



[An Autonomous Institute affiliated to Savitribai Phule Pune University]

Personalization of Information based on user interaction

Final Year B.Tech Major Project Report

*Submitted in partial fulfillment of the
requirements for the award of the degree*

of

BACHELOR OF TECHNOLOGY

in

COMPUTER ENGINEERING

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MAY 2021



**Academy of
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CERTIFICATE

This is hereby certified that the work which is being presented in the B.Tech. Major Project Report entitled “Personalization of Information based on user interaction”, in partial fulfillment of the requirements for the award of the **Bachelor of Technology in Computer Engineering** and submitted to the **School of Computer Engineering & Technology of MIT Academy of Engineering, Alandi(D), Pune** is an authentic record of work carried out during an Academic Year 2020-2021, under the supervision of Mrs. Mayura Kulkarni, **School of Computer Engineering & Technology.**

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Abstract

Web site personalization is defined as the process of customizing the web-content and structure of a Web site to the specific and individual needs of each user taking advantage of the user's navigational behavior. The main goal of personalization is delivering the content and thus matching the functionality or interests that user needs, with no effort from the targeted users. Personalization may emphasize user's particular information, grant or restrict access to certain tools, or simplify transactions and processes by remembering information about a user.

On a traveling web-site, a user may see advertisements, promotions and specials for locations they have visited before or recently searched for. On an internet, personalization could remove access to a tool intended only for certain employees. In an application, personalization might study user past searches so as to enable quick access of information that might be of interest for future to the users. In none of these instances do users need to take any action to make these changes: the system makes the call based on the identity of the user. The purpose of this project is to provide personalized experience to the user while searching data. Users, when searched data will inform about its relevance as a feedback and according a customized search, will be provided to the users. In our project we are going to implement a personalization system in which user will browse the content according to their requirement then from the searched information they will provide feedback for the relevance of that where the data will be processed through various stages as editorial planning, content reusing, navigation and content hierarchy.

Acknowledgment

We would like to express our deep and sincere gratitude to our research supervisor, Mrs. Mayura Kulkarni for giving us the opportunity to do research and providing invaluable guidance throughout this research. Her dynamism, vision, sincerity and motivation have deeply inspired us. She has taught us the methodology to carry out the research and to present the research works as clearly as possible. It was a great privilege and honor to work and study under her guidance. We are extremely grateful for what she has offered us.

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Chapter 1

Introduction

1.1 Introduction

In the modern era users demand personalized experiences. They required information that is relevant, individualized and provide them with an accurate recommendation for the new content and new products based on their previous activities. People usually spent hours for searching relevant product over the internet. Any application or website that would fail to deliver on these demands will quickly see its users collecting at the digital door.

The purpose of this project is to provide personalized experience to the user while searching data. Users, when searched data will inform about its relevance as a feedback and according a customized search, will be provided to the users. In our project we are going to implement a personalization system in which user will browse the content according to their requirement then from the searched information they will provide feedback for the relevance of that where the data will be processed through various stages as editorial planning, content reusing, navigation and content hierarchy.

1.2 Purpose

The purpose of this project is to provide personalized experience to the user while searching data. Users when searched data will inform about its relevance as a feedback and according a customized search will be provided to the users.

1.3 Problem-Statement

To find useful and relevant information based on the keyword typed and the user's interest which is found out using different methods of personalization of information and algorithms.

1.4 Scope

In our project we are going to implement a personalization system in which user will browse the content according to their requirement then from the searched information they will provide feedback for the relevance of that where the data will be processed through various stages as editorial planning, content reusing ,navigation and content hierarchy, Users flow and calls to action, content structure Taxonomy and Metadata ,Content development and production .This will result in the customized data to the user.

1.5 Objectives

The main objective of this project is to provide personalized experience to the user while searching data. Users when searched data will inform about its relevance as a feedback and according a customized search will be provided to the users.Also we will try to find useful and relevant information based on the keyword typed and the user's interest which is found out using different methods of personalization of information and algorithms. We'll try to save a whole bunch of time working over the internet and provide more Relevant data Recommendations.It focuses on consistency among

the website users and every user gets a personalized experience of the website but at the same time we cannot get it right every time that's what's going on in the mind of the user. It comes with great customer service and satisfaction although it comes at its own cost for the users.

Chapter 2

Literature Review

1.

A paper was published by M. Rami Ghorab, Dong Zhou, Alexander O'Connor, Vincent Wade Published online on 13 May 2012 at the Springer Science Business which focused on Personalized Information Retrieval survey and its classification. It had a mechanism to learn about their users' search interests by either explicitly supplying this information implicitly gathering this information in an unobtrusive manner from the users' search history.

In order to provide a personalized service, their system maintained information and data about the users and the history of their interactions among user and system. This paper had a three-step approach including the information gathering which included how and which information to be gathered from the user and his usage behavior. The next step included representation of the gathered information either through vector-based models or Semantic network-based Models where user's interests are maintained in a network structure of terms and its related terms. User models here are represented using a semantic network structure. In this case the model is made up of nodes and associated nodes that capture terms and their semantically-related or co-occurring terms respectively. The next step would be implementation of the query adaption by the use of various algorithmic approaches like global analysis, Explicit relevance feedback, interactive query expansion.

2.

Another paper written by Magdalini Erinaki in the year 2003 focused on Web mining for Web personalization. This paper includes personalization techniques such as Content based filtering-recommendation based on individual past ratings and preferences and the Rule based filtering- based on some predefined set of rules. The overall process of web usage-based Web personalization basically has five different modules, which correspond to each step of the process. These are as follows.

- a. User profiling
- b. Log analysis and Web usage mining
- c. Content management
- d. Web site publishing
- e. Information acquisition and searching

It merely records the addresses of pages requested by its user thus highlighting interesting hyperlinks without involving the user .The main advantage that they achieved was that the search is user specific and the process is quite easier but Both rule based and content based techniques do not provide large scope and hence limiting benefits.A study was done on another paper published in IEEE in the year 2008 which enlightened Profiling. They worked with Implicit data gathering and personalization focusing on Memory based technique which involves saving past rating for each user for different items and maintaining pairwise similarity between users and also the Model based technique was used where Models are built on past searches and prediction models are generated based on behavioral data collection and Real time recommendation score generation. But the major problem that they found here was that Data Sparsity and inefficient user group categorization can lead to unreliable results.

3.

A further study was done on a paper published in IEEE 2011 written by Mandeep Pannu which focused on Explicit user profiles in web Personalization. This

paper includes personalization techniques such as Vector based modeling which involves creating preferences vectors for the users and comparing them with the same vector model created for web data and then comparing them. Also, they used the Probability modeling which worked for estimating the probability of relevance to the ranking document for a query.

The main advantage of this paper was that this Allows ranking documents according to their possible relevance but Long documents are poorly represented because they have poor similarity values. This implemented system allows users to create, remove, save and update user profiles based on their recursively changing information requirements and user preferences thus providing a personalized experience. Preliminary experimental results indicate that the system produces more user-interest based results based on explicit user profiles when compared to traditional search methods which provided the same data for a similar search to every user.

4.

A similar study was done and it's proposed framework composed of two modules: an off-line module which pre-processes data to build user and content profiles and predict a recommendation list to provide more relevant data to users. They applied data mining techniques to build user profiles, where the prediction of the user model is accomplished not using explicit user interaction, but rather implicit information collected from all past usage sessions which is also known as usage behavior. The input data for this first step consists mainly of Web server access log files. In order to extract useful information from log files and build user profiles, they applied Web Usage-Mining techniques. They studied the application of data mining techniques to discover usage sample from data collected, in order to understand and better serve the needs of its user.

5.

MICHAEL J. COLE et.al tells the quest for knowledge rooted in complex consumer

behaviors resulting from highly conditionalized decisions. They have mainly focused on development of a user-centered representation of information search interaction based on the activity patterns of the user during search. Presentation of a technique to investigate interactions between aspects of user knowledge states that are not (easily) observed and page discovery and using deliberate user behaviors typically used to describe search behavior. Results show that task types and task intensity can be differentiated by user activity pattern properties, in particular by pattern complexity and activity status distribution. They have performed various kind of analysis activities for personalization such as eye moment analysis , page sequence analysis ,low level information acquisition activity , clustered page types, complexity of sequences and Markov State Models and Graph Properties

Chapter 3

Theory And Relevance

3.1 Web Scraping:

Web scraping is the process of collection of structured web data in an structured fashion. It's also called web data extraction. There are many use cases of web scraping which include price intelligence, monitoring new, price monitoring, generation of lead and market research among many others. Web scraping a web page involves extracting data and results from it that are relevant. Therefore, web crawling is one of the main component of web scraping, so as to extract pages for later processing. Once fetched, then extraction can take place. These contents of pages may be searched, parsed, reformatted, its data copied into a spreadsheet etc. Web scrapers typically extracts relevant data out of a page, to make use of it for another purpose by studying data. This is an automatic version of gathering well-structured data from web pages. In other terms it is said to be web-data extraction. Web scraping a web page implies fetching it, and extracting data from it. Fetching is actually the downloading of a page. Hence, web crawling is a major component of web scraping, to fetch pages for further processing. Once after fetching the data, then data extraction can take place . Web Crawling actually consists of a crawler that automatically searches and explores content on the web. Crawlers are fundamentally programmed for repetitive steps and actions such that web browsing and searching gets automated. Some websites contain a massive amount of invaluable data. It's a very tedious job to manually

extract this huge amount of data. Web Scraping extracts this huge amount of data and then exports it to a format that is more convenient for the user (For Eg. Excel, pdf etc).

3.2 Web Usage mining :

Web usage mining is the application of data mining techniques to discover interesting usage pattern from the Web data in order to study and better satisfy the needs of Web-based applications. Usage data captures the identity or origin of Web users along with their browsing behavior at a Web site. Web usage mining is a subcategory of data mining which is used for recognizing usage patterns and trends from web data. This is a combination of different applied techniques, to unravel informative usage trends from data taken over the internet. Web usage mining understands the requirements and needs of web based applications and It is then analyzed, understood and is then fed to web based applications. This type of data captures the identity or emergence of Web users along with their behavior of how they browse and browsing history, at browser level as well as website level

Web usage mining can be classified depending on the kind of data-usage considered:

- a. Web server data: The user information are collected by the Web server. The typical user data includes IP address of site, page data etc.
- b. Application server data: Many Commercial application servers have significant functionality so as to enable applications to be built on top of them with minimal effort. A key feature of this is the ability to understand various kinds of business events and thus log them in application server data.
- c. Application level data: Many new kinds of events and actions can be defined in an application, and thus logging can be turned manually on for them thus generating past searches of these specially defined actions. Many back-end application requires a combo of one or more of these techniques applied.

3.3 Web personalization :

Web Personalisation or Personalisation of information is a web mining technique which helps the customers to find relevant information to the searches they make on the internet. The main focus of this project is on providing the users the provision of bettering their web searches and personalizing according to their experience and also help them in personalizing the information with some external help such as recommendation system, search feedback, pages indexing etc.

After studying and analyzing many paper and articles on web, we found that the main problem in the system is :

- a. Optimized Landing Pages
 - b. More Relevant Content Recommendations
 - c. Increase in User Engagement on the Website.
 - d. Unsatisfactory Search Results
 - e. Inefficient methods of getting useful information
 - f. Reduce the time required for finding useful results
-

Chapter 4

Systems Analysis and Design

1. Specific Requirements

- a. Need searches based on his interests
- b. user needs to save a lot of time from this system

2. External Interface Requirements

- a. Allow user to search for his query
- b. Selection of the type of algorithm to be used.
- c. Show a list of results or fetched URLs based on his interest
- d. Redirection to the clicked URLe from this system

3. Functional Requirements

This project supports all types of browsers. We are using simple questionnaires to understand the user experience over a particular website. The major software requirements from the deployer side are –

- 1) Python IDE
- 2) Web Browser (Chrome, Edge etc)
- 3) Legal Website to scrape data
- 4) Web Scraping Tool (Parsehub)

4. Performance Requirement

This provides a highly Personalised result to its users due to use of page rank algorithm and Pseudo Relevance Feedback. If there is extensive damage to a wide portion of the database due to catastrophic failure the recovery method restores a past copy of the database that was backed up to archival storage and reconstructs a more current state by reapplying or redoing the operations of committed transactions from the backed up log, up to the time of failure.

4.1 System Designing/Modeling

Module 1 - Collection of data (by web scraping) - Web Scraping (also termed Screen Scraping, Web Data Extraction, Web Harvesting etc.) is a technique employed to extract large amounts of data from websites

1. We can gather information depending on three approaches:
 - a. Information gathering approach(whether implicit/explicit)
 - b. Type of information(users and their usage behavior when interacting with the system)
 - b. Source of information(gathered at the server-side or at the client-side)
2. In the implicit method, information is gathered unobtrusively, without any effort from the user.
3. In the explicit method, the users themselves have to explicitly supply information to the system, whether positive or negative.

Module 2 -Analysing and pre-processing the data -

1. Finding the missing values.
2. Finding out inconsistent data.
3. Dealing with Duplicate values.
4. Data Transformation
5. Data Reduction

Module 3 - Personalization in PIR systems is generally performed by adapting the query and/or the results. Query adaptation: Query adaptation attempts to expand the terms of the user's query with other terms, with the aim of retrieving more rel-

evant results.

1. processing the user model
2. processing aggregate usage information
3. pseudo-relevance feedback
4. global analysis
5. Explicit relevance feedback
6. interactive query expansion

Module 4 - Applying the suitable and most appropriate algorithm so that we could get more relevant and personalized results.

4.2 System Architecture

The major functions that product must perform are:

1. Scraping of data

Scraping is the process of collecting structured web data in an automated fashion. It's also called web data extraction. Some of the main use cases of web scraping include price monitoring, price intelligence, news monitoring, lead generation and market research among many others

2. Analyzing and preprocessing the data

Data analyzing is a process of inspecting, cleansing, transforming and modeling data with the goal of discovering useful information, informing conclusions and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, and is used in different business, science, and social science domains. In today's business world, data analysis plays a role in making decisions more scientific and helping businesses operate more effectively.

3. Classification to show specific results to the users

The searched product will be categorised and classified according to the users need and accordingly results will be displayed

4. Applying Algorithm

Suitable algorithm will be used in order to enhance the system performance.

5. Speech Recognition

We are adding voice assistance to it, in order to make it more user friendly .As we know Python is a suitable language for script writers and developers.The query for the assistant can be manipulated as per the user's need.

4.2.1 System Architecture

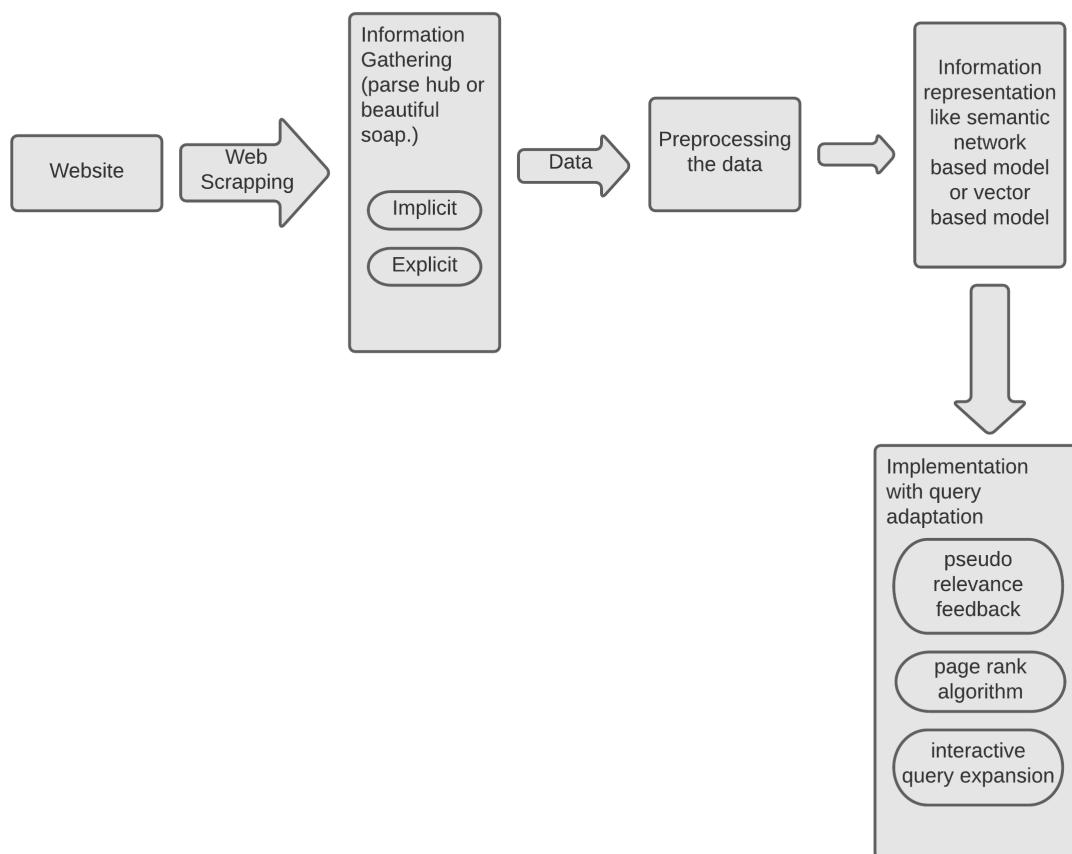


Figure 4.1: System Design



Figure 4.2: State Diagram

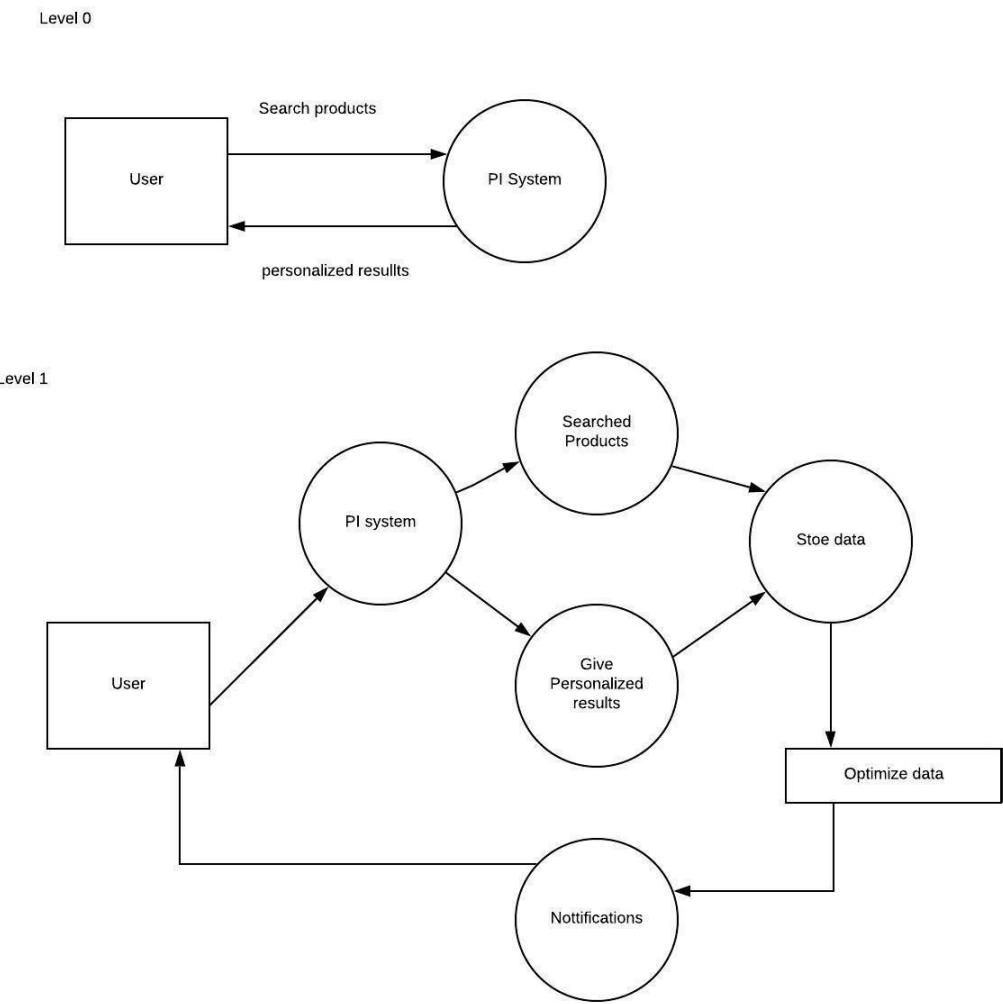


Figure 4.3: DFD Diagram

personalized user interface System Use Case Diagram

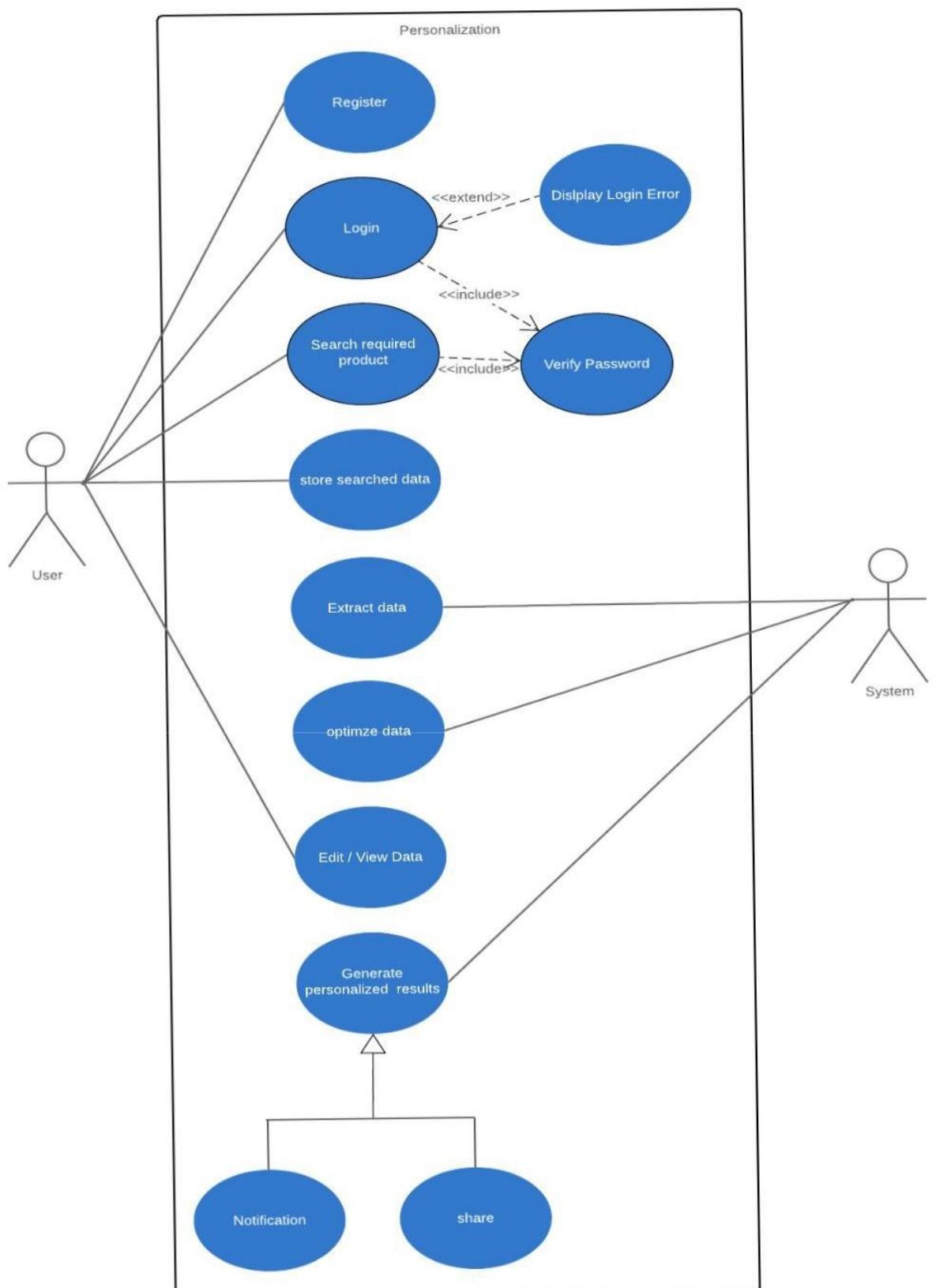


Figure 4.4: Use Case Diagram

Chapter 5

Methodology/ Approach/ Techniques

5.1 Architecture of Systems

The staggering measure of information on the Internet is a rich asset for any field of examination or individual premium. To successfully reap that information, you'll need to turn into gifted at web scratching

The scraping is done as follows:

1. Use demands and Beautiful Soup for scratching and parsing information from the Web
2. Stroll through a web scratching pipeline beginning to end
3. Assemble a content that brings an item detail including its value, rating, surveys, URL and the item portrayal from the Web and shows important data in the comfort. Likewise, we have utilized the mechanization office given by selenium which is a free (open-source) robotized testing system used to approve web applications across various programs and stages After viably collecting that information for example after web scratching we are adding a voice help to it, to make it more easy to understand. As we probably are aware Python is a reasonable language for script scholars and developers. The question for the collaborator can be controlled according to the

clients need. Discourse acknowledgment is the way toward changing over sound into text. This is usually utilized in voice aides like Alexa, Siri, and so on Python gives an API called Speech Recognition to permit us to change over sound into text for additional preparing.

5.2 Algorithm Used

1. Pseudo -Relevance Feedback:

Pseudo relevance feedback , also known as blind relevance feedback , provides a method for automatic local analysis. It automates the manual part of relevance feedback, so that the user gets improved retrieval performance without an extended interaction. The method is to do normal retrieval to find an initial set of most relevant documents, to then assume that the top ranked documents are relevant, and finally to do relevance feedback as before under this assumption.. The idea behind relevance feedback is to take the results that are initially returned from a given query, to gather user feedback, and to use information about whether or not those results are relevant to perform a new query. We can usefully distinguish between three types of feedback: explicit feedback, implicit feedback, and blind or "pseudo" feedback.

2. Page Rank Algorithm:

PageRank (PR) is an algorithm used by Google Search to rank websites in their search engine results. PageRank is a way of measuring the importance of website pages. PageRank works by counting the number and quality of links to a page to determine a rough estimate of how important the website is. The underlying assumption is that more important websites are likely to receive more links from other websites.

5.3 Approach

- 1) Information Gathering (Using Web Scraping)
 - 2) Preprocessing of gathered data
 - 3) Query and retrieving
 - 4) User Interface
 - 5) Applying the most efficient algorithm for personalization (in our case we have used page rank and pseudo relevance feedback)
-

Chapter 6

Implementation

6.1 System Analysis

System Implementation

- 1) Information Gathering (Using Web Scraping)
- 2) Pre-processing of gathered data
- 3) Query and retrieving
- 4) User Interface
- 5) Applying the most efficient algorithm for personalization.

Expected Output

Expected output of the project would be to provide customized data to users which will attract more customers to the websites and it will save a whole bunch of time working over the internet. This project provides a More Relevant data and would certainly improve customer satisfaction. This project supports all types of browsers and simple questionnaires to understand the user experience over a particular website used in the pseudo relevance feedback.

Personalization from web mining has received lots of interest in business as a gifted tool to improve sales and retain customers, since it can increase customer's satisfaction by providing them with tailor-made products and services. Web Personalization can also help the company to implement build-to-order policy by connecting

customers requirements and preferences directly to the production line and supply chain. As a result the company can benefit from cost saving and efficient utilization of resources.

Chapter 7

Results Analysis and Performance Analysis

In our project we implemented a personalization system in which user will browse the content according to their requirement then from the searched information they will provide feedback for the relevance of that where the data will be processed through various stages as editorial planning, content reusing ,navigation and content hierarchy, Users flow and calls to action, content structure Taxonomy and Metadata ,Content development and production .This will result in the customized data to the user.

7.1 Challenges Overcomed:

1. At first it was truly hard to pick what sort of savvy part to plan. I have no involvement with this kind of use at all and contemplating improvements without having a demo to test on is simply so troublesome.
2. During the execution part, we invested a great deal of energy in finding out about Python libraries and develops that we did not have the foggiest idea yet, similar to strings, how to execute or do web scratching to get the connections out of a HTML page. Something else that I needed to gain without any preparation was the means by which to make a GUI in Python.

3. Something irritating was the way that I needed to creep 10000 pages more than once, since I found in the pages different and wrong organizations. In the end the whole rundown of organizations that I needed to boycott had a size of 18 and it included .docx,.doc,.avi,.mp4 etc.

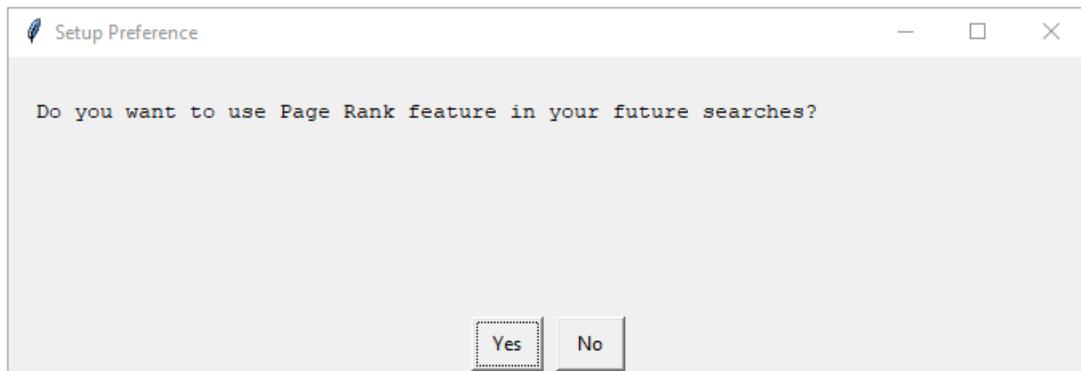


Figure 7.1: Selection for Page Rank Feature

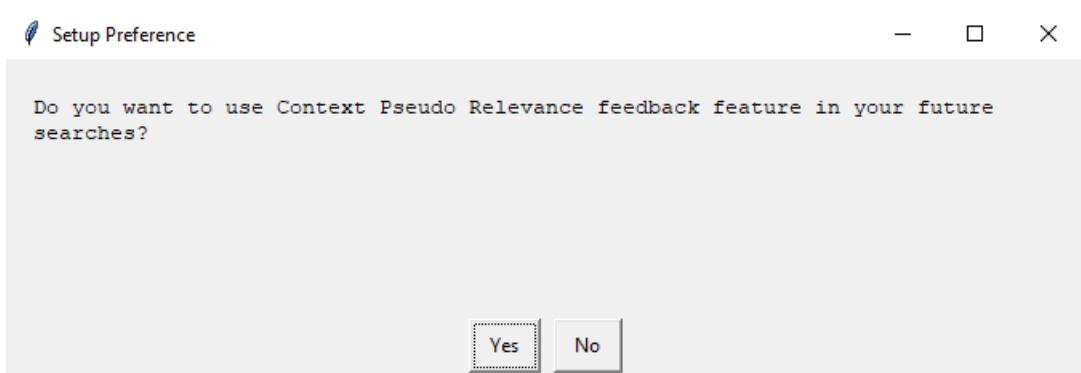


Figure 7.2: Selection for Pseudo Relevance Feedback Feature

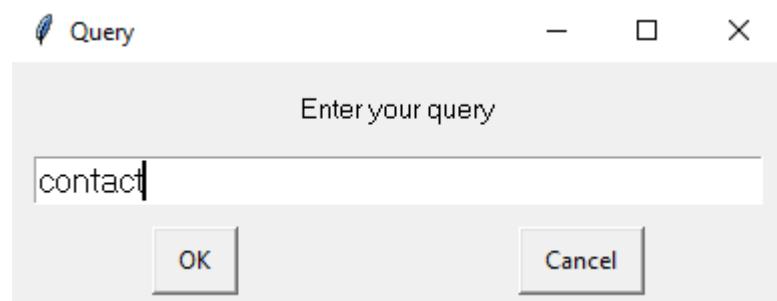


Figure 7.3: Input the User Query

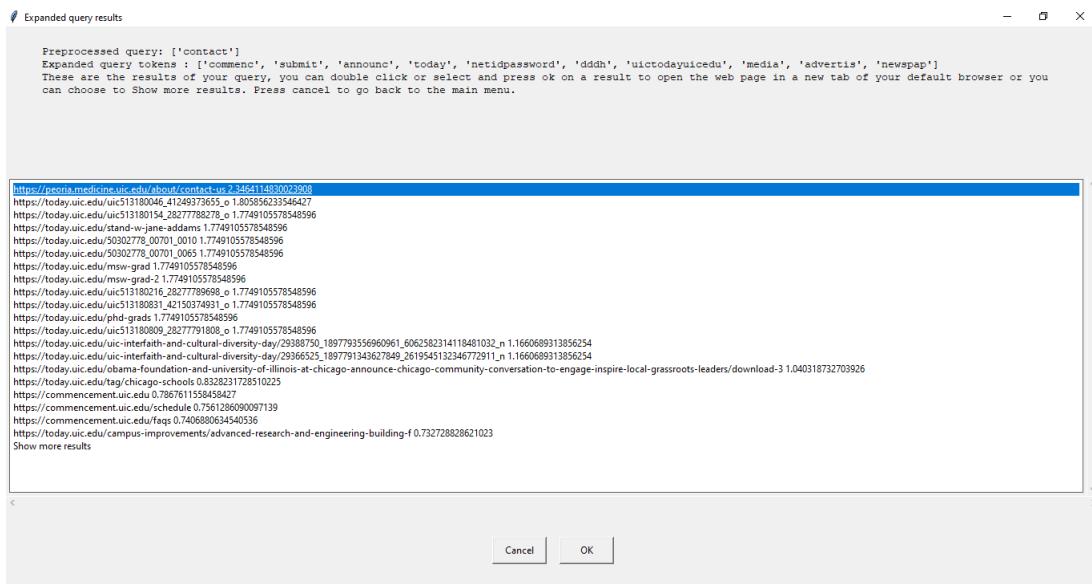


Figure 7.4: Screenshots of Project Output with generated URLs

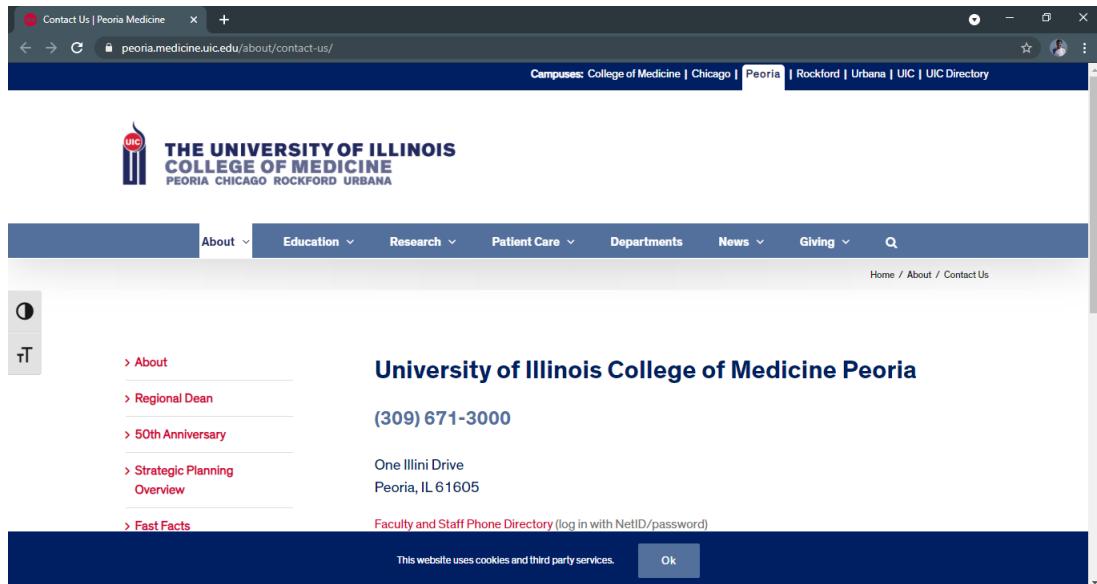


Figure 7.5: Screenshots of Project Output displaying generated URL

Chapter 8

Conclusion & Future Work

8.1 Conclusion:

In this venture we have given a far reaching audit of patterns and methods for Web personalization. Personalization from web mining has gotten heaps of interests in business as a skilled device to improve deals and hold clients, since, it can expands consumer loyaltyies by giving them customized items also, administrations. Web Personalization can likewise assist the organization with carrying out form to-arrange strategy by interfacing clients necessities and inclinations straightforwardly to creation line and production network. Therefore the organization can profit by cost saving and effective use of assets. We have effectively rejected the information from various sources and finished all the preprocessing steps of information and the following step is to apply the reasonable calculation for web personalization.

8.2 Future Scope:

Personalization from web mining has gotten bunches of interest in business as a talented apparatus to improve deals and hold clients, since it can expand clients satisfaction group by furnishing them with customized items and administrations. Web Personalization can likewise assist the organization with carrying out form to-arrange strategy by interfacing clients necessities and inclinations straightforwardly

to the creation line and supply chain. Therefore the organization can profit by cost saving and effective use of assets. We have done web personalisation on a college site which isn't greatly utilized , we can stretch out our degree to business sites like Amazon, Flipkart and so on

Chapter 9

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Appendices

Appendix A

Certificates





CERTIFICATE OF PRESENTATION

This is to certify that

Sumit Sakarkar

has successfully presented a paper titled

Web Personalisation based on user interaction Web Personalisation

in the 3rd International Conference on

Intelligent Communication Technologies and Virtual Mobile Networks (ICICV 2021)
organised by Francis Xavier Engineering College, Tirunelveli, India on 04-06, February 2021.



Session Chair



Dr. G. Rajakumar
Conference Chair



Dr. V. Velmurugan
Principal



IEEE XPLOR ISBN
978-0-7381-1183-4

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Session Chair



Dr. G. Rajakumar
Conference Chair



Dr. V. Velmurugan
Principal



IEEE XPLOR ISBN
978-0-7381-1183-4

Appendix B

Papers presented/published

Web Personalisation based on user interaction

Web Personalisation

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Abstract—The World Wide Web is routinely favored plus a global reference for collecting information. Sadly various web deployed learning systems are providing identical educational resources to different users/profiles. Many work has been done for personalizing systems. In this paper, our objective is to evaluate recommendations of active users/learners by studying her / his history plus utilizing likeness as well as differences between the user preferences together with the content of the learning resources. We have used here concepts like Web scraping, Web usage mining for Web personalization. User profiling and personalizing the web search results are used to evaluate the links which could be recommended to the active users. Web personalization provides users/learner's relevant information and also the information which is facilitated by the likeness of the users/learners. The main motto of personalization is to make a website more flexible (responsive) towards the users/learner's requirements. Web mining which is covering concepts like web content mining as well as web usage mining as well as web structure mining falls under data mining. Personalization also falls under web usage mining. Researchers

I. INTRODUCTION

In the modern era, users demand personalized experiences. They required information that is relevant, individualized, and provided them with an accurate recommendation for the new content and new products based on their previous activities. People usually spend hours searching for relevant products or information over the internet. The motive of this paper is to deliver a personalized experience to the active user while searching for data. Users, when searched data will inform about its relevance as feedback and according to a customized search, will be provided to the users To provide a personalized experience to the user while searching for data. Users, when searched data will inform about its relevance as feedback and according to a customized search, will be provided to the

B.1 Refer

<https://github.com/Tanmayrg1999/Research-paper-on-Web-Personalisation-based-on-user-interaction.git>

Appendix C

User Documentation

Website Personalization is the process of creating customized experiences for visitors to a website. Rather than providing a single, broad experience, website personalization allows companies to present visitors with unique experiences tailored to their needs and desires.

The major benefits of Personalization include –

1. Online retailers can provide targeted offers to shoppers based on browsing behaviour.
2. Travel sites can present visitors with promotions based on the current weather or season.
3. News and other media outlets can surface specific videos to viewers based on where they live.

The following things should be provided from the user side -

- 1) Location - The country, region, or city a user is located in.
- 2) Technology - A user's device-type (desktop, mobile, tablet), operating system, browser, and even screen resolution.
- 3) Traffic Sources - The specific traffic source a user is visiting from, be it direct or paid, via referral search or social.
- 4) 3rd party data - Information about a user that has been collected from outside sources and aggregated by a DMP.
- 5) Behaviour - Important user interactions such as clicks, add-to-carts, or purchase events, as well as the number of page views, URLs visited, and so on.

- 6) Explicit data - CRM data that has been collected about a user or has been provided intentionally through surveys and registration forms.
- 7) Time- The select dates, days of the week, or time of day the experience is to be served to a user.
- 8) Current Page - The type of page a user lands on, whether its a specific URL, the homepage, a product detail page (PDP), or cart page. Users can refer to our Github Repository for user documentation – <https://github.com/Tanmayrg1999/Major-Project.git>

Appendix D

Project Photographs

