module and sequence of execution.

3) Implementation:

In implementation phase of our project, we have implemented various module required of successfully getting expected outcome at the different module levels. With inputs from system design, the system is first developed in small programs called units, which are integrated into the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

4) Testing:

The different test cases are performed to test whether the project module is giving an expected outcome in assumed time.

All the units developed in the implementation phase are integrated into a system after testing of each unit. Post-integration the entire system is tested for any faults and failures.

5) Deployment of System:

Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

6) Maintenance:

There are some issues which come up in the client environment. To fix those issues patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

All these phases are cascaded to each other in which progress is seen as flowing steadily downwards like a waterfall through the phases. The next phase is started only after the defined set of goals are achieved for the previous phase and it is signed off, so the name "Waterfall Model". In this model, phases do not overlap.

5. ALGORITHMS

We have used the following algorithms to implement the proposed system.

1) K-means:

The process to achieve the result sets of classified data is quite simple. It basically consists on several iterations of a specific process, designed to get a optimal minimum solution for all data points. Let's look this process in detail. First, we need to establish a function of what we want to minimize, in our case the distance between every data point and the correspondent centroid. So, what we want is:

$$J = \sum_{i=1}^{k} \sum_{j=1}^{n} \|x_j - c_i\|^2$$

With this function well defined, we can split the process in several steps, in order to achieve the wanted result. Our starting point is a large set of data entries and a k defining the number of centers. 1 – The first step is to choose randomly k of our points as partition centers. 2 – Next, we compute the distance between every data point on the set and those centers and store that information. 3 – Supported by the last step calculations, we assign each point to the nearest cluster center. This is, we get the minimum distance calculated for each point, and we add that point to the specific partition set. 4 – Update de cluster center positions by using the following formula:

$$c_i = \frac{1}{|k_i|} \sum_{x_{j \in k}}^{k} x_j$$

If the cluster centers change, repeat the process from 2. Otherwise you have successfully computed the k means clustering algorithm and got the partition's members and centroids. The achieved result is the minimum configuration for the selected start points. It is possible that this

Output isn't the optimal minimum of the selected set of data, but instead a local minimum of the function. To mitigate this problem, we can run process more than one time in order to get the optimal solution. It is important for you to know that there are some variations of the initial center choice method. Depending on the problem you want to solve, some initial processes might benefit your implementations.

2. K-nearest neighbors KNN algorithm:

Here is step by step on how to compute K-nearest neighbors KNN algorithm:

1) Determine parameter K = number of nearest neighbors

2) Calculate the distance between the query-instance and all the training samples

3) Sort the distance and determine nearest neighbors based on the K-th minimum distance

4) Gather the category Y of the nearest neighbors

5) Use the simple majority of the category of nearest neighbors as the prediction value of the query instance. Time complexity and optimality of KNN

6) KNN with pre-processing of the training set

Training $\Theta(|\mathbb{D}|L_{ave})$

Testing $\Theta(L_a + |\mathbb{D}|M_{ave}M_a) = \Theta(|\mathbb{D}|M_{ave}M_a)$ KNN without pre-processing of the training set

Training $\Theta(1)$

Testing $\Theta(L_a + |\mathbb{D}|L_{ave}M_a) = \Theta(|\mathbb{D}|L_{ave}M_a)$

Training and test times for KNN classification. M_{ave} is the average size of the vocabulary of documents in the collection.

Training and test times for KNN classification is the average size of the vocabulary of documents in the collection.

6. CONCLUSION

We analyzed the solutions currently available for the implementation of library management system. The discussed technologies are close to being standardized, and industry players are already active in the production of devices that take advantage of these technologies to enable the applications of interest. This application can be used by any Library to automate the process of manually maintaining the records related to the subject of maintaining the stock and Book Issues. It's totally dynamic system [9]

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