



Tribhuvan University Institute of Science and Technology

A Project Report on

“Business Directory with Sentiment Analysis”

*In partial fulfillment of the requirement for the degree of BSc Computer Science and
Information Technology*

(BSc CSIT)

Submitted to:

Department of Computer Science and Information Technology,

Academia International College

Submitted by:

Utsab Singh (26521/ 077)

Rahul Adhikari (26502 /077)

Saurav Pachhai(26516 /077)

Under the Supervision of

E.R Rabin Maharjan

January, 2025



Tribhuvan University
Institute of Science and Technology
Academia International College



Department of Computer Science and Information Technology

Email: mail@academiacollege.edu.np

Supervisor's Recommendation

I hereby recommend that the project work report prepared under my supervision by Mr. Utsab Singh (26521/077), Mr. Rahul Adhikari (26502 /077), and Mr. Saurav Pachhai (26516 /077) entitled "Business Directory with Sentiment Analysis (BizNepal)" be accepted as fulfilling in partial requirements for the degree of Bachelors of Science in Computer Science and Information Technology. In my best knowledge, this is an original work in Computer Science and Information Technology.

.....

E.R Rabin Maharjan

Project Supervisor

HOD/Program Coordinator

Department of Computer Science and Information Technology Academia International College

Gwarko, Lalitpur



Tribhuvan University
Department of Computer Science and Information Technology
Academia International College

Certificate of Approval

This is to certify that this project prepared by Mr. Utsab Singh, Mr. Saurav Pachhai, and Mr. Rahul Adhikari entitled “Business Directory with Sentiment Analysis (BizNepal)” in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Information Technology has been well studied. In our opinion, it is satisfactory in scope and quality as a project for the required degree.

<p>.....</p> <p>Er. Rabin Maharjan</p> <p>Project Supervisor Department of Computer Science and IT Academia International College</p>	<p>.....</p> <p>Mr.</p> <p>HOD/Program Coordinator Department of Computer Science and IT Academia International College</p>
<p>.....</p> <p>Internal Examiner Academia International College</p>	<p>.....</p> <p>External Examiner Central Department of CSIT Tribhuvan University</p>

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We also want to express our gratitude to our classmates for their support and spirit of cooperation, which created a positive atmosphere that was crucial to the development and accomplishment of this project.

ABSTRACT

BizNepal is a comprehensive web-based business directory designed to connect users with local businesses across Nepal. With a focus on strengthening the online presence of businesses, the platform bridges the gap between business owners and consumers by offering features such as sentiment analysis, user engagement tools, and advanced search and filtering capabilities.

The platform addresses the challenges of visibility and customer engagement faced by local businesses while providing users with reliable information, authentic reviews, and detailed business analytics. BizNepal's sentiment analysis feature classifies customer reviews as positive, negative, offering actionable insights to businesses for improving their services and reputation.

BizNepal supports three user roles: Admins manage business listings, Business Owners maintain profiles and General Users search, review, and bookmark favorite businesses. The system integrates features such as map-based location services, email for new reviews, and comprehensive analytics for tracking growth and trends.

BizNepal is built using the Agile methodology, emphasizing iterative development, timely updates, and collaboration for efficient project management. By combining innovation with user-centric design, BizNepal aims to contribute to the growth of Nepal's local economy by connecting businesses and customers in a meaningful and impactful

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ABBREVIATIONS

API	Application Programming Interface
SQL	Structured Query Language
JS	JavaScript
VS Code	Visual Studio Code
CSS	Cascading Style Sheet
UML	Unified Modeling language
ML	Machine Learning
NLP	Natural Language Processing
IDE	Integrated Development Environment
QA	Quality Assurance

Chapter 1: Introduction

1.1. Introduction

BizNepal is a comprehensive business directory designed to help users and customers discover and connect with various businesses. It offers a detailed list of services, making it easy for users to find what they need. One of the standouts features of this directory is use of Sentiment analysis to analyze user reviews and provide meaningful insights to both user and Business.

The primary goal of BizNepal is to support local businesses in Nepal by enhancing their online presence, fostering user engagement, and providing valuable data through sentiment analysis. By addressing the current challenges faced by both consumers and businesses, BizNepal aims to contribute to the growth of a connected and thriving local economy.

1.2. Problem Statement

In the current digital era, businesses in Nepal face substantial obstacles in achieving visibility and attracting customers due to their limited online presence. For business owners, efficiently managing and responding to customer feedback remains a tedious and time-consuming task, often adding to their administrative workload. They require a platform where they can directly showcase their businesses, receive authentic reviews, and use these reviews to enhance their reputation and customer engagement.

On the other hand, consumers find it challenging to obtain reliable and trustworthy information about businesses, including genuine reviews and ratings. The lack of a centralized source for comprehensive feedback often results in a fragmented and time-consuming experience. Additionally, consumers frequently encounter fake or biased reviews, which diminishes trust in the available information and makes it harder to make informed decisions. These challenges create significant barriers for both consumers and business owners.

1.3. Objectives:

The primary goal of the project is to develop a Comprehensive Business Directory with the following key focuses:

- **Promote Local Businesses**

Strengthen the online presence of local businesses in Nepal, making it easier for potential customers to discover and interact with them.

- **Sentiment Analysis of Reviews**

Utilize machine learning techniques to assess the sentiment of reviews, classifying them as positive, negative, or neutral.

Provide businesses with actionable insights derived from sentiment analysis, helping them understand customer perceptions and enhance their services.

- **Business Analytics for Growth Tracking**

Provide business owners with actionable insights through analytics tools, enabling them to monitor their business growth, customer engagement, and trends over time.

1.4. Scope and Limitations

1.4.1. Scope

The scope of the project involves:

- **Platform**

The system will be accessible via a web application, allowing users to log in from any internet-connected device, providing a seamless and consistent user experience.

- **Users**

The system will support three user roles: Admin, Business Owner, and General User. Admins will manage business listings and moderate reviews, Business Owners will manage their business profiles and view reviews and user engagement, and General Users will search for businesses and submit reviews.

- **Business Profile Management**

Business Owners will be able to create, edit, and delete their business profiles, including detailed information such as name, address, contact details, descriptions, images, and categories.

- **Sentiment Analysis**

The system will implement sentiment analysis to evaluate the tone of user reviews, categorizing them as positive, negative and providing businesses with valuable insights.

- **Search and Filter**

Users will be able to search for businesses based on criteria such as name, category, and location. Advanced filtering options will allow users to refine their search based on ratings, distance, and other parameters.

- **Favorites Business**

Users can save businesses to their favorites list for quick access.

- **Notifications**

Business Owners will receive notifications for recent reviews.

- **Map Integration**

The website will display the location of a business on a map making it easier to find nearby options.

1.4.2. Limitations

Some of the limitations of the project are:

- **Lack of Mobile Application**

The project will not have a mobile app at first; it will only be available as a web application. This might affect the user experience and accessibility for people who use mobile platforms more often.

- **Sentiment Analysis Limitations**

Reviews written in English will be the main language supported by the sentiment analysis, which might not adequately handle dialects, local languages, or subtle expressions in Nepali or other regional languages.

- **User Privacy and Data Security**

Preventing unwanted access and data breaches requires making sure that personal information is handled securely and that data protection laws are followed.

1.5. Development Methodology

We have chosen the Agile methodology for the BizNepal project. Agile is a project management and software development approach that emphasizes delivering smaller, incremental pieces of work regularly rather than a single large launch. This enables teams to adapt swiftly to changes and deliver customer value more quickly.

Agile Development Methodology Features

Iterative & incremental: The agile methodology feature proposes incremental and iterative approaches with frequent reassessments that make a product better.

Work breakdown: The agile process consists of cycles known as sprints or scrums. It splits tasks into iterations or sprints.

Parallel testing: The software development and the software testing are taken up concurrently to ensure quality software is delivered. Regression testing is involved whenever new activities or minds collaborate.

Effective collaboration between teams: Testers and developers work in close collaboration compared to the earlier waterfall model.

Daily stand-up calls: Everyday scheduling of short and quick meetings as stand-up calls happen to review the status of the task within the agile process.

Timely Updates and Reports: The agile methodology process places the product update upfront with daily and weekly reports on project status, which makes the process transparent.

[1]

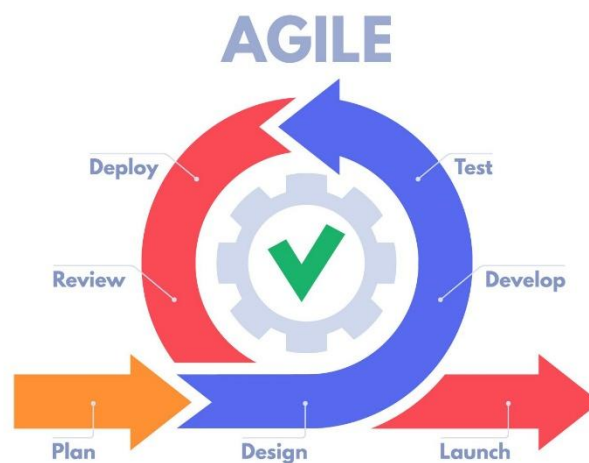


Figure 1: Agile Methodology

1.6. Report Organization

Chapter 1 provides an overview of the project, introducing its significance and addressing the identified problem. The chapter outlines the objectives, defines the scope and limitations, presents the chosen development methodology, and provides an overview of the report organization.

In Chapter 2, the background study includes fundamental theories, concepts, and terminologies related to the project. The literature review offers a comprehensive overview of similar or relevant projects, theories, and findings by other researchers, establishing a context for the project.

Chapter 3 focuses on system analysis, exploring in-depth requirements through functional and non-functional aspects. It includes a feasibility analysis covering technical, operational, economic, and schedule aspects. The use of an object-oriented approach and modeling techniques like class and activity diagrams are detailed in the analysis section.

Chapter 4 is the design phase, presenting the class, object, Sequence, State and Activity Diagrams. The chapter also discusses user interface design and provides detailed insights into the algorithmic aspects of the project.

Chapter 5 includes the practical aspects of the project. It describes the tools used in the implementation phase, including CASE tools, programming languages, and database platforms. The chapter provides implementation details for modules, classes, procedures, functions, methods, and algorithms. Testing is covered extensively, with details on unit testing, system testing, and result analysis.

The final chapter, Chapter 6, draws conclusions based on the findings and outcomes of the project. It also outlines potential future recommendations for further enhancements or expansions of the project, bringing the report to a comprehensive close.

Chapter 2: Background Study and Literature Review

2.1. Background Study

In recent years, the rapid growth of internet penetration and smartphone usage has significantly transformed how consumers engage with businesses. This trend is particularly relevant in Nepal, a geographically diverse country where accessing preferred businesses can be challenging, especially when traveling to different regions. To bridge the gap between consumers and business owners, there is a growing need for digital tools that facilitate seamless connections.

However, Nepal faces unique challenges in this digital transformation. Many local businesses and medium-sized enterprises struggle with limited online presence due to the high costs associated with going digital. Small businesses, in particular, find it difficult to connect with their target audience due to the lack of accessible online platforms. The absence of a centralized platform, such as a comprehensive business directory with customer reviews, makes it harder for consumers to find reliable and trustworthy businesses.

In this digital economy, business directories play a vital role to serve the bridge between business and consumer. A business directory provides easy access to business and relevant information about the business, it is a centralized platform where you can only get the business details. When you search for your business on search engines like google and Bing, multiple business can appear, and it can be difficult to select one. Also, business directory increases your local visibility because every user who searches business online looks for local information first. Globally, businesses are going online, and Nepal need to adopt similar solutions to stay competitive.

There are some existing business directories in Nepal which are trying to fill gap, but it lacks advance feature like sentiment analysis, limited user engagement, lack of business analytics and daily views of business and no of user interaction. Most business directory are not user friendly and cannot meet the global user need and global user requirement

To address these gaps, we have developed a business directory with features like sentiment analysis. Our platform allows businesses to list themselves, while users can search for businesses using multiple categories, keywords, and location-based filters. This ensures that consumers can easily find nearby businesses and access detailed information, including

business engagement metrics and analytics. Users can also rate and review businesses, providing valuable feedback for others.

Sentiment analysis gives the sentiment of the review in two categories negative and positive so due to this user can easily make decision to choose business they want.

2.2. Literature Review

We all know that the internet is a rich source of information. Most consumers approach the internet to find relevant services for their day-to-day work. Finding the better service on the internet is like searching for a needle in the haystack. There are various searching tools available on the internet but result from these tools are often scattered into multiple websites which is not convenient for the user as well as Business owner.

A research paper published by Harvard Business School “Getting on the Map: The Impact of Online Listings on Business Performance” suggested that establishing an online presence leads to a 5% increase on revenue. Using data on customer reviews, it finds that businesses that had stayed offline until the acquisition ended up having lower ratings, on average, than those that added themselves or were added by customers. [2]

Another research conduct in Surigao City, Indonesia provides insightful information regarding the problem faced by Business owner. It conducted research with questions statements like:

- Customers are having challenges particularly in identifying and locating Small and Medium Scale Enterprises (SMEs)/Business establishments within Surigao City
- Without any local business directory, customers will be having a tough time contacting Business establishments.
- Customers are having difficulties to quickly check and compare the right product or services they are looking for with the absence of a local business director

Overall, the responses indicate a strong consensus (category value of 4.64) among business owners on the need for better promotional tools and platforms, as well as the importance of location familiarity to attract and retain customers. [3]

Study of Existing Systems

Some of the existing system like BizNepal are:

- Google Business Profile

Google Business Profile helps businesses manage their online presence on Google Search and Maps. Businesses can update their information, respond to reviews, and add photos. Users can leave reviews and view business details directly from Google.

- Facebook Business Directory

Facebook Business Directory allows businesses to create pages where users can leave reviews and engage with the business. It also offers features like business hours, contact details, and promotions.

- Justdial

Justdial is an Indian business directory that offers local business listings, reviews, and contact information. It provides a platform for users to find services and businesses in various categories.

- YellowPagesNepal

This is a Nepali Business directory site which provide listing of various business in Nepal but with limited functionality.

After thorough examination of the above system, it was evident that none of the systems use Sentimental analysis to analyze the user reviews. This gave us an opportunity to address these challenges in a more managed and user-friendly manner.

Chapter 3: System Analysis

3.1. System Analysis

Systems analysis is the study of a problem domain of any organization which helps to recommend improvements and specify the requirements for the solution whereas the systems study is the specification of computer. based solution for the requirements identified in a system analysis.

3.1.1 Requirement Analysis

There are two types of requirement functional requirement and nonfunctional requirements

i. Functional Requirements

General User

- Create and Manage Profile
- Search and View Business Listings
- Filter the business search
- Read and Post reviews
- Save Favorites

Business Owner

- Log into Business Dashboard
- Create and Manage Business Profile
- View reviews Analytics
- View Business Analytics
- Receive Email Notifications

Admin

- Log in to Admin Panel
- Manage Business Listings
- Manage User Accounts
- Send Notifications
- Manage category

- View Business listing and user engagement analytics

System Roles

- Sentiment Analysis
- Notification System
- Filtering

Use Case Diagram:

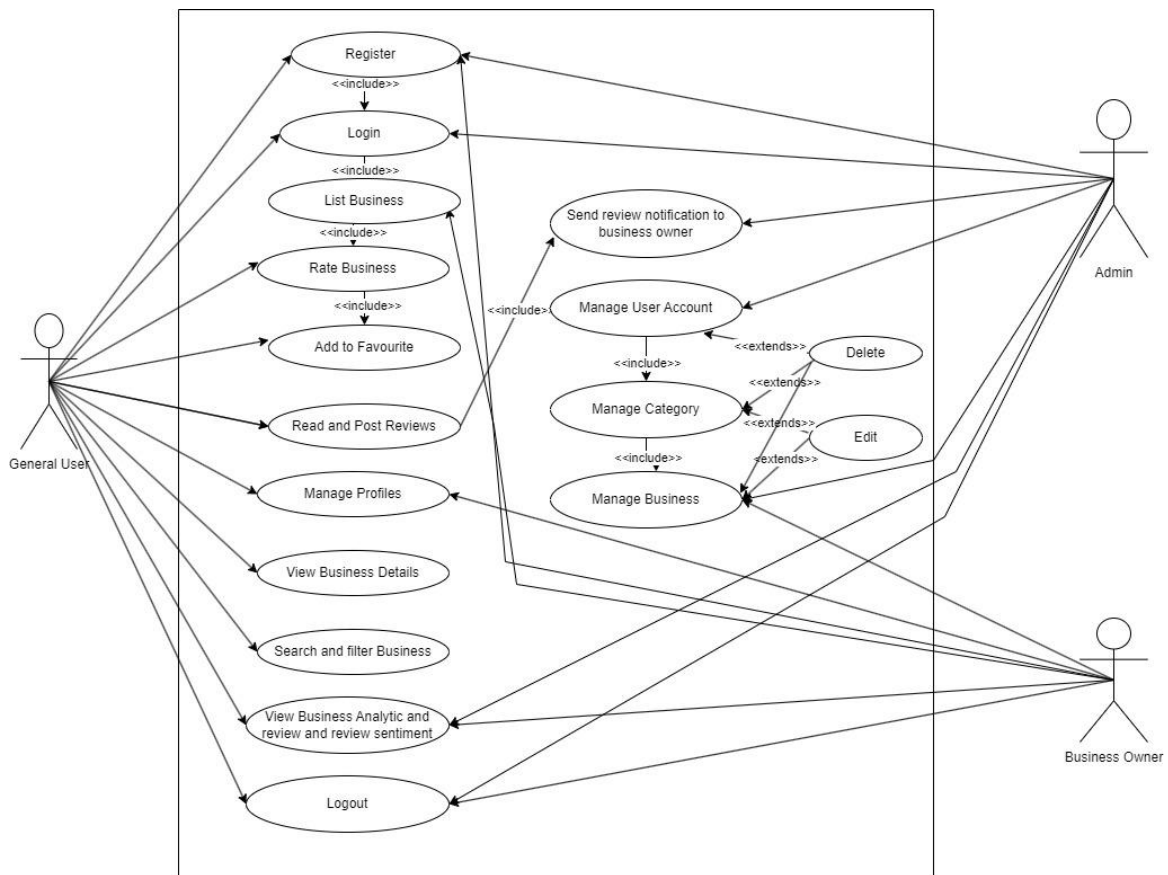


Figure 2: Use Case Diagram

The above use case diagram consists of three actors as General User, Business owner and Administrator.

ii. Non-Functional Requirements

- Performance

Ensure fast search query responses and page loading times. Optimize the review aggregation and sentiment analysis processes for quick results.

- Scalability

The system should handle a growing number of users and business listings without significant performance degradation.

- Security

Encrypt user data, including personal information and reviews, and securely store all data. Implement regular data backups and recovery processes.

- Reliability

Aim for 99.9% uptime to ensure the system is available with minimal disruptions.

- Error Handling

Provide user-friendly error messages for failed operations. Log critical errors and report them to administrators for prompt resolution.

- Usability

Design an intuitive and user-friendly interface for both users and administrators, ensuring easy navigation and interaction with the system.

3.1.2. Feasibility Analysis

A feasibility study is an analysis and evaluation of the practicality, viability, and potential success of a proposed project or business practice. It involves assessing various technical, economic, legal, operational, and scheduling considerations, to determine whether the project is feasible and worth pursuing. The goal of the feasibility study is to provide stakeholders with insights into potential risks, costs, and benefits, helping them to decide whether they should proceed with the project or not. This study is the foundation of any project. It helps answer the question” Is the project feasible or not?” [4]

i. Technical Feasibility

This assessment focuses on the technical resources available to the organization. It helps organizations determine if the technical resources meet capacity and if the technical team can convert the ideas into working systems. Technical feasibility also involves

evaluating the proposed system's hardware, software, and other technical requirements.
[5]

ii. Economic Feasibility

An economic feasibility study is an analysis of the costs and revenues of a project to determine whether it is logical and possible to complete it. It is a type of cost-benefit analysis that evaluates whether it is possible to implement the project. Our project is economically feasible as we are using freely available tools and software to build the project. Furthermore, after our project is successfully developed, collaborations with recruiters and educational institutions further enhance revenue opportunities through strategic partnerships and targeted advertising.

iii. Operational Feasibility

Operational feasibility refers to the degree of providing service to requirements and how easy the product will be to operate and maintain after deployment. It also determines the usability of the product and whether the solution suggested by the software development team is acceptable or not.

iv. Schedule Feasibility

Schedule feasibility is a type of feasibility study that assesses whether a project can be completed within a given time limit. It examines the time required to complete each task and determines whether it is feasible to complete the project within the given schedule.

For our project, we are using Gantt Chart. Given below is a Gantt Chart describing the schedule for BizNepal Project:

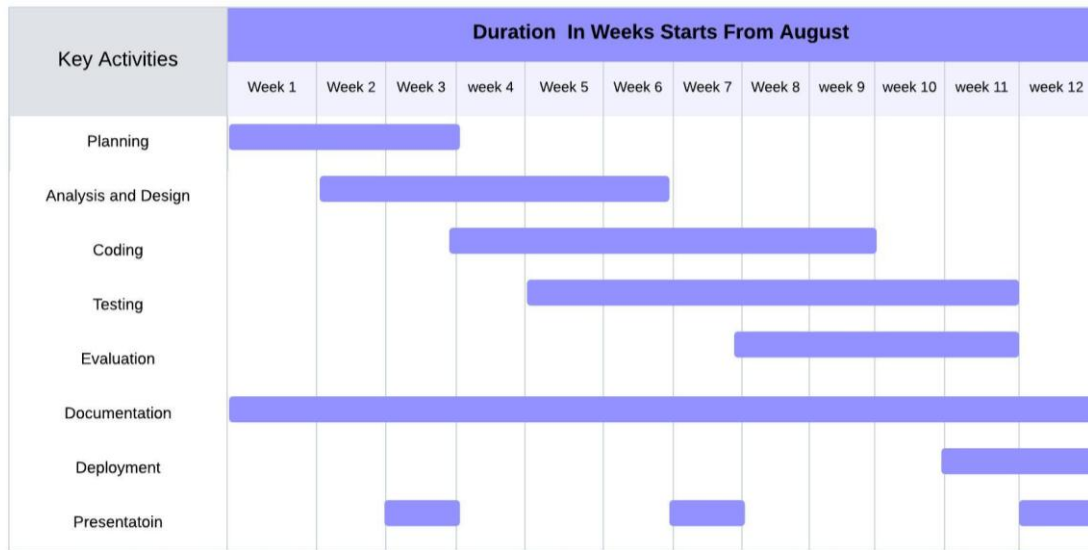


Figure 3 Gantt chart

3.1.3. Analysis

i. Class Diagram

The class diagram depicts a static view of an application. It represents the types of objects residing in the system and the relationships between them. A class consists of its objects, and also it may inherit from other classes. A class diagram is used to visualize, describe, document various different aspects of the system, and also construct executable software code.

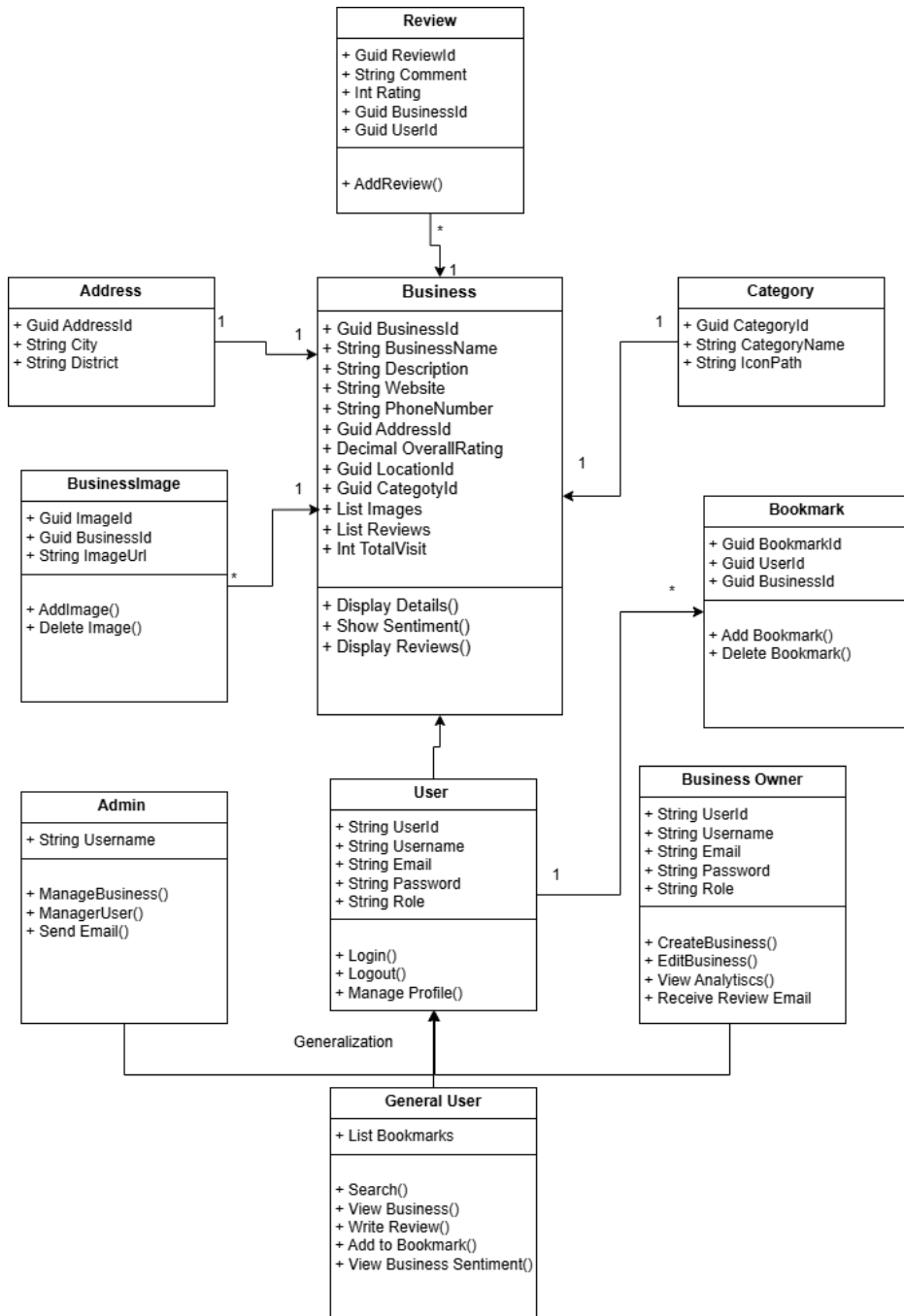


Figure 4 Class Diagram

ii. Object Diagram:

An object diagram is a type of diagram used in software engineering and object-oriented design to represent a snapshot of the system at a specific point in time. It shows instances (objects) of classes, their attributes, and the relationships (or links) between those objects. Object diagrams are a subset of class diagrams but focus on illustrating the concrete, real-world instances of classes rather than abstract definitions.

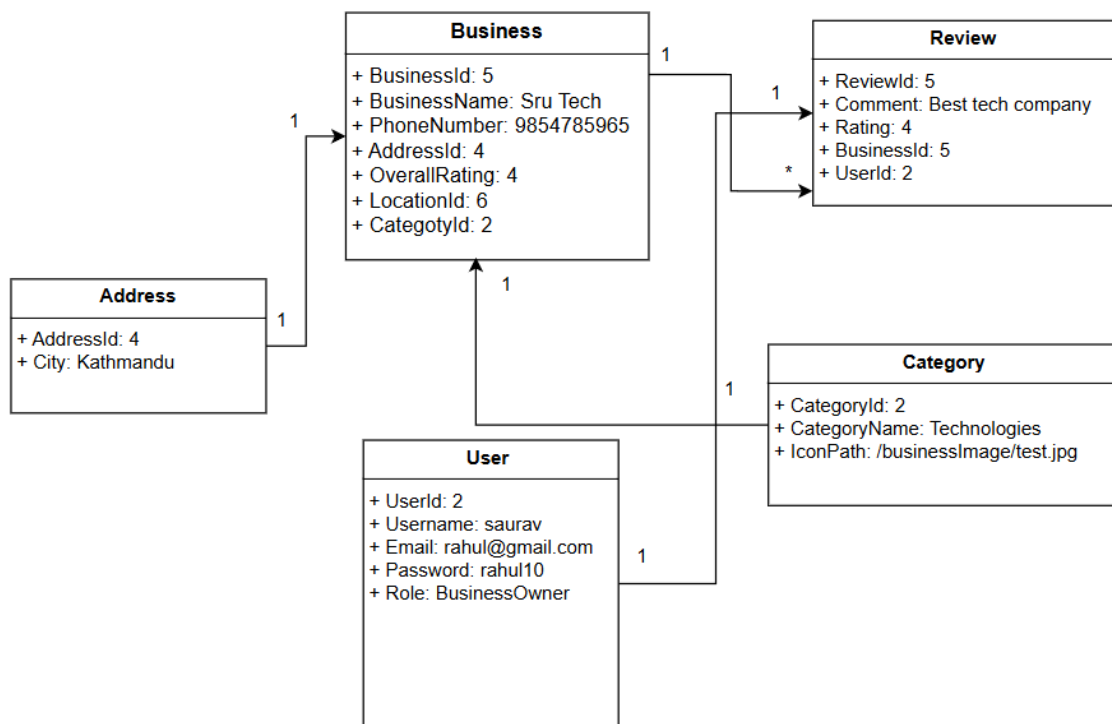


Figure 5 Object Diagram

iii. Sequence Diagram

The sequence diagram represents the flow of messages in the system and is also termed as an event diagram. It helps in envisioning several dynamic scenarios. It portrays the communication between any two lifelines as a time-ordered sequence of events, such that these lifelines took part at the run time. In UML, the lifeline is represented by a vertical bar, whereas the message flow is represented by a vertical dotted line that extends across the bottom of the page. It incorporates the iterations as well as branching.



Figure 6 Sequence Diagram

iv. State Diagram

State machine diagrams typically are used to describe state-dependent behavior for an object. An object responds differently to the same event depending on what state it is in. State machine diagrams are usually applied to objects but can be applied to any element that has behavior to other entities such as: actors, use cases, methods, subsystems systems and etc. and they are typically used in conjunction with interaction diagrams (usually sequence diagram's).

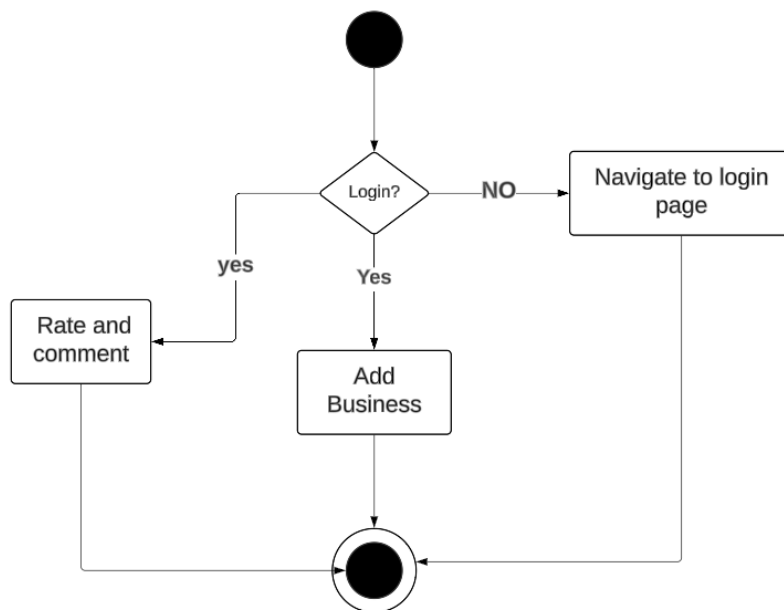


Figure 7 State Diagram

v. Activity Diagram:

Activity diagrams illustrate how a system or process moves from one action to another.

Here the activity diagram visually represents how users and admin will interact with the system.

Activity Diagram for User:

This flowchart outlines the user journey in the BizNepal system, starting with account registration, followed by login and authentication. Once verified, users can manage their profiles (update details or change passwords), search for services (view details or add to favorites), and write review. The process concludes with the user logging out, ensuring a

seamless and secure experience. Furthermore, user don't need to sign in to search and view business details.

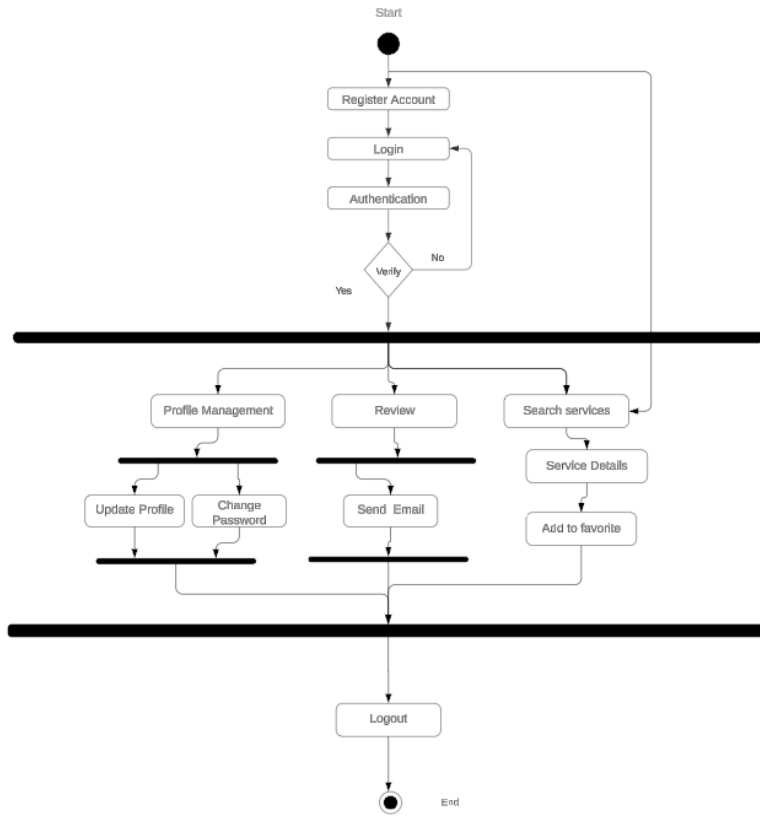


Figure 8 Activity Diagram for User

Activity Diagram for Admin:

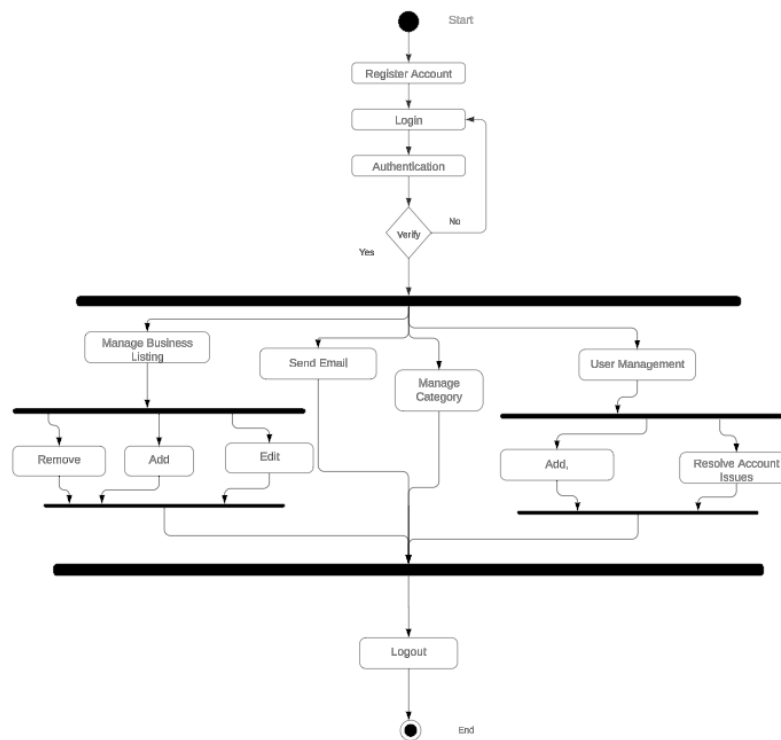


Figure 9 Activity Diagram for Admin

This flowchart represents the admin workflow in the BizNepal system. It starts with account registration, login, and authentication. After verification, admins can manage business listings (add, edit, or remove businesses), handle categories, send emails, and perform user management tasks such as adding users or resolving account issues. The process ends with the admin logging out, ensuring efficient system administration.

Chapter 4: System Design

4.1. Design

Systems Design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. It involves translating user requirements into a detailed blueprint that guides the implementation phase. The goal is to create a well-organized and efficient structure that meets the intended purpose while considering factors like scalability, maintainability, and performance.

4.1.1 System Architecture

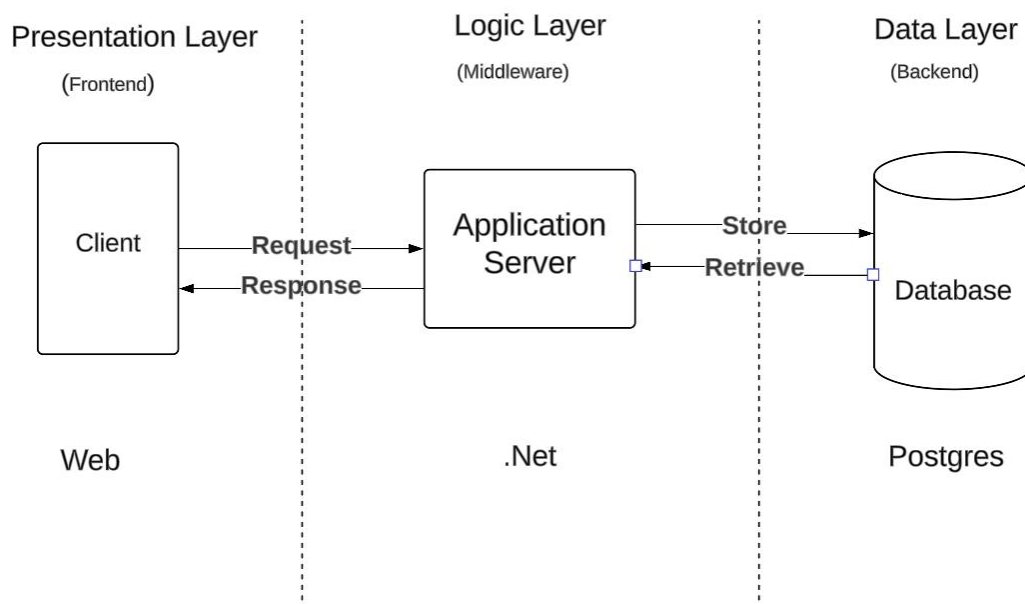


Figure 10 System Architecture

This diagram represents the three-layer architecture of BizNepal project:

1. Presentation Layer (Frontend):

- The Client (web interface) represents the users interacting with BizNepal services.
- Users send requests (e.g., search for businesses or categories) and receive responses (e.g., results, profiles, or feedback).

2. Logic Layer (Middleware):

- The Application Server processes incoming requests from the client.
- It acts as the brain, implementing business logic such as handling business listings, reviews, bookmarks, or user authentication.
- This layer communicates with the database to store or retrieve required data.

3. Data Layer:

- The Database (PostgreSQL) stores all BizNepal's data, including user information, business profiles, categories, reviews, and bookmarks.
- It supports operations like querying and updating data.

4.1.2 Database Design

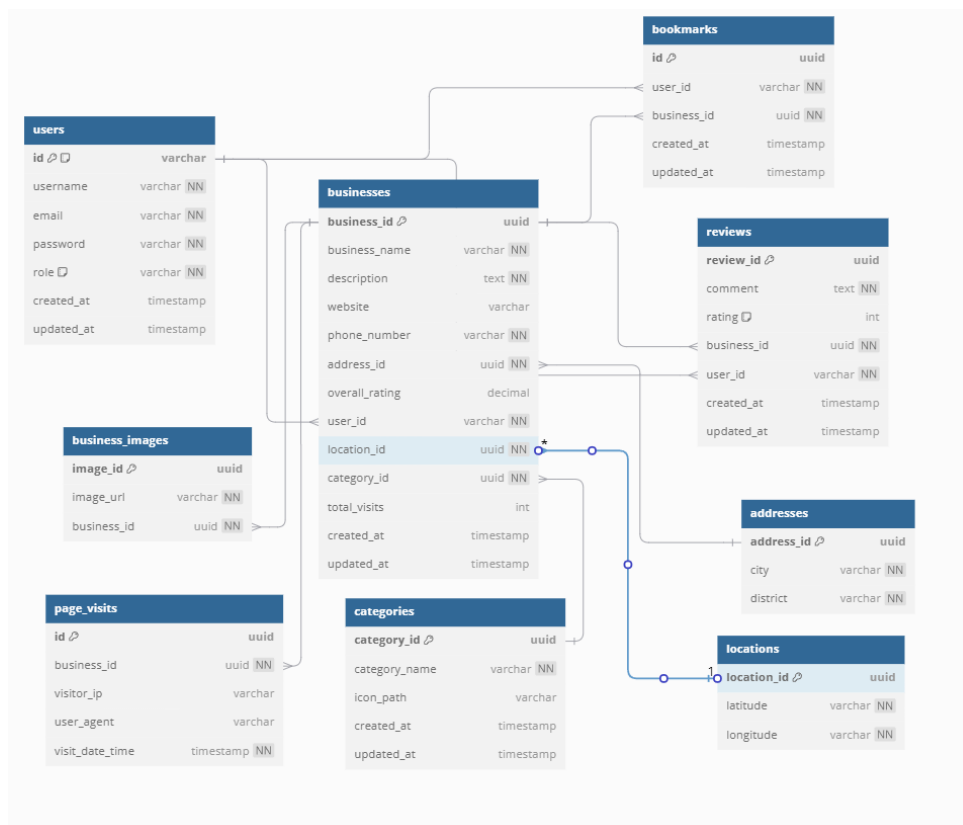


Figure 11 Database Design

4.1.3. Component Diagram

A component diagram is used to break down a large object-oriented system into the smaller components, so as to make them more manageable. It models the physical view of a system such as executables, files, libraries, etc. that resides within the node.

It visualizes the relationships as well as the organization between the components present in the system. It helps in forming an executable system. A component is a single unit of the system, which is replaceable and executable. The implementation details of a component are hidden, and it necessitates an interface to execute a function. It is like a black box whose behavior is explained by the provided and required interfaces.

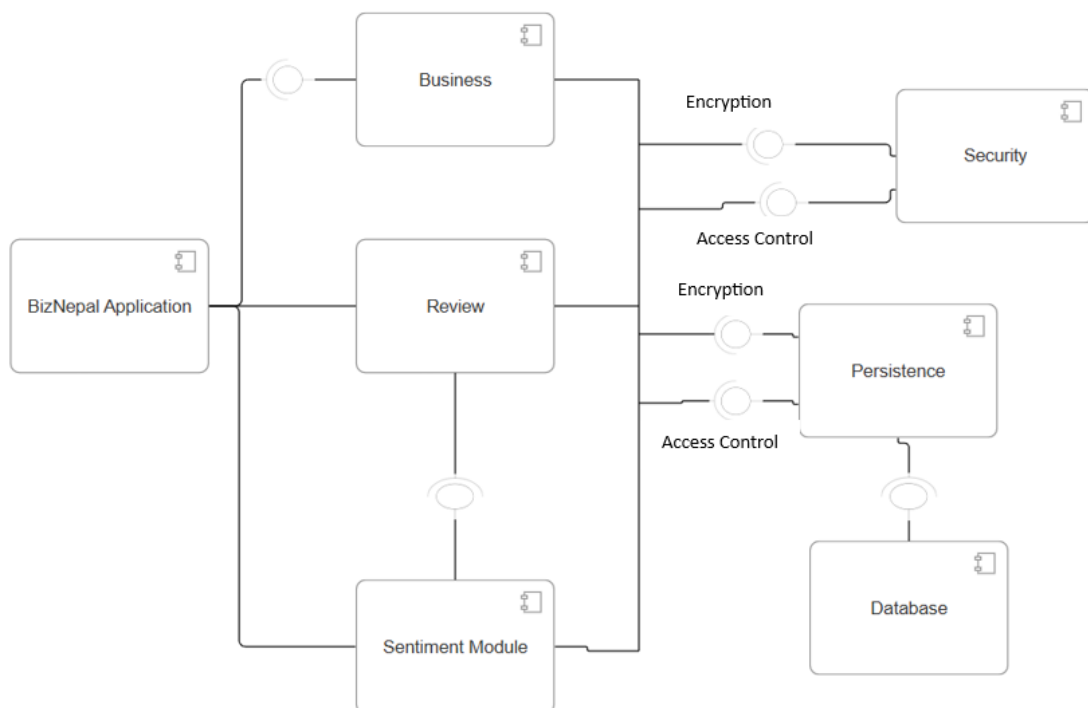


Figure 12 Component of BizNepal

4.1.4 Interface Design:

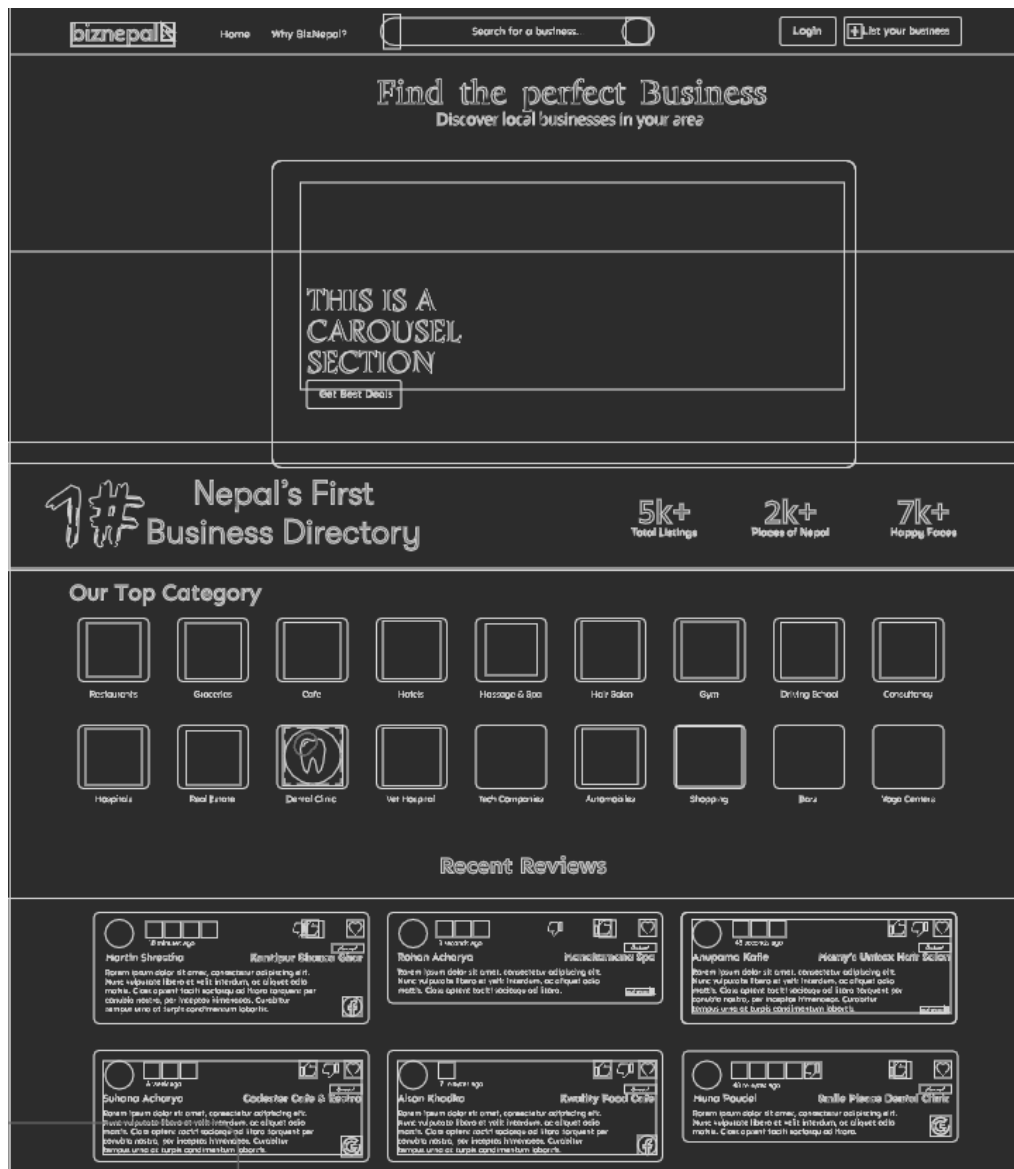


Figure 13 Wireframe of BizNepal Landing Page



Figure 14 Wireframe of Business Display In Card Form

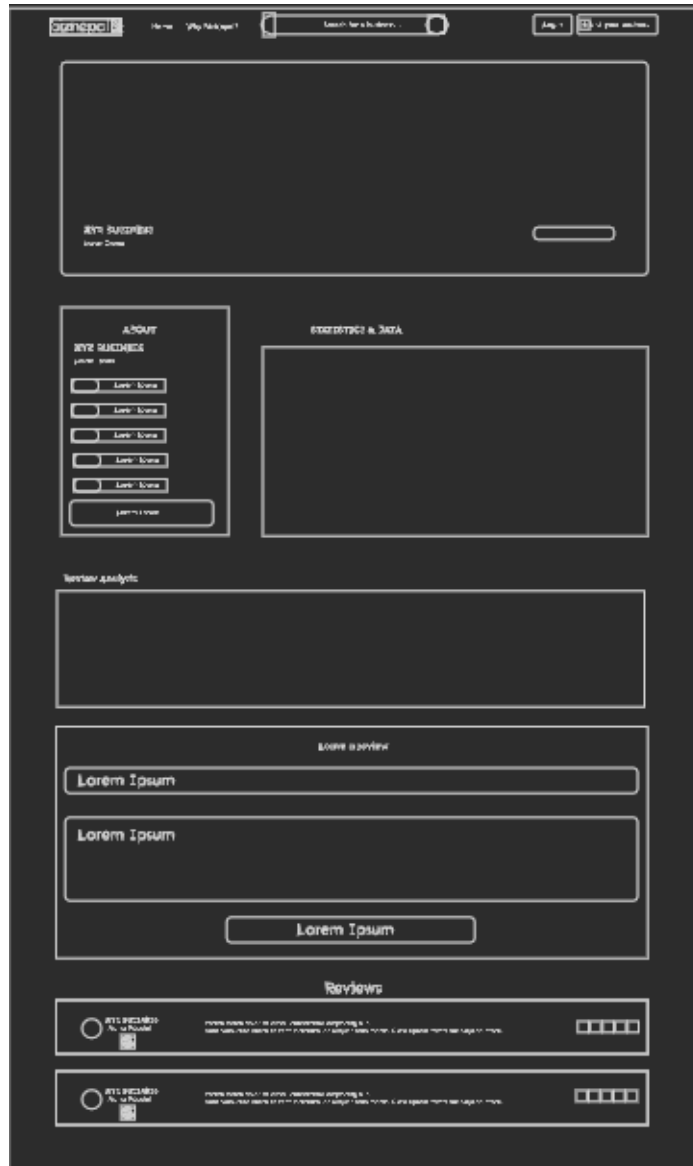


Figure 15 wireframe of Business Profile



Figure 16 Wireframe of Business Listing From Page

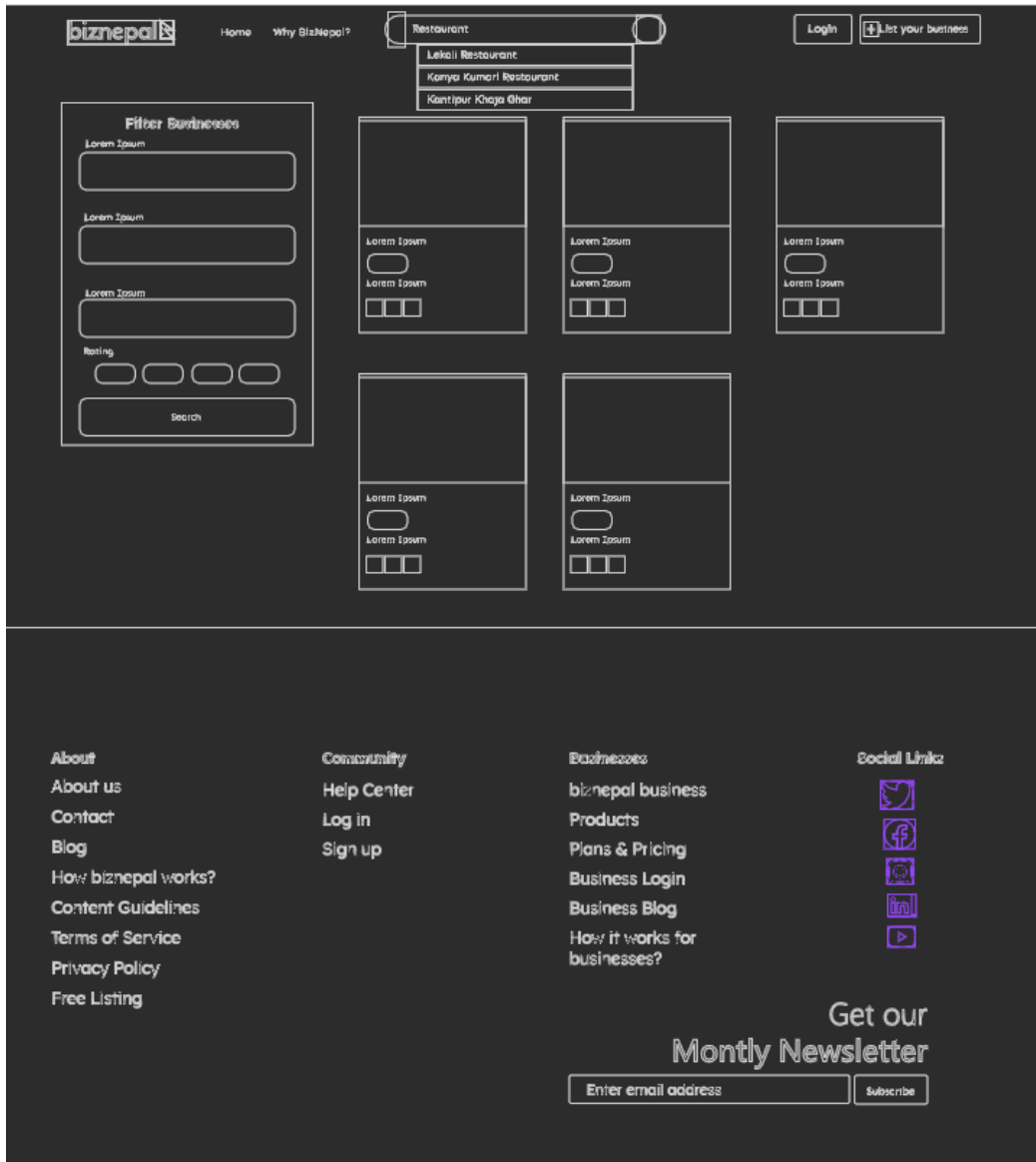


Figure 17 Searching Wireframe In BizNepal

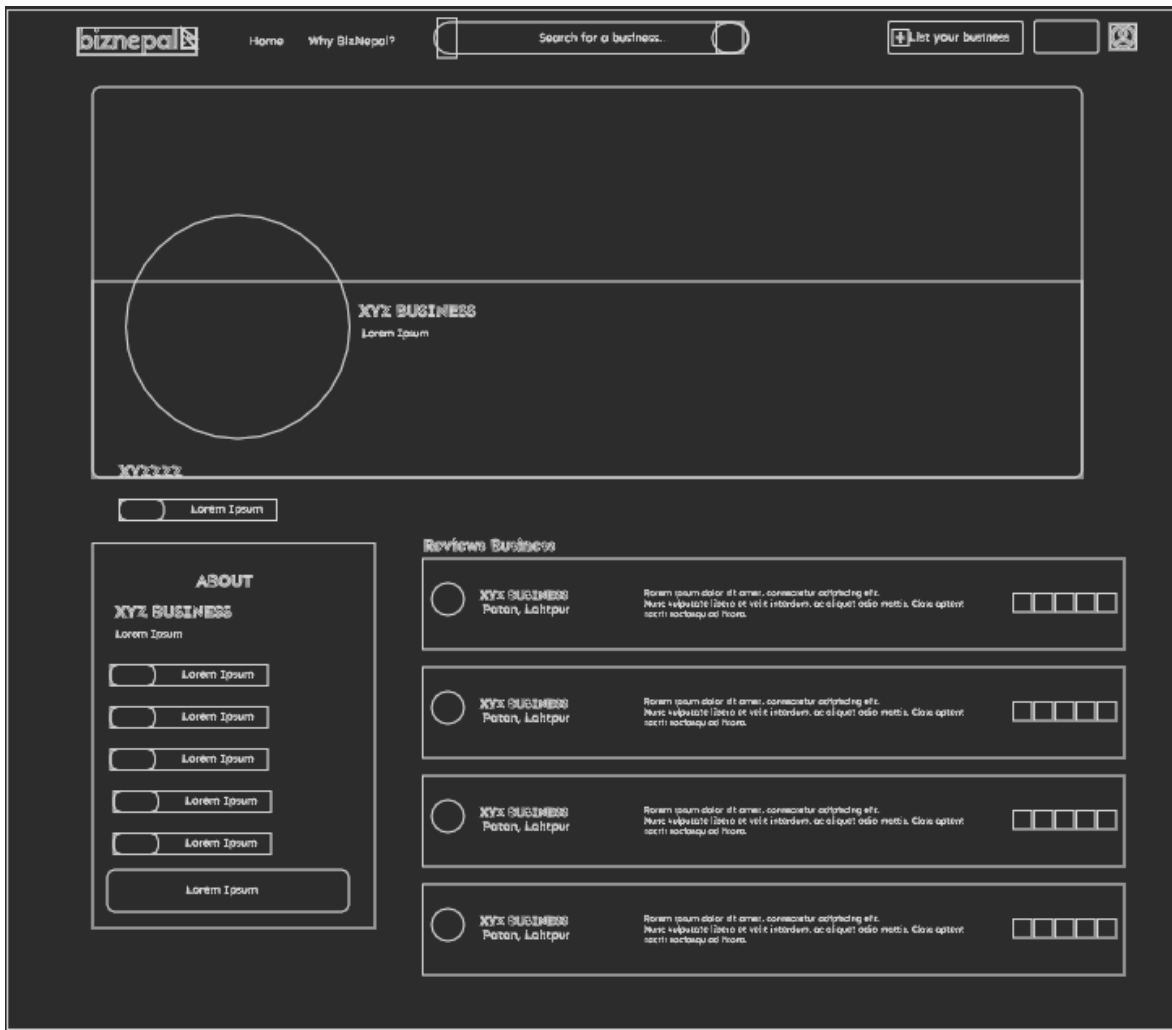


Figure 18 User Profile And Information Wireframe



Figure 19 Wireframe of Registration Page

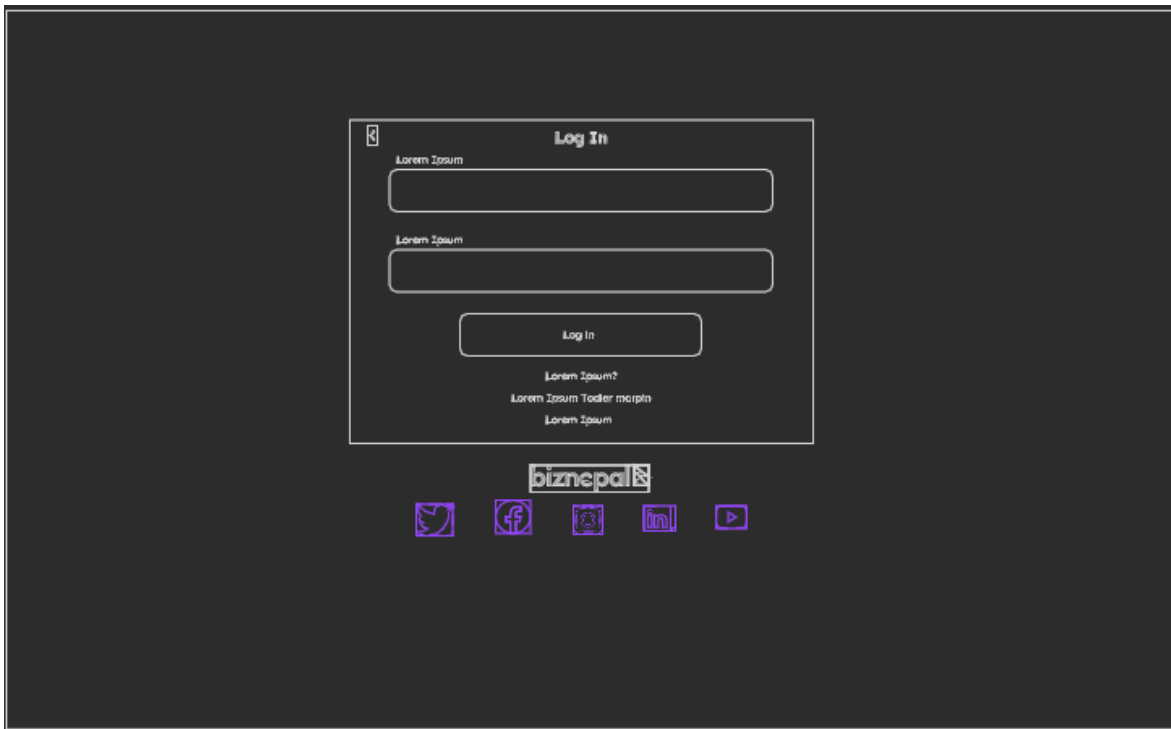


Figure 20 Wireframe of Login Page

4.2. Description of Algorithms:

4.2.1. Haversine Formula:

The haversine formula determines the great-circle distance between two points on a sphere given their longitudes and latitudes. Important in navigation, it is a special case of a more general formula in spherical trigonometry, the law of haversines, that relates the sides and angles of spherical triangles.

Formulation

Let the central angle θ between any two points on a sphere be:

$$\theta = \frac{d}{r}$$

The haversine formula allows the haversine of θ to be computed directly from the latitude (represented by φ) and longitude (represented by λ) of the two points:

$$\text{hav } \theta = \text{hav}(\Delta\varphi) + \cos(\varphi_1) \cos(\varphi_2) \text{hav}(\Delta\lambda)$$

Where,

- φ_1, φ_2 are the latitude of point 1 and latitude of point 2,
- λ_1, λ_2 are the longitude of point 1 and longitude of point 2,
- $\Delta\varphi = \varphi_2 - \varphi_1, \Delta\lambda = \lambda_2 - \lambda_1$.

Finally, the haversine function $\text{hav}(\theta)$, applied above to both the central angle θ and the differences in latitude and longitude, is

$$\text{hav } \theta = \sin^2\left(\frac{\theta}{2}\right) = \frac{1 - \cos(\theta)}{2}$$

To solve for the distance d , apply the archaversine (inverse haversine) to $\text{hav}(\theta)$ or use the arcsine (inverse sine) function:

$$d = r \text{archav}(\text{hav } \theta) = 2r \arcsin(\sqrt{\text{hav } \theta})$$

•

The sample code using in Project is given below. This is used to calculate distance between user coordinates and business coordinates so that to show business within that distance.

```
// Haversine formula to calculate distance in kilometers
private static double GetDistanceInKm(double lat1, double lon1, double lat2,
double lon2)
{
    const double EarthRadius = 6371; // Earth's radius in kilometers

    var dLat = DegreesToRadians(lat2 - lat1);
    var dLon = DegreesToRadians(lon2 - lon1);

    var a = Math.Sin(dLat / 2) * Math.Sin(dLat / 2) +
        Math.Cos(DegreesToRadians(lat1)) *
Math.Cos(DegreesToRadians(lat2)) *
        Math.Sin(dLon / 2) * Math.Sin(dLon / 2);

    var c = 2 * Math.Atan2(Math.Sqrt(a), Math.Sqrt(1 - a));
    return EarthRadius * c;
}
```

4.2.2. Logistic regression

For our project, we are going to use **Sentiment analysis algorithm**. Sentiment analysis, or opinion mining, is the process of analyzing large volumes of text to determine whether it expresses a positive, negative or a neutral sentiment. Sentiment analysis uses natural language processing (NLP) and machine learning (ML) technologies to train computer software to analyze and interpret text like humans. [6]

A logistic model, also known as **logistic regression**, is a statistical technique utilized for binary classification tasks. It estimates the likelihood that a particular input falls into one of two categories. The model applies a logistic function, or sigmoid function, to translate the input features into a probability score ranging from 0 to 1. [7]

The dataset used is Yelp review dataset. The initial structure of the dataset is as below:

	review_id	user_id	business_id	stars	useful	funny	cool	text	date
0	ljUkKzmXtuST_VIMDhvOw	j0h_JZabUH5Lm2q6N8Utw	ka06rQE8Z-8etFZ0Oa4qyg	5.0	0	0	0	My favorite Publix! Always clean, inside and o...	2017-08-10 20:25:44
1	u7MdcnZ9y-3qloSKEvA3RA	CFi2XrWkugQ1LolJhtN2Nw	B91y8SPvAz5Q_t9JfAfN1Q	1.0	3	0	0	This place is terrible! If you know what's goo...	2020-09-13 14:17:16
2	1YOEdsbAfaG4WWWQyzz2iA	B-yyh8MWYHtgLTV1U_Xk2g	3JpJ3b8r5jMdAb1yPmchrQ	5.0	0	0	0	Best chicken I've ever had. Hot , spicy, juicy...	2018-04-26 04:05:44
3	AUE6lq-2EyKS_CGg0-jJaA	g50Q8wWqiasHP32XH-lyvQ	IANRJpM8uHD7pxZsG4fGw	1.0	0	0	0	Shady place. A lot of "under the table" type th...	2018-02-03 00:30:22
4	FJIR_SOVvh_8vmOaiKx4fQ	2ujyfzrQ30K1r86mklFkg	vloE7oh2OzOYGvZSt6aVfQ	3.0	0	0	0	Great local coffee shop. Good place to relax, ...	2015-05-20 15:06:42

The stars in the dataset is used to create new column sentiment which consist value like negative and positive.

```
def f(row):
    '''This function returns sentiment value based on the overall ratings from the user'''
    if row['stars'] >= 3.0:
        val = 'Positive'
    else:
        val = 'Negative'
    return val

#Applying the function in our new column
process_reviews['sentiment'] = process_reviews.apply(f, axis=1)
process_reviews.head()
```

	stars	Review	sentiment
0	5.0	My favorite Publix! Always clean, inside and o...	Positive
1	1.0	This place is terrible! If you know what's goo...	Negative
2	5.0	Best chicken I've ever had. Hot , spicy, juicy...	Positive
3	1.0	Shady place. Alot of "under the table" type th...	Negative
4	3.0	Great local coffee shop. Good place to relax, ...	Positive

Then we use logistic regression after processing and transforming it to desired format.

The preprocessing step used are Null value handling, removing unnecessary columns, Punctuation cleaning, stop words, Stemming, TFIDF etc.

After performing logistic regression on data, we get result as below:

```
#creating the objects
logreg_cv = LogisticRegression(random_state=0)

cv_dict = {0: 'Logistic Regression'}
cv_models=[logreg_cv]

for i,model in enumerate(cv_models):
    print("{} Test Accuracy: {}".format(cv_dict[i],cross_val_score(model, X, y, cv=10, scoring = 'accuracy').mean()))

Logistic Regression Test Accuracy: 0.9038821048656134
```

Looking at the result we get 90% accuracy on the model.

Chapter 5: Implementation and Testing

5.1. Implementation

5.1.1. Tools used

- React.js: Frontend development JavaScript library
- Bootstrap: CSS framework.
- .Net: For building API and runtime environment
- PostgreSQL: An open-source relational database management system uses as database management
- Git: A distributed version control system for tracking changes in source code during software development.
- Git hub: A web-based platform for version control and collaborative development using Git.
- Lucid charts and Draw.io: To create diagram like class diagram state diagram and Gantt charts.
- Vs code: IDE for writing and running the code

5.1.2. Implementation Details of modules

Some of the module included in the project are:

- Admin Module: It allows administrators to carry out task like user management, business management and category management. Administration able to add category, edit delete user, business and category using this module
- User Module: This module includes special feature like user register, signup, login, business listing, search business, review the business.
- Business user module: It allows business management, review analytics.
- Sentiment analysis module: It take business review as input and gives the sentiment of the business in negative and positive.

5.2. Testing

Testing is a comprehensive process that ensures that software applications are reliable, secure, and user-friendly. It encompasses a range of techniques and methodologies, each targeting different aspects of software to provide a quality product.

System testing, also referred to as system-level tests or system-integration testing, is the process in which a quality assurance (QA) team evaluates how the various components of application interact together in the full, integrated system or application.

Types and levels of testing

Levels of testing performed for the project's testing are as:

- **Unit Testing:** As part of unit testing, unit tests were written in the backend to verify the working of APIs.
- **Integration Testing:** Integration testing was performed manually to verify that the frontend, backend and database worked seamlessly with each other.
- **System Testing:** As part of system testing, the system was tested entirely end-to-end to identify potential errors and bugs.
- **Acceptance Testing:** The system was tested with user perspective to fulfill the acceptance criteria as part of acceptance testing

5.2.1. Test Case for Unit Testing

- i. Login Validation test 1

Description

User must register first to get log in to site, assume user register first and test is performed

Table 1: Login Validation

Test ID	Test Steps	Test Data	Expected Result	Actual Result	Result(p/f)
1	Click the Login Button		Login Successful and navigate to home page	Login Successful and navigated	Pass
2	Provide registered email or username	test@gmail.com			pass

3	Provide registered password	1111			pass
4	Login				pass

ii. Business listing process test 2

Description:

Business Owner should log first as business owner and then only they can list the business let assume the user is business owner and check the business listing

Table 2: Business Listing Validation

Test ID	Test Steps	Test Data	Expected Result	Actual Result	Result(p/f)
1	Click the Business list button from navbar		Business Created Successfully	Business created Successfully	Pass
2	Providing business name	Test Business			
3	Provide District	Kathmandu			
4	Providing City	Baneshwor			
5	Providing Description	Business Description			
6	Providing website	www.test.com			
7	Category	Gym			
8	Image	Businessimage.png			

9	Location	Lat and long of map			
10	Add business	Button clicked	Business register success full	Business register success full	Pass

iii. Searching Business process test 3

Table 3: Business Search Validation

Test ID	Test Steps	Test Data	Expected Result	Actual Result	Result(p/f)
1	From navbar in search box searching business	Test Business	Search Result on business result screen	Searching business get render in business result screen	Pass

5.2.2. Test Case for Integrated Testing

Integration Testing can be defined as the type of system testing where the system modules are integrated logically and tested as a group. The integration testing of our System is given below.

Description

Integrated testing for register a user, add business, add comment on business

Table 4: Integration Testing Table

Test ID	Test Steps	Test Data	Expected Result	Actual Result	Result(p/f)
1	Hover and click the Login/Registrar button on	<ul style="list-style-type: none"> • Username • Email • Password • role 	Registration Successful	Registration Successful	Pass

	Navigation bar and Register the User				
2	Login User	<ul style="list-style-type: none"> • Enter email or username • Enter Password 	Successful login and navigate to home page	Login success and navigate to home page	pass
3	From navbar in search box searching business		Business should be render in business result screen	Business get render	Pass

5.2.3. Test Case for System testing

In system testing the behavior of whole system/product is tested as defined by the scope of the development project or product.

Here we test the responsiveness of the system

Table 5: System Responsiveness Testing

Test ID	Test Steps	Step to Execution	Expected Result	Actual Result	Result(p/f)
1	Verify that the layouts adapt the desktop screen	When user open application in desktop resize to 1920 x 1080	Render correctly without overlapping	Same as expected result	Pass
2	Verify the layout adapt the tablet screen	When user open application in tablet resize to 768 x 608	Render correctly without overlapping	Same as expected result	pass

3	Verify the layout adapt the mobile screen	When user open application in mobile resize to 320 x 608	Render correctly without overlapping	Same as expected result	pass
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Chapter 6: Conclusion and Future Recommendations

6.1. Conclusion

BizNepal is a platform designed to help businesses reach a larger audience and link consumers with the businesses they want. It is more than just a business directory. We have tried to develop an intuitive, engaging environment that makes life easier for both customers and business owners by combining elements like reviews and comments. This project shows the significant role that technology can play in boost Nepal's economy and companies. We are providing everyone more power and insights to make better decisions. BizNepal has a lot of things to improve as it expands, whether that means introducing new features, making a more user-friendly, or adding more languages so that it can reach all of Nepal.

6.2. Future Recommendation

Integrated Review System: Integration of review from multiple platforms like Facebook, google will provide user with centralized place for review management.

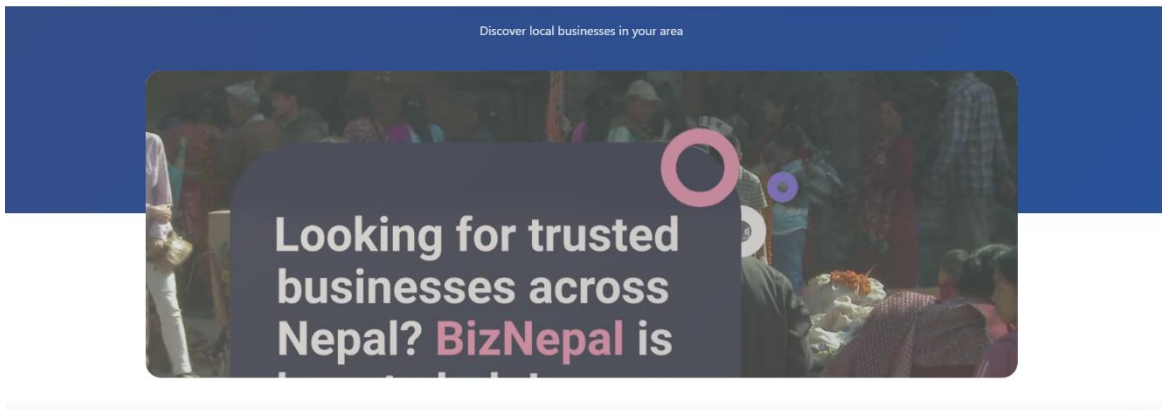
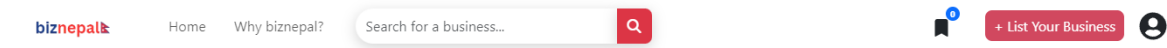
Enhanced User Engagement: Introduce points, badge, or reward for users who often contribute reviews, comment or suggestions.

Mobile based application: User can easily access the business directory through mobile.

Sentiment Analysis Improvement: Using deep learning model we can understand the tone of review more effectively.

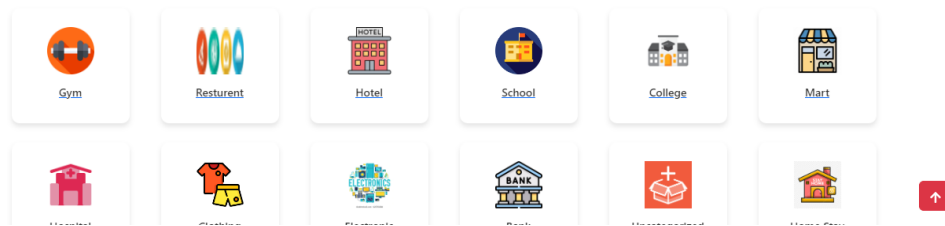
Online Service: It will allow user to access various online services like booking reservation, ordering products or service etc. directly through the website.

Appendix

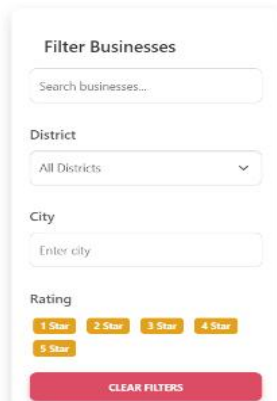


Browse By Category

Discover local businesses and services across various categories



Home Stay Businesses



Deploy **Test**
Review **Develop**

Pihu technologies
Gym

Bookmark

About Pihu technologies

Taxi 123

Location
Kathmandu, kathmandu

Contact
9854789658

Website
[Visit Website](#)

Views
12

Call Directions

Business Sentiment Meter

Sentiment Meter

0 50 100
Sentiment: Positive

Review Analysis

Positive Reviews 100.00%

Negative Reviews 0.00%

←

biznepal

Welcome Back

Sign in to continue to BizNepal

Username or Email

Password

Sign In

[Forgot Password?](#)

Don't have an account?
[Register](#)

←

Register To biznepal

Create an account to get started

Username

Email

Password

Confirm Password

Continue

Select Your Role

Choose the role that best describes you to get started with BizNepal

General User

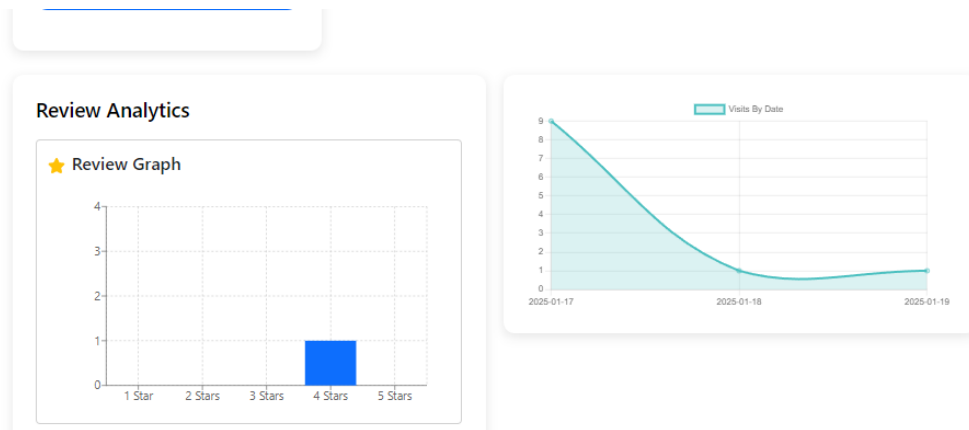
Browse businesses, read reviews, and discover local services in Nepal.

Continue as General User

Business Owner

List your business, manage your profile, and connect with potential customers.

Continue as Business Owner



Leave a Review

Comment

Write your comment here...

Rating

★ ★ ★ ★ ★ (1)

Submit Review

Reviews

👤 1/17/2025
★ ★ ★ ★ ★

This business has excellent customer service and a great selection of products!

Dashboard

Dashboard

Manage Business

Review

★ Business Dashboard

Your Business Performance at a Glance

Total Businesses

3

↑ 12% from last month

Total Reviews

2

↑ 8% from last month

Average Rating

2.0

★ ★ ★ ★ ★

Review Trends

Dashboard

- Dashboard
- Manage Business
- Review

My Business Listings

Manage your registered businesses

3

Total Listings

2

Review

+ Add New

Deepika Boarding School

Srijananagar, Bhaktapur

Uncategorized

Views	Reviews	Rating
11	2	2 ★

Mero Business

ffff, Banke

Home Stay

Views	Reviews	Rating
9	0	4 ★

Dashboard

- General User
- Business Owner
- Business
- Category
- All User
- Logout

Total Users

13

Total Business

121

Total Categories

12

Business Created Per Year

Year	Number of Businesses
2023	~5
2024	~110
2025	~10

Business Created Per day

Businesses by Category

User Created Per day

Add Use

Show 10 entries

Search:

Username	Email	Role	Actions
ananda	ananda@gmail.com	GeneralUser	Edit Delete
Manish	businessowner@gmail.com	BusinessOwner	Edit Delete
newuser	newuser@gmail.com	BusinessOwner	Edit Delete
prastuti	prastuti@gmail.com	GeneralUser	Edit Delete
pup	pup@gmail.com	Admin	Edit Delete
rabin	rabin@gamil.com	BusinessOwner	Edit Delete
Rahuladhikari	rahuladhikar2034@gmail.com	GeneralUser	Edit Delete
ronil	ronil@gmail.com	BusinessOwner	Edit Delete
sagar10	sagar10@gmail.com	BusinessOwner	Edit Delete

[Add Category](#)

Show entries Search:

Category Name	Actions
Bank	Edit Delete
Clothing	Edit Delete
College	Edit Delete
Electronic	Edit Delete
Gym	Edit Delete
Home Stay	Edit Delete
Hospital	Edit Delete
Hotel	Edit Delete

entries per page Search:

Name	Description	Category	Phone	Website	Actions
Annapurna Circuit Adventures	Superficial foreign body, unspecified thigh, subs encntr	Uncategorized	9800965036	https://geocities.com/vel/augue/vestibulum.json	Edit Delete
Annapurna Circuit Supplies	External constriction, unspecified lower leg	Uncategorized	9450366412	https://seesaa.net/ornare/imperdiet/sapien/urna.png	Edit Delete
Annapurna Circuit Treks	Nondisp fx of base of 2nd MC bone, I hand, 7thP	Gym	9167520582	http://webmd.com/ac/est/lacinia/nisi.json	Edit Delete
Annapurna Trekkers Hub	Corrosion of second degree of other site of trunk, sequela	Uncategorized	9090809318	https://msu.edu/suscipit/a/feugiat/et/eros/vestibulum/ac.json	Edit Delete

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