Tribhuvan University

Institute of Science and Technology

A Final Year Project Report

On

Travel Feed for Kathmandu Valley

Submitted to:

Department of Computer Science and Information Technology

Ambition College

Mid-Baneshwor, Kathmandu, Nepal

In partial fulfillment of the requirements

For the Bachelor's Degree in Computer Science and Information Technology

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AMBITION COLLEGE

Mid-Baneshwor, Kathmandu

SUPERVISION RECOMMENDATION

I hereby recommend that this project prepared under my supervision by the team of Manoj Acharya, Pankaj Bhattarai, Prabash Paudel and Pramod Khatiwada entitled "Travel Feed for Kathmandu Valley" is accepted as fulfilling in partial requirements for the degree of Bachelor of Science in Computer Science and Information Technology. In my best knowledge, this is an original work in Computer Science by them.

Mr. Sandeep Aryal

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LETTER OF APPROVAL

This is to certify that this project prepared by the team of Manoj Acharya, Pankaj Bhattarai, Prabash Paudel and Pramod Khatiwada entitled "Travel Feed for Kathmandu Valley", in partial fulfillment of the requirements for the degree of Bachelors of Science in Computer Science and Information Technology has been well studied and prepared. In our opinion, it is satisfactory in the scope and quality as a project for the required degree.

Evaluation Committee

_____	_____
Mr. Janak Raj Joshi	**Mr. Sandeep Aryal**
Head of Department	**Lecturer**
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External

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We would also like to thank Mr. Janak Raj Joshi, Head of Departments, Ambition College for giving us valuable guidelines and suggestions to complete this project. We have to appreciate the guidance given by our respected sir Shree Ram Bohora throughout the completion of the project. He has shown good patience and high level of experience to guide us through the whole project. We would also like to thank Ambition College for being a healthy environment. Everyone associated with the college helped us without any hesitation to get through this project.

At the end we would like to express our sincere thanks to all our friends and others who helped us directly and indirectly during this project.

ABSTRACT

This is an online web-based platform which includes essential information of particular place in one destination profile, where all posts posted by users will be displayed. People can see what they can expect from the destination. On top of that, the users can create destination profiles. The system recommends the destinations by analyzing user profiles and activities they are engaged with. This system aims to encourage travelers to share their travel moments to inspire or influence others. Moreover, the quality of recommendation in this system is directly proportional to the amount of user base in this system and their engagement ratio. For the recommendation, this system implements K-Means Clustering Algorithm in order to make a K-number of groups of users with similar interest. So that these clusters help to recommend the destination based on their activities within a specific group. We expect that this system will help bridge the gap between travelers and their destinations.

Keywords: *Recommendation, Travel Feed, K- means Clustering, Social media, Travel*

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LIST OF ABBREVIATION

AJAX	=	Asynchronous JavaScript and XML
CSS	=	Cascading Style Sheet
DFD	=	Data Flow Diagram
ER	=	Entity Relationship
HTML	=	Hypertext Markup Language
PHP	=	Hypertext Preprocessor
PC	=	Personal Computer
XML	=	Extensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 Overview

"Travel Feed for Kathmandu Valley" is a recommendation system which recommends the places inside Kathmandu Valley to the users according to their interests. The project is an attempt to help the travelers by recommending destination according to their choices and by giving the proper information about the destinations.

As we all know the increasing use of social networking sites, people use various social media platforms depending on their requirements and interests. Social media is a dynamic platform that can be used in so many ways to share news, knowledge, entertainment etc. This is a project somehow similar like a social media platform that we are developing as a Travel Feed for the destinations inside Kathmandu valley.

Everyone associated with the traveling like bloggers, digital nomads, solo travelers or a family can share their travel experience of every destination they have enjoyed to the rest of the world. Other users or people can get influence to travel, get connected to other travelers, know information about destinations. Our system mainly focuses on giving recommendation about destination for a particular user. The system does so by dividing our users to a group of clusters using K-Means Clustering Algorithm. The recommendations will also depend on the user activities in which user can follow other users, destinations and can view their profile accordingly.

These days, recommendation has a big role in scaling up any organization's brand, analyzing their audience, tracking user experiences, suggesting products. This project is completely focused on making a reliable and feasible recommendation system for travelers. Our primary concern is to cluster all users of our system in a similar group of a cluster using K-Means Clustering Algorithm thereby it helps us to analyze their behavior and so we can do recommendations based on the user parameters. The first part is clustering users based on their profile information such as destination category, interest, age group etc. After clustering, a number of clusters will be formed. The actual number of clusters is determined by the elbow methods of K-Means clustering. For implementation of algorithm, we use a python programming language from scratch. The supportive libraries NumPy and pandas is used for simplifying complex calculations for arrays and dataframes correspondingly. After doing so, our system finally tracks all the activities done by the users such as likes

and comments. These details even make our cluster group more specific. After then the users within the same user group, their post and activities information get compared with one another within the same group. This enables our system to know about the destinations name to recommend for each user. The more users do activities in our system, the more accurate cluster will be made and more accurate recommendations will be done.

1.2 Problem Definition

Nowadays, when people decide to do travel, they start searching information in internet. They want to get different kind of information of particular destination before actually going there. Unmanaged information in the internet really bother travelers to extract useful information about different places. Not only the information, some people want to explore new destination to travel. All information about any destination can't be found in one particular place. So, people need to spend a lot of time to gather useful information.

Few major problems out there are;

- Hard to get proper recommendations.

- Variation in information about the same travel destination.

- Too much time required to gather information.

1.3 Objectives

The main objective of the project is to increase the tourism activity by recommending and providing the concise information of particular destination according to the user interests.

Few major objectives are;

- To recommend travel destinations inside valley.

- To create profile of travel destinations to reduce variation in information.

- To connect fellow travelers.

- To promote unnoticed destination.

1.4 Scope and Limitations

1.4.1 Scope

This application provides better platform for any travelers or user who are seeking for the destinations and recommendation that suits their personal interest and choices. The main focus of this system is to recommend the best fit travel destinations inside the valley that

matches the user interests. Moreover, the user can share the moments, connect to other fellow travelers, and can gain valuable information from our platform. The recommendation process is based on the K Means Clustering Algorithm which divides the users to group of clusters thus providing the accurate recommendation according to the similar user. Some major scope of the system is,

- It will recommend the precise destinations according to the user's interest.

- It provides the concise information about the destinations.

- It helps for travel planning

- It connects the fellow travelers.

1.4.2 Limitations

After the analysis and implementation of the project, we found that we could face some problem from user's perspective. They may reduce the quality of recommendation process. Some limitations are;

- Admin need to approve newly created destination profile, system can't do.

- Other users can't have access to edit destination and user profile content.

1.5 Report Organization

Report Organization is an important part of the report formation. It gives the overall pattern of the report, which contains summary of the overall document. This document is categorized into several chapters and further divided into sub chapters including all the details of the project.

- **First chapter** is about the introduction of the whole report. It includes short introduction of the system, scope and limitations, background study and objectives of the system.

- **Second chapter** includes the research methodologies in the project. It also includes feasibility study and requirement analysis. Data and process modeling are also included in this chapter.

- **Third chapter** in all about system design. It contains database design, interface design and many more.

- **Fourth chapter** is about the implementation and testing procedures. It contains the detail about the tools that are required to design the system. In the testing section, different testing processes are included.

- The **last chapter** includes conclusion of the whole project. It also provides information about what further can be achieved from this project.

CHAPTER 2

REQUIREMENT ANALYSIS AND FEASIBILITY STUDY

2.1 Literature Review

Over the years, tourism has continued to gain massive interest at a global scale. It is a major foreign exchange earner for a good number of advanced and emerging economies. It is also true that information explosion makes it cumbersome times to access relevant information to enhance decision making. This has given rise to the emergence of intelligent systems or mechanisms that facilitate quick access to relevant content found in the Internet [1].

In the aspect of tourism, Internet and web technologies have made more readily available information on tourist locations, accommodations, transportation, shopping, food, festivals, and other attractions, thus improving travel experience [2].

Social media has fundamentally changed the way that many companies communicate with and market to their target demographics. For the travel and hospitality sector, in particular, the rise of the Internet and the increased popularity of social channels has altered travel marketing. From the way that travelers research potential destinations to the activities that they participate in once they arrive, the new ways that consumers use social media to make purchasing decisions has influenced tourism marketing from start to finish. Social media has altered the landscape of marketing in the leisure and hospitality industry. Most travelers determine their travel plans based on reviews and social media shares, making online customer service a crucial part of building a positive brand reputation. The prevalence of social media has disrupted traditional customer service models for hotels and travel agencies alike. By curating positive reviews and encouraging social shares, hospitality brands can leverage social media to build positive brand awareness, increase brand loyalty, and display just how much their accommodations and activities have to offer [3].

In this era that has witnessed rapid advances in information technology, information overload has become a serious problem to those seeking for information online. Recently, intelligent search mechanisms have been deployed on the web that shows that the problem of information overload can be partially eliminated by providing a platform with more intelligence to assist tourists in the search for relevant information [4].

Google.com is an example of an intelligent search engine that helps users with information and another class of intelligent system that has proven relevant in addressing the problem of information overload are recommender systems [5].

Recommender systems are commonly defined as applications that e-commerce sites exploit to suggest products and provide consumers with information to facilitate their decision-making processes. They implicitly assume that we can map user needs and constraints, through appropriate recommendation algorithms, and convert them into product selections using knowledge compiled into the intelligent recommender. Knowledge is extracted from either domain experts (content- or knowledge-based approaches) or extensive logs of previous purchases (collaborative-based approaches). Furthermore, the interaction process, which turns needs into products, is presented to the user with a rationale that depends on the underlying recommendation technology and algorithms [6].

Recommender systems are now pervasive and seek to make profit out of customers or successfully meet their needs. However, to reach this goal, systems need to parse a lot of data and collect information, sometimes from different resources, and predict how the user will like the product or item. The computation power needed is considerable. Also, companies try to avoid flooding customer mailboxes with hundreds of products each morning, thus they are looking for one email or text that will make the customer look and act. The process of grouping a set of physical or abstract objects into classes of similar object is called clustering. A cluster is a collection of data objects that are similar to one another within the same cluster and are dissimilar to the objects in other clusters. A cluster of data objects can be treated collectively as one group. Although classification is an effective means for distinguishing groups or classes of objects, it requires often costly collection and labeling of a large set of training tuples or patterns, which the classifier uses to model each group. Clustering is also called data segmentation in some applications because clustering partitions large data sets into groups according to their similarity [7].

The k-means algorithm is best suited for data mining because of its efficiency in processing large data sets. Clustering is one of the well-known Data mining techniques to find useful pattern from a data in a large database. However, working only on numeric values limits its use in data mining because data sets in data mining often have categorical values. The k-means algorithm takes the input parameter, k (Clusters), and partitions a set of n objects

into k clusters so that the resulting intra cluster similarity is high but the inter cluster similarity is low. Cluster similarity is measured in regard to the mean value of the objects in a cluster, which can be viewed as the cluster's centroid or center of gravity. The biggest advantage of the k-means algorithm in datamining applications is its efficiency in clustering large data sets. Data mining adds to clustering the complications of very large datasets with very many attributes of different types [8].

The new TripAdvisor expands its community beyond travelers to also include brands, social media influencers, publishers and friends. Travelers can follow and connect with individuals or content creators who share information that is relevant to their interests. Complementing our more than 661 million reviews and opinions. TripAdvisor members will be able to create and view inspirational and helpful new forms of content including photos, videos and articles. Members will also have the ability to create "Trips", which can be in-depth travel guides, itineraries or simple wish lists of things to do while travelling. Trips can be made private and saved for personal use or shared with the community to inspire and help others. Powered by the world's first "travel feed", TripAdvisor members will be able to discover more relevant information faster when planning travel. Assisted throughout the entire travel planning process, members can draw advice and inspiration from their friends, family and trusted experts [9].

It is known that digital data is spread all over the Internet, making it difficult for organizations' and companies' managers to capture, treat and analyze them during the decision-making process. This data is often made available by social network users who review and post comments on products and services on Websites such as TripAdvisor. The platform is described as the largest social network for the exchange of information on tourist destinations around the world. The Website users provide the data by evaluating tourism products and services both quantitatively and qualitatively and, therefore, they facilitate each other's choice of destinations and travel plans. According to the information on the website, TripAdvisor pages reached 390 million individual visitors per month in the first quarter of 2017, having 500 million appraisals, and over seven million registered views of many types of lodging, restaurants and attractions [10].

2.2 Requirement Analysis

While developing a system and before implementing it is necessary to analyze the whole

system requirements. It is categorized into mainly two parts, namely: functional and non-functional requirements.

2.2.1 Functional Requirement

The functional requirements specification documents the operations and activities that a system must be able to perform. Some of the functional requirements of the proposed system is given below;

- Users should provide the necessary information for the registration process.

- Users must be logged on and should select at least one of the destination categories to get the recommendation.

Use Case Diagram:

The following use case diagram show the functional requirements of the system:
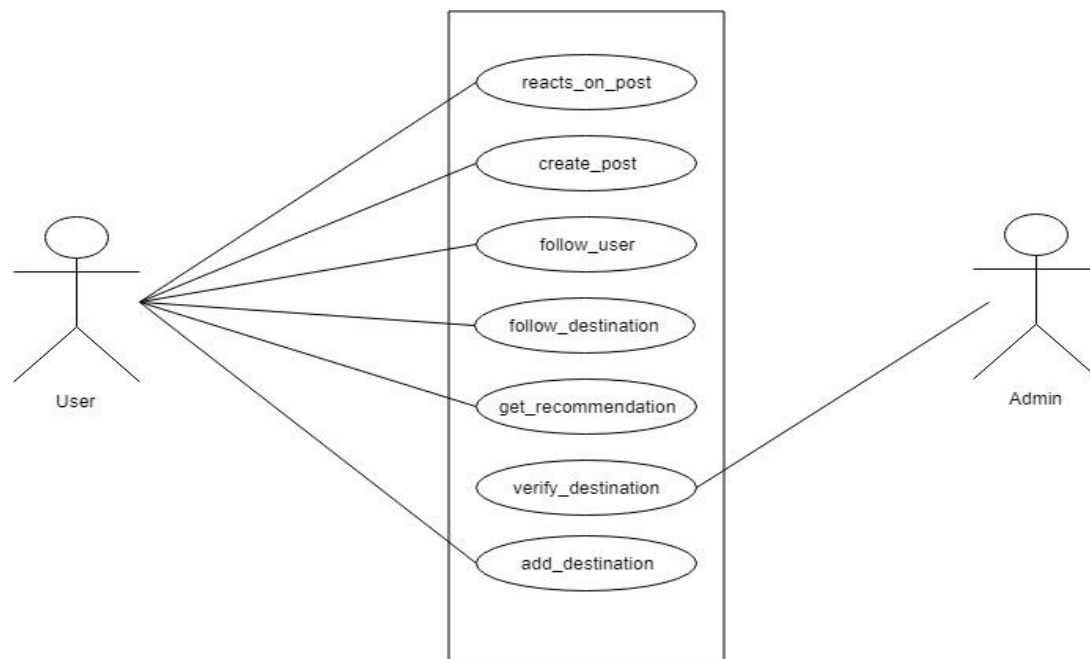
Fig 2.2.1: Use case diagram

2.2.2 Non-Functional Requirements

Non-functional requirements are those type of requirements which is not directly concerned with the system functionality but in absence of it reduces the quality of the system process. Some of non-functional requirements of the system is as follows;

- This system should able to find the optimal value of K from gathered dataset.

- This system should be capable of supporting large number of visitors.

- Program code should compare users details accurately within a same cluster group.

2.3 Feasibility Analysis

Feasibility analysis is a part of system analysis carried to confirm that the system being developed is actually feasible or not. This is the phase where any system designers are able to know whether to start the project or not.

We performed some study and analyzed the system and get to know that it is feasible to make the system. Mainly four types of feasibility studies were done. They are; Economic, Operational, Technical and Scheduled feasibility.

2.3.1 Technical Feasibility

This is a web-based application. It uses HTML, CSS, and JavaScript as front and PHP plus Python as a back end. It is based on client server architecture and needs internet connection to access the information. All the technology required by the application and can be accessed freely, hence it is technically feasible.

2.3.2 Operational Feasibility

The end users are the client of the application. They are the one who add and search for the various information. The server keeps the records of various information and users. The application can be accessed from anywhere with an internet connection. It is easy to use. Thus, this project is operationally feasible.
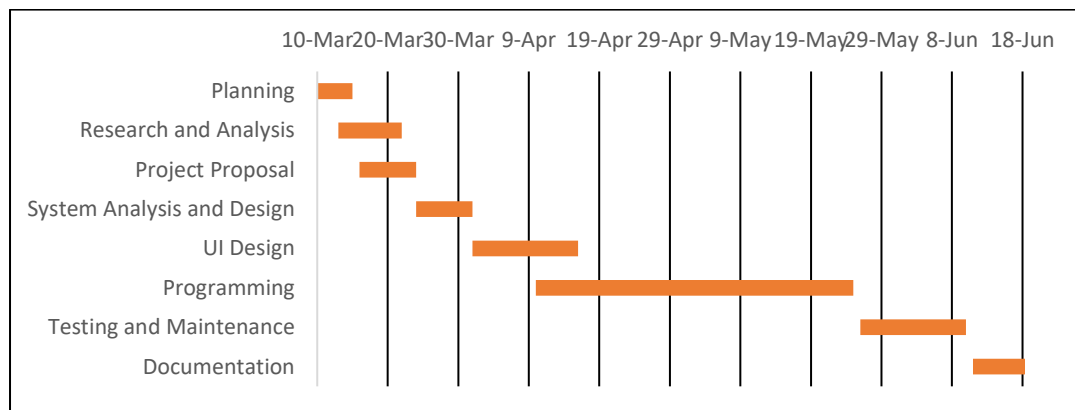
2.3.3 Economic Feasibility

Developing and deploying the system will be economic. For development, PC's that support any operating system with some application is sufficient. For deployment, a PC with internet is required. During the data collection too, not much cost was spent and same with time as well. Further, it does not cost too much to develop and access this system. And hence, we can say that this system was economically feasible.

2.3.4 Schedule Feasibility

A system is said to be scheduled feasible if it is implemented within the planned scheduled. We carried out the study on how much it will take to complete the task after studying the requirements and proposed plan.

Table 2.3.4: *Working schedule*

	10-Mar	20-Mar	30-Mar	9-Apr	19-Apr	29-Apr	9-May	19-May	29-May	8-Jun	18-Jun
Planning	▬										
Research and Analysis		▬									
Project Proposal		▬									
System Analysis and Design			▬								
UI Design				▬							
Programming					▬▬▬▬▬						
Testing and Maintenance									▬▬		
Documentation											▬

We proposed the rough timeline so that it would help us to perform our different project activities. Above Gantt chart shows the proposed scheduled to perform the project. Thus, with the help of above working schedule we completed the project on time so the project is scheduled feasible.

2.4 Structuring System Requirements

Giving structure to system requirements helps to get better idea about the system process and to know how the system actually works. Different models can be designed to represent the system and show the flow of data in different part of the system. In this project, we perform various activities regarding the relationships, data manipulations and data processing. We created relationships between two or more entity sets so that they can provide better information while searching result in the system. The data processing is represented in the diagrammatic form so that every individual who look at the diagram can understand about the main gist of the system. Diagrams are made following the Structured Approach that contains ER-Diagram (Entity Relationship Diagram) as a data modeling approach and DFD (Data Flow Diagram) as a process modeling approach.

2.4.1 Data Modeling

The ER-Diagram contains different entity sets, relationship sets along with their properties and data flow direction. By defining the entities, their attributes, and showing the relationships between them, an ER diagram illustrates the logical structure of databases. The system contains the following entity sets and relationship s along with their descriptions.

USERS

They are the clients who use our system they can share posts, create destination, and engage with content.

POST

It is created by user for users.

DESTINSTION

It is profile created by users which include information about that place.

USER_PROFILE

It is the user profile which consist of the user data.

USER_CLUSTER

It is the entity that consists of the users and their respective cluster group.

reactions

This is the engagement functionality for users to do like, dislike and comments.

follows

This is a kind of action to get access to contents of other users.

follow

This is the relation that maps the user profiles and the followed destination profile.

The following figure shows the Entity Relationship diagram of our system.
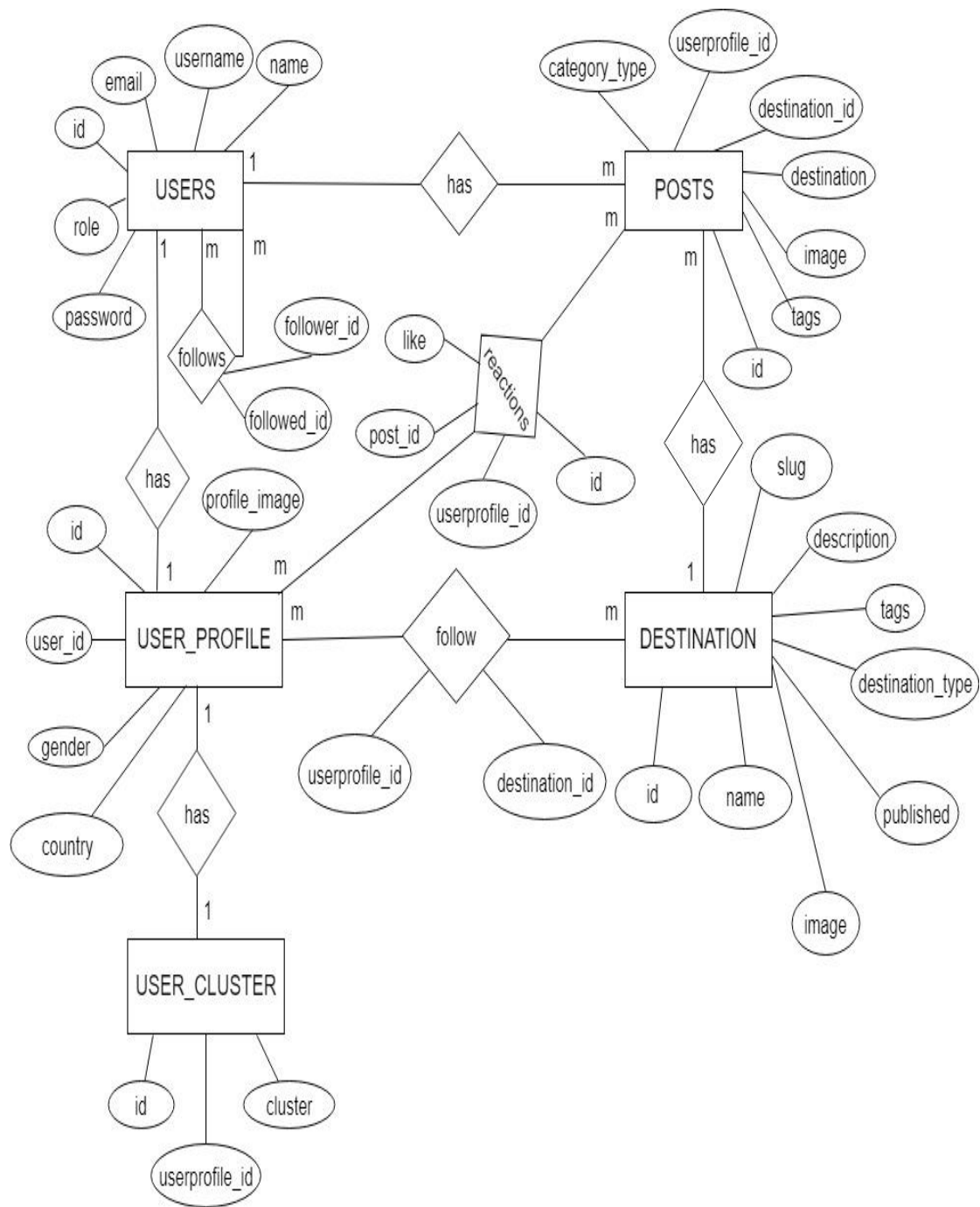
Fig 2.4.1: *Entity relationship diagram of the system*

2.4.2 Process Modeling

Process modeling is a part of structuring the requirement where different processes in the system are connected with the sources and sink so that the actual flow of data in the system is displayed to the report header. Data flow diagram helps to represent the flow of data in the system. Context diagram and level 1 DFD are created in order to show the overall process in the system.

2.4.2.1 Data Flow Diagram

A data-flow diagram (DFD) represents a flow of our data of a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow, there are no decision rules and no loops. Basically, DFD explains how data is processed in terms of input and output.

Context Diagram:

Level 0 DFD explains the first level of data flows in our system. In our system users and admin are main entity. The flow of data is shown in above figure. As we see, there is a Travel Feed system where the data inherit from the user. Post reaction, Post creation, adding destination are the data that flows from user to a system but displaying posts and recommendation is flows to every user from the system.

Similarly, for entity admin, verification of destination process flows to the system from admin side and the notification flows from system to admin to notify newly added destination.
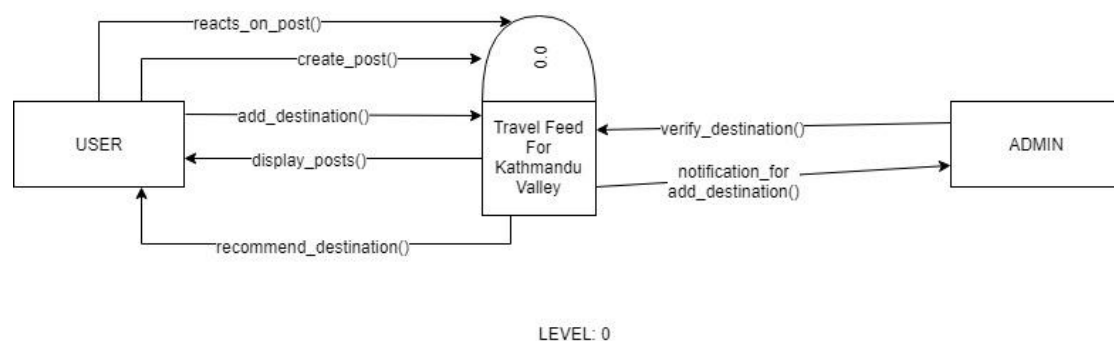

Fig 2.4.2.1 (1): Context diagram

Level 1 DFD:

The decomposed process is now further decomposed in to other sub processes and is called as level. Level 1 is more in-depth version of level 0 DFD. In this, the system

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increases in number. According to above figure, our main travel feed system from level 0 divided into two systems as Recommendation and Sharing etc. Entity admin is connected with sharing system where data related to sharing flow from user to system and system displays the post to every user.
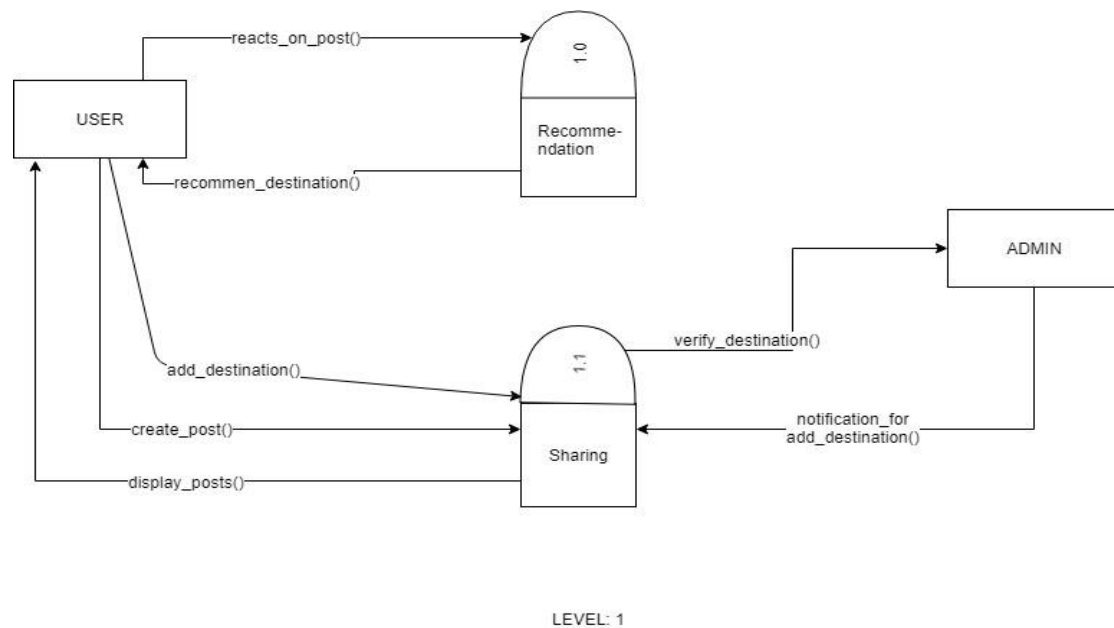

Fig 2.4.2.1 (2): Level 1 DFD

CHAPTER 3

SYSTEM DESIGN

3.1 System Design

This phase contains diagram and designs that help to know about the overall process in the system. Some of the designs are described below:

3.1.1 Block Diagram

In the proposed system, user can register and create their account. During registration they can select their interest and choices. According to chosen user interest the system will recommend the user best fit travel destination inside valley. The user can manage their own profile and can add relevant information about travel destination.

The proposed system is an interactive news feed, in which user can follow another user as well as the travel destination. It uses K-means clustering algorithm to recommend the destination according to the user interest.

The Block Diagram of the system is as follows:
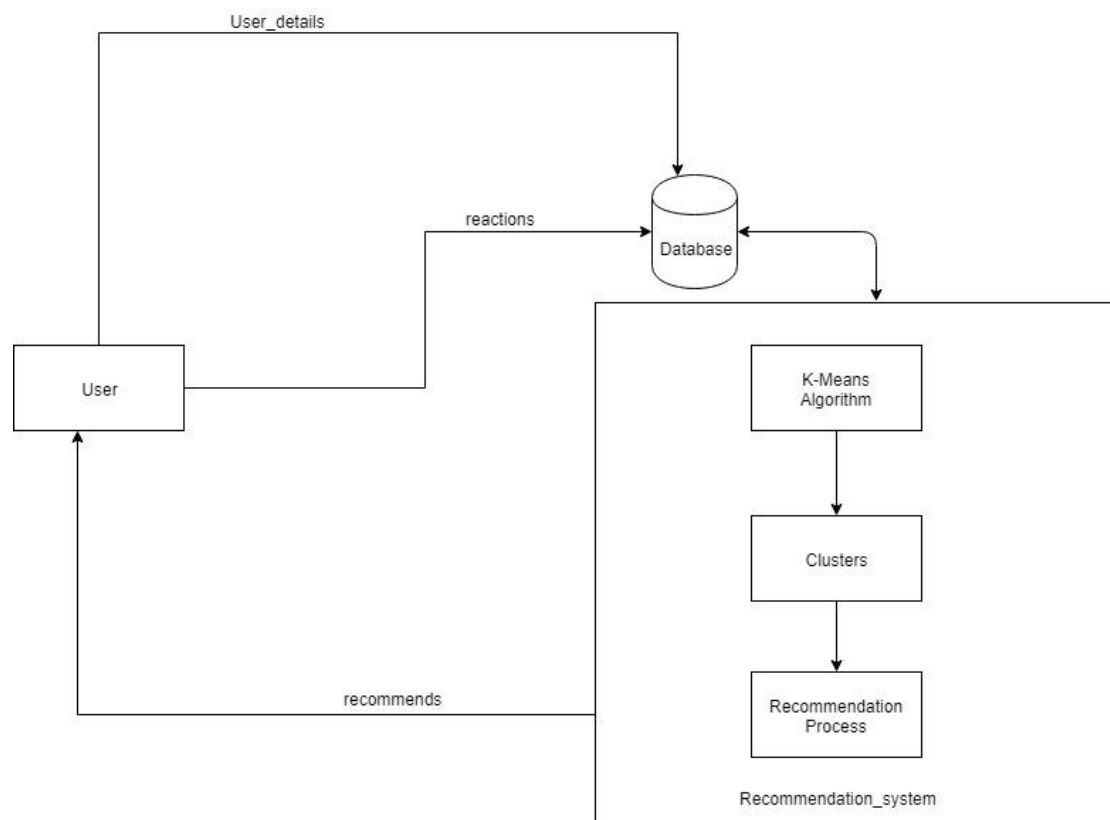
Fig 3.1.1: Block diagram of the system

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3.1.2 Database Schema Design

Design Database Schema is the overall representation of database tables in a way that represents all the co-relations between them. The database schema design is given below:
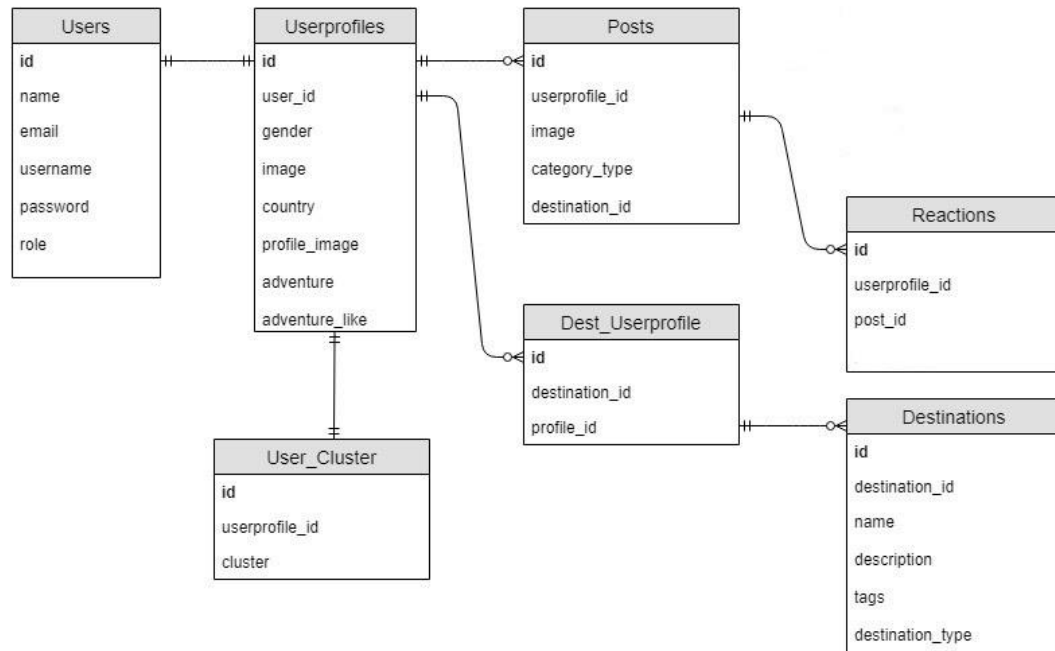
Fig 3.1.2: Database schema design

3.1.3 Interface Design

This is the way of representing how the system looks. Our final product will be a web-based application. This application is a recommendation system in the form of a social media. New user can sign up, create their profile and share the experience through our application.
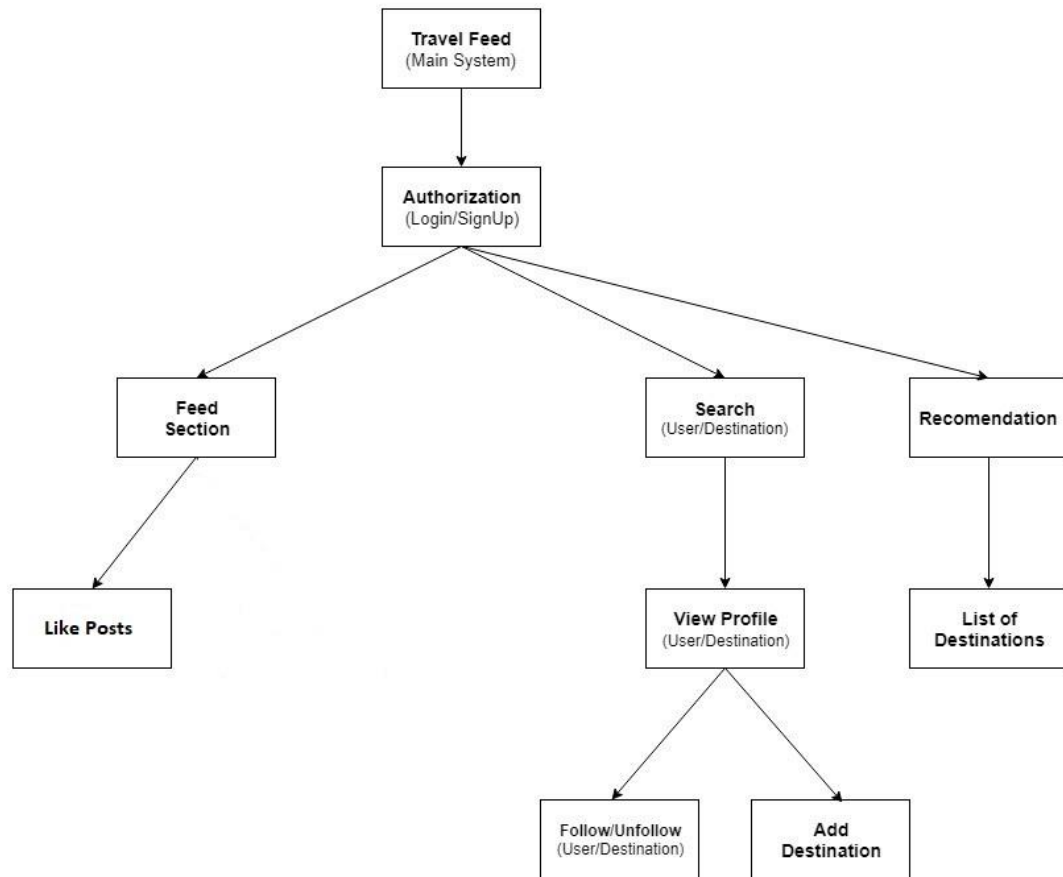
Fig 3.1.3: *Interface design*

CHAPTER 4

IMPLEMENTATION AND TESTING

4.1 Background Study

In order to design this system, it is necessary to know some background knowledge of basic terms in programming. This project is done using Laravel and python programming language and is performed over Laravel Framework. The design portion of this project is made using HTML, CSS, Ajax, and JavaScript.

So, the team members who are going to design this system needs to know the above-mentioned skills. And for the system users, there is no need to do the background study of any code or designing techniques. They only require is to know the basic usage of system with proper interaction.

4.2 Implementation Tools

This is the phase where we are actually building the system. Firstly, the whole information that we gathered are studied, analyzed and then it was processed to build an actual system. Different tools and technologies that we have used are given below:

4.2.1 HTML, CSS, JavaScript

As we are building a website to fulfil our purpose so, obviously we used HTML to design the layout of the system, similarly CSS is used to design the webpages to make the system more user-friendly and attractive and JavaScript is used to include the programming approach to make the design and layout more stable and accurate. These all tools are marked as the frontend of the system.

4.2.2 Laravel

PHP is used to handle the backend of the system. Every task and function in the system other than algorithm are programmed with PHP framework called Laravel.

4.2.3 Python

Python is used to implement the K-Means algorithm. Since, Python provides various libraries and tools; it is easier to implement the machine learning algorithm. Python is only used for algorithm and operates independently to the PHP.

4.3 Algorithm Implementation

K-Means Clustering Algorithm

We used K-Means clustering algorithm to make a cluster of similar user group and do the recommendation based on their interests. K-Means clustering algorithm is one of the simplest and popular unsupervised machine learning algorithms.

This algorithm assigns data points to a cluster (a cluster refers to a collection of data points aggregated together because of certain similarities), such that the sum of the squared distance between the data points and the cluster's centroid i.e. arithmetic mean of all the data points that belong to that cluster is at the minimum. The less variation we have within clusters the more homogeneous (similar) the data points are within the same cluster. K-Means algorithm is iterative process that is carried out until each data is assigned to exactly one centroid.

The Euclidean distance formula is used to carry out the calculation of the centroids, which is given by;

$$d(x, y) = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + \cdots + (x_n - y_n)^2}$$

Where,

d(x,y) is the distance between the data point and centroid,

$(x_1, x_2, \ldots x_n)$ is the data points,

$(y_1, y_2, \ldots y_n)$ is the centroids,

n is the number of data points which is same as the number of clusters (K).

The algorithm is composed of the following steps:

1. Place K points into the space represented by the objects that are being clustered.
2. Calculate the initial centroid randomly.
   For example, if K=3; three data rows are selected randomly which will be the initial cluster centroids.
3. Assign each data to the group that has the closest centroid. This is done by calculating the Euclidean distance from the centroid to each data points.
4. When all objects have been assigned, recalculate the positions of the K centroids using the arithmetic mean of all data points that resides in each cluster.

5. Repeat Steps 3 and 4 until the centroids no longer move. This produces a separation of the objects into groups from which the metric to be minimized can be calculated.

In this system following steps are performed for the calculation of the clusters;

❖ The required data is first fetched and converted to numpy array.

X = [all the data as numpy array]

❖ The data array i.e. X is then normalized.

❖ Now the normalized array is used to calculate the clusers.

For (each value of k) {

       For (each iteration until cluster centroids no longer moves) {

              For (data in X) {

                     Distance = Euclidean distance between cluster centroid and and data points

              }

              Centroid = Recalculated cluster centroid

       }

       Clusters = Final cluster points for each possible possible value of k

}

❖ Thus obtained clusters hold the clusters point for each value of k. So, we have to choose only one optimal value of k. To choose optimal number of k, we used Elbow method as;

- For each k, calculate the total within cluster sum of squared errors.
- Calculate the sum of squared errors variation between two consecutive value of k.
- The least variation defines the optimal number of k.

❖ Finally, the cluster values of optimal k is stored in the database with their respective id, which is then used to recommend the destination.

4.4 Testing

Particular units of programs were tested at particular time instance to determine, if the block of codes is working properly. Besides, the flow of data and values within the system is checked too. There several testing processes carried out during the development process of this system are discussed below

4.4.1 Unit Testing:

Separately each and every functional module is tested and analyzed the result of that module. The module interface is tested to ensure that the information flows in and out of the program under unit test. The modules that were tested in this phase are as follows:

- • Login Module:
- • User Follow Module
- • Post Like Module

Simple example of unit testing has been performed and is presented below.

Testing of Login Module:

The test for the login after the registration is shown here. For the user Ram, the username is theram and the password in ram@1234.

Test Case 1

Username: theram

Password: ram1234

Alert: These credentials do not match our records.

Test Case 2

Username: theram

Password:

Alert: These credentials do not match our records.

Test Case 3

Username: ram

Password: ram@1234

Alert: These credentials do not match our records.

Test Case 4

Username: theram

Password: ram@1234

Alert: Login Successful!

Testing of Follow Module:

The test for the follow after the logged in is shown here. For the user Ram, if someone followed him and ram himself follow others, the number of following and followers should be increased and the changes must be saved in the database.

Test Case 1

Username: theram

Action: Following

Action To Username: manoz

Alert: manoz followers increased by one

Test Case 2

Username: manoz

Action: Following

Action To Username: tonystark

Alert: tonystark followers increased by one

Testing of Post Like Module:

The test for the post like after logged in is shown here. For post id 323, if someone liked like option to 323 post or any other posts, the number of like should be increased by one. And multiple like for same post by the same user is not allowed, it means the post get dislike.

Test Case 1

PostID: 323

Action: Like

Condition: Already Liked by you or NOT

Case: true

Alert: Post get dislike

Test Case 2

PostID: 323

Action: Like

Condition: Already Liked by you or NOT

Case: false

Alert: Like is increased and number is shown

4.4.2 Integration Testing:

While integrating all separate modules as one, errors that were detected were analyzed and debugged. Author assembled all the components of the system which includes user

registration, follow one another, giving a like, unlike and most importantly extraction of data from the site to classify its cluster group based on their information. All the modules worked well in a harmony to make a system run without any error.

4.4.3 System Testing:

System testing is conducted in a complete, integrated system to evaluate the system with its specified requirements. In this testing, whole application was tested to check the errors. The complete application was tested by implementing in a device with the local server.

Table 4.4.3: Test Case for System Testing

S.N.	Test Cases	Input	Expected Outcome	Actual Outcome	Status
1.	Adding Destination	Name: Nagarkot Image: nagarkot.jpg Description: This is… Hashtags: #nature Category: Trekking	Destination must be added.	Destination Added	True
2.	Destination Approval	From Add Destination Section	Destination approved/rejected	Approval Action Done	True
3.	Redirecting to Login	Admin Dashboard URL	Redirect to Login	Redirected to Login	True

4.4.4 UI Testing:

The designed user interface was tested with different browsers (Internet Explorer, Firefox, Google Chrome, etc.) to check whether the display of contents is consistent or not. The display of the content is found to be consistent in different browser.

4.5 Analysis

Analysis is a problem solving technique that improves the system and ensures that all the component of the system work efficiently to accomplish their purpose.

After testing the system, we also analyzed the system in various aspects; such as variation in result of the K-Means algorithm with regular data and normalized data. The normalized data improves the performance of the algorithm. So, we analyzed the following things;

❖ Before normalization of the data the array consists of the data sets as;

[[0 3 0 1 1 2 1 0 1 4 1 0]

[0 7 0 1 1 5 0 1 1 0 1 3]

………………………..

[0 0 0 1 1 0 1 0 1 0 1 0]]

❖ And the obtained clusters are as follows;

{1: 3, 2: 4, 3: 4, 4: 1, 5: 5, 6: 1, 7: 5, 8: 3, 9: 3, 10: 1, 11: 1, 12: 5, 13: 3, 14: 2, 15: 1, 16: 1, 17: 1, 18: 2, 19: 1, 20: 1, 21: 1, 22: 3, 23: 1, 24: 5, 25: 1}

❖ After we normalized data the data points were obtained as;

[[0.   0.13429844 0.   0.04476615 0.04476615 0.0895323

0.04476615 0.   0.04476615 0.17906459 0.04476615 0.   ]

[0.   0.31336304 0.   0.04476615 0.04476615 0.22383074

………………………………………………………………………

[0.   0.   0.   0.04476615 0.04476615 0.

0.04476615 0.   0.04476615 0.   0.04476615 0.   ]]

❖ And the obtained clusters after normalization are as;

{1: 1, 2: 2, 3: 2, 4: 4, 5: 1, 6: 3, 7: 1, 8: 1, 9: 1, 10: 3, 11: 3, 12: 1, 13: 1, 14: 3, 15: 3, 16: 4, 17: 3, 18: 1, 19: 4, 20: 3, 21: 4, 22: 1, 23: 3, 24: 1, 25: 3}

Here, this clearly show that the normalized data differs from the regular data, providing efficient performance. We also found that the normalized data are more accurate and decreases the execution time of the algorithm.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The project has been a successful platform for sharing travel experience. Users can share their travel moments in the form of post and user users can engage with. Users can follow other users. On the top of that, this system enables users to get recommend based on their interest, hobbies and activity.

Recommendation systems have become extremely common in recent years and are applied in a variety of applications. So, in this system similar destinations are recommended to the users which they are more interact with. The recommendation of the destination helps the users to easily decide their next travel destination. Hence, they feel comfortable to visit the website repeatedly.

5.2 Recommendation

Here, the project is developed just for providing the platform for Travelers to share their travel experience and recommend the best matched destination to the users. This system may not give more accurate results in all conditions and the recommended information may not meet all the user needs in every situation as it is user-based recommendation. For making this system with higher efficiency, implementation of sentiment analysis for user activities need to concerned.

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Appendix I – Snapshots

Homepage

Register

Login

User Profile and Recommendations

News Feed

Destination Profile

Description

Take an early morning or evening stroll around the inspiring white dome buzzing with energy; observe the devout passersby, light a butter lamp and send a prayer where you wish, look around for souvenirs, or observe all from a nearby rooftop restaurant, coffee in hand. Situated 8 km to the east of downtown Kathmandu, Boudhanath, is one of the most imposing landmarks in Kathmandu, visible as soon as you land at the Tribhuvan International Airport. It is the largest stupa in the Kathmandu Valley. The 36-meter-high stupa of Boudhanath is one of the largest stupas in South Asia. With countless monasteries surrounding it, Boudhanath is the center of Tibetan Buddhism in Nepal. Built in the shape of a mandala designed to replicate the Gyangtse of Tibet, the stupa was renovated by Licchhavi rulers in the 8th century. The location of the stupa is interesting as it once lay on the ancient trade route to Tibet and it was here that Tibetan merchants rested and offered prayers for centuries. On each side are a pair of the all-seeing-eyes of the Buddha symbolizing awareness. The canopy has 13 stages. At ground level there is a brick wall with 147 niches and 108 images of the meditational Buddha inset behind copper prayer wheels.
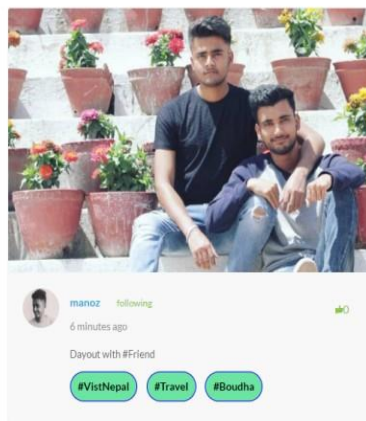
Tags

Stupa   Boudha   TravelNepal   Pilgrim

Destination Type

pilgrims

What other people are doing here?

manoz   following
6 minutes ago

Dayout with #Friend

#VistNepal   #Travel   #Boudha

Admin Dashboard (Destination Approval)

SN	Destination Name	Tags	Description	Published	Verified	Destination Type	Options
1	Boudha Stupa	Stupa, Boudha, TravelNepal, Pilgrim	Take an early morning or evening stroll around the inspiring white dome buzzing with energy; observe the devout passersby, light a butter lamp and send a prayer where you wish, look around for souveni...	Unpublish	Unverified	pilgrims	Edit
2	Godawari	Nature, FamilyVaccation, Travel	Godawari lies in the southern town in Godawari Municipality in Lalitpur District in the Bagmati Zone of central Nepal. In year 2014 Dec, Nepal government merged five Village Development Committees inc...	Publish	Unverified	natureseeing	Edit
3	Nagarkot	Adventure, NatureSeeing, BikeRiding, FamilyVaccation	Nagarkot is 32 km NE of Kathmandu on the northern fringe of the Kathmandu Valley. Nagarkot is famous for its Himalayan views- the Himalayan peaks at sunrise are a magnificent sight to behold. Many wis...	Publish	Unverified	natureseeing	Edit
4	Kathmandu Funpark	adventure, fun, Roller Coasters, games	Kathmandu Ramailo Mela (Kathmandu Fun Park) is the only amusement park in Kathmandu until 2012. Situated at the Exhibition Road, Bhrikuti Mandap in Kathmandu, this is one of the best places to hang ou...	Publish	Unverified	adventure	Edit
5	Swayambhunath Temple	buddha, god, swayambhu, monkey,	Find peace and prayers on the little hillock of Swaymbhunath in the northwest of the Kathmandu Valley. Visitors for whom the name was a tongue twister have called it "Monkey Temple"from the 1970s. Swa...	Publish	Unverified	pilgrims	Edit
6	Pashupati Nath Temple	Pashupati, God, Religious, Hindu, Shiva, Bhola Baba	One of the most sacred Hindu temples of Nepal – Pashupatinath Temple is located on both banks of Bagmati River on the eastern outskirts of Kathmandu. Pashupatinath is the most important temple dedi...	Publish	Unverified	pilgrims	Edit

Appendix II – Implementation Codes

Calculate the possible clusters from the user data

```python
def find_clusters(X: np):
    clusters = {}
    min_clusters = {}
    for i in range(2,11):
        clusters[i] = {}
        index = np.random.randint(0, X.shape[0], i)
        cluster = index.tolist()
        for j in cluster:
            k = cluster.index(j)
            clusters[i][k+1] = X[j]
    final_clusters = {}
    min_clusters[0] = {}
    for size in clusters:
        final_clusters[size]={}
        for iteration in range(1, 100):
            min_clusters[iteration] = {}
            if iteration < 2 or min_clusters[iteration-2] != min_clusters[iteration-1]:
                distance = {}
                min_distance = []
                for cluster in clusters[size]:
                    value = 0
                    distance[cluster] = {}
                    for values in X:
                        value = value+1
                        sub = np.sum(np.square(clusters[size][cluster]-values))
                        distance[cluster][value] = math.sqrt(sub)
                        if cluster == 1:
                            min_distance.append(distance[cluster][value])
                            min_clusters[iteration][value] = cluster
                        else:
```

```python
                    if min_distance[value-1] > distance[cluster][value]:
                        min_distance[value-1] = distance[cluster][value]
                        min_clusters[iteration][value] = cluster
            k_cluster = {}
            for n in range(1, size+1):
                k_cluster[n] = {}
                for val in min_clusters[iteration]:
                    if min_clusters[iteration][val] == n:
                        k_cluster[n][val] = min_clusters[iteration][val]
            clusters[size] = {}
            array = {}
            final_array = {}
            for clust in k_cluster:
                array[clust] = []
                if k_cluster[clust] != {}:
                    for items in k_cluster[clust]:
                        array[clust].append(X[items-1])
                    final_array[clust] = np.asarray(array[clust])
                    clusters[size][clust] = np.mean(final_array[clust], axis=0)
                else:
                    continue
        elif iter == 99 or min_clusters[iteration-2] == min_clusters[iteration-1]:
            final_clusters[size] = min_clusters[iteration-1]
            print(iteration)
            break
    return final_clusters
```

Calculate the best possible cluster using Elbow method

```python
def elbow_method(X: np, final_clusters):
    ss = {}
    sse = {}
    for num in final_clusters:
```

```python
        ss[num] = {}
        sse[num] = [0]
        for cluster in final_clusters[num]:
            value = 0
            ss[num][cluster] = {}
            for values in X:
                value = value + 1
                ss[num][cluster][value] = np.sum(np.square(final_clusters[num][cluster] -
values))
                sse[num] = sse[num] + ss[num][cluster][value]
    return find_k(sse)


def find_k(sse):
    sse_final = []
    for n in sse:
        for val in sse[n]:
            sse_final.append(val / n)
    last_sse = []
    for value in sse_final:
        last_sse.append(abs(value - mean(sse_final)))
    k = last_sse.index(min(last_sse)) + 1
    return k
```

Implementation of algorithm to recommend destination

```php
<?php
namespace App\Traits;


use App\Models\Usercluster;
use App\Models\Userprofile;


trait Recommendation{
```

```php
  public function getSameClusterUser()
  {
    $userprofile_id = \Auth::user()->userprofile->id;


    $user_cluster = Usercluster::whereUserprofile_id($userprofile_id)->first();
    $sameClusterUser        =        Usercluster::whereCluster($user_cluster->cluster)-
>where('userprofile_id', '!=', $userprofile_id)->get();
    return $sameClusterUser;
  }
  public function recommendPlaces()
  {
   $sameClusterUser = $this->getSameClusterUser();


    //if this user is only one in cluseter.
    if(count($sameClusterUser) == 0){
      $userprofile = \Auth::user()->userprofile;


      //get all destination type where user has choose while registration
      $destinationType = [];
      foreach($userprofile->toArray() as $key => $value){
        if($value == 1){
          $destinationType[] = $key;
        }
      }
    //collection object which will collect all destination which type is selected by user at
time of registration
    $destinations = collect([]);
    for($i=0; $i<sizeof($destinationType); $i++){
      $desti = \App\Models\Destination::where('destination_type', $destinationType[$i])-
>get();
      $destinations = $destinations->merge($desti);
    }
```

```php
   //recommending 4 destination from to user if collection is more then 4
   if($destinations->count() > 4){
     $Rdestination = $destinations->random(4);
     return $Rdestination;
     die;
   } else {
     $Rdestination = $destinations;
     return $Rdestination;
     die;
   }


   } else {
   //collection of destination which is followed by the user in same cluster with
recommendee user.
   $recommendDestination = collect([]);
   foreach($sameClusterUser as $usercluster)
   {
     $userprofile = Userprofile::whereId($usercluster->userprofile_id)->first();
     $followedDesti = $userprofile->destinationFollower;
     $recommendDestination = $recommendDestination->merge($followedDesti);
   }
   //multiple user have followed same destination so getting unique destination.
   $uniqueDestination = $recommendDestination->unique('id');
   //recommending 4 destination from to user if collection is more then 4
   if($uniqueDestination->count() > 4){
     $Rdestination = $uniqueDestination->random(4);
     return $Rdestination;
     die;
   } else {
     $Rdestination = $uniqueDestination;
     return $Rdestination;
     die;
   }
```

```php
    return $Rdestination;
   }
  }
}
?>
```