Project Report

on

FREECOM

In partial fulfillment of requirements for the degree

of

BACHELOR OF TECHNOLOGY
IN

COMPUTER SCIENCE & ENGINEERING

Submitted by:

DEVA GANESH NAIR [19100BTCSAII05257]

DIVYAM PITHAWA [19100BTCSAII05259]

JANISH PANCHOLI [19100BTCSAII05265]

SARTHAK NAHAR [19100BTCSAII05283]

Under the guidance of

PROF. PRITESH KUMAR JAIN

SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE

SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

JUL-DEC-2022

SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE

SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

DECLARATION

We here declare that work which is being presented in the project entitled "**FreeCom**" in partial fulfillment of degree of **Bachelor of Technology** in **Computer Science & Engineering** is an authentic record of our work carried out under the supervision and guidance of **Mr. Pritesh Kumar Jain Assistant Professor** of Computer Science & Engineering. The matter embodied in this project has not been submitted for the award of any other degree.

Deva Ganesh Nair

Divyam Pithawa

Janish Pancholi

Sarthak Nahar

Date:

SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE

SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROJECT APPROVAL SHEET

The following team has done the appropriate work related to the "**FreeCom**" in partial fulfillment for the award of **Bachelor of Technology** in **Computer Science & Engineering** of "SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY" and is being submitted to SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE.

Team:

1. Deva Ganesh Nair

2. Divyam Pithawa

3. Janish Pancholi

4. Sarthak Nahar

Internal Examiner **External Examiner**

Date

SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE

SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CERTIFICATE

This is to certify that **Mr. Deva Ganesh Nair**, **Mr. Divyam Pithawa**, **Mr. Janish Pancholi** and **Mr. Sarthak Nahar** working in a team have satisfactorily completed the project entitled "**FreeCom**" under the guidance of Mr. Pritesh Kumar Jain in the partial fulfillment of the degree of **Bachelor of Technology** in **Computer Science & Engineering** awarded by SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY affiliated to SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE during the academic year **Jul-Dec-2022**.

Mr. Pritesh Kumar Jain
Project Guide

Mr. Rajesh Kumar Chakrawarti
Project Coordinator

Dr. Anand Rajavat
Director & Head,
Department of Computer Science & Engineering

ACKNOWLEDGEMENT

We are grateful to a number of persons for their advice and support during the time of complete our project work. First and foremost, our thanks go to **Dr. Anand Rajavat** Head of the Department of Computer Science & Engineering and **Mr. Pritesh Kumar Jain** the mentor of our project for providing us valuable support and necessary help whenever required and also helping us explore new technologies by the help of their technical expertise. His direction, supervision and constructive criticism were indeed the source of inspiration for us.

We would also like to express our sincere gratitude towards our Director **Dr. Anand Rajavat** for providing us valuable support.

We are really indebted to **Mr. Rajesh Kumar Chakrawarti ,** project coordinator for helping us in each aspect of our academic's activities. We also owe our sincere thanks to all the **faculty members** of Computer Science & Engineering Department who have always been helpful.

We forward our sincere thanks to all **teaching and non-teaching staff** of Computer Science & Engineering department, SVVV Indore for providing necessary information and their kind co-operation.

We would like to thanks our parents and family members, our classmates and our friends for their motivation and their valuable suggestion during the project. Last, but not the least, we thank all those people, who have helped us directly or indirectly in accomplishing this work. It has been a privilege to study at SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE.

ABSTRACT

With the rapid development of science and technology and economic society, the application of artificial intelligence (AI) is becoming more and more common. Its development has a profound impact on our work and lifestyle. In the field of e-commerce, AI technology has also been well applied and achieved good results. AI has become an important driving force for the development of e-commerce.

By taking one step further, we have proposed our system "FreeCom". It will be available as a web application. It will be hosted online. It is designed to compare the prices and specifications of electronic goods from a range of providers, which will help consumers make decisions to choose products that will save them money online. It will also provide a mechanism to verify the authenticity of the product through the use of a QR code reader. It will also provide a QR code comparison mechanism that will help the consumer when comparing items in retail stores. For marketing purposes, companies often use creative art, images, or logos that have hidden discounts or offers that will be sent to the consumer's email address when they purchase goods from their site. This technique can be implemented using Steganography. There is one product analysis part that will help consumers get to know about the top trending products according to the Amazon dataset.

LIST OF FIGURES

TABLE OF CONTENT

CHAPTER 1
INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In the contemporary arena, Internet has become an inseparable and indispensable part of an average household. People are extensively using the Internet to gather information about products and services they are willing to purchase or pay for. People tend to spend hours together browsing through a whole host of websites to gather particulars about a product, before going in for its purchase. In today's hyper-competitive e-commerce scenario, retail players grab every opportunity to attract potential customers.

Price comparison websites are one of the opportunities e-retailers leverage to attract customers. Price comparison websites are a win-win for both a business owner and a customer. Customers benefit by gaining good deals, a convenient shopping experience, better coverage than major e-commerce sites, and a display of greater variety for the same product. On the other hand, businessowners benefit by gaining a greater number of leads, better conversion rates, and enhanced customer service.

Product comparison will help users to select the best product out of two products available in the same electronic category; e.g., iPhone 6s vs One Plus 6T.

A QR code reader and decoder will allow the user to check whether the product is authentic or not.

A QR code comparison is used to compare products with the product QR code only. It will save us from having to rely on the salesman's understanding. In this, we can compare two products, i.e., either a mobile or a laptop. For example, mobiles and laptops have the greatest number of specifications, i.e., fingerprint sensors, processors,

RAM, etc. Also, it needs a clear and concise analysis of specifications.

Steganography will be used for marketing purposes by the brand or company. A company/brand will use its creative art/images/logo in a lottery-type system. The user/customer will collect those creative art/images/logos and use this module to redeem the code for a discount/offer etc.

In product analysis, there will be a popularity-based recommendation system using IMDB's rating formula. As the dataset changes, it will change the popularity of products. It will help users or customers select the most trending product at a glance. This site's end goal is to provide the best and most practical benefit to the user.

1.2 PROBLEM STATEMENT

Since the usage of the internet is growing day by day, many of the daily necessary products are available online on E-commerce websites. By knowing the demand of the customers' many E-commerce websites is selling the same product but at different prices. This price variation is dependent on various causes, such as offers, festival discounts, one-time sale offers, etc. Since many sites have their price list based on their discount scheme. A layman would have to work his way through various other e-commerce websites to get the best product at the right price.

A web comparison website needs to return results with the low prices as what the customers want but accurate results are also important so that customers can get what they want. It also depends on how regularly the database is being updated otherwise customers will be confused when they compared it to another site.

Most working people do not have time to do the shopping for their home groceries. As consumers, they have the right to choose which shop is offering the best price for a certain product that they are interested in. However, checking on the price offered by each shop is time-consuming and due to the limited time that they have, they are not able to compare the prices and end up buying the certain

product at a higher price. The typical mindset of customers nowadays, they see Amazon as the provider for the cheapest product but the reality is, that not every product in Tesco is offered at the cheapest price. Sometimes, the smaller shop in the neighborhood offers cheaper prices.

The other problem that occurs to the retailers/seller side is for them to promote their products or if there is any promotion going on, usually they will print out a pamphlet to distribute to the customers. It is costly as they have to produce it in lots of copies and if there is any error in the printed pamphlet, they have to correct every copy, which is time-consuming, so that customers will not confuse with the pricing. Plus, the catalog or pamphlets given to customers usually end up being thrown away carelessly and which led to pollution. Therefore, by having a catalog published online the sellers will be able to save costs and support the green campaign too.

Moreover, the sellers/retailers who are operating with the small shops, usually don't know about blogging and website to promote their products online. Compared to big supermarkets like Giant or Tesco that have their website, owners of small shops found it hard for them to reach out to their customers. They do have the basic knowledge about the internet but they do not have the skills to have a blog/website for their shops. So, this project will be beneficial for them to get people to know about them and their products.

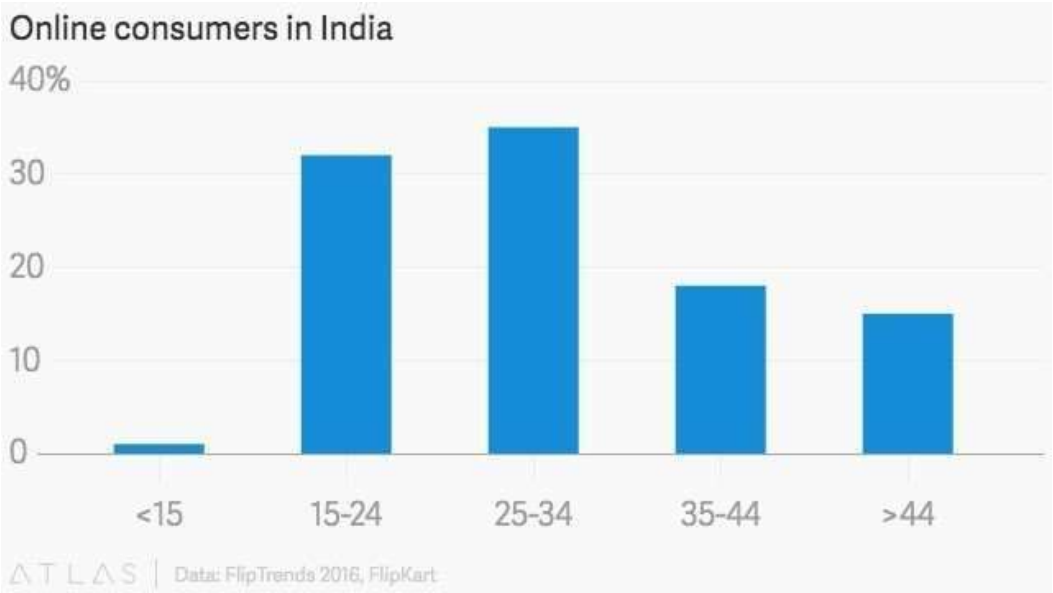
The main problems are as follows:

1. Consumers are confused by the many e-commerce websites selling the same product.
2. Consumers want specifications of the product on touch or scan.
3. Retailers have to employ individuals with knowledge of the product specifications.
4. The brand/company wants useful interaction with the customer.
5. Scam/fake products on e-commerce require an authentication mechanism.
6. Customers want to know the trending products on e-commerce websites.

1.3 NEED FOR THE PROPER SYSTEM

"FreeCom" acts as a tool to assist consumers to make an informed decision before purchasing a product by providing a list of prices offered by different retailers/supermarkets. Users will use this website as their reference to check on the price of groceries products sold and promote if there is any promotion going on. It is also able to help sellers to promote a new product by sending emails to the subscribers about them. Users will use this website to check out the difference between an electronic device that seems to have almost the same price but may have different specifications.

Instead of taking hours and energy to go to each shop just want to check on the price, "FreeCom" offered a better solution by getting all the prices, and users just need to go online about and choose which product they want to know and the list of retailers and the price offered will be shown. Users can check it from anywhere, no matter at home or work, or even on the train while going back from work, "FreeCom" is accessible anytime as long as there is an internet connection. Users can also check the authenticity of the product that they bought using the QR code scanner on our site.



Online Consumer in India by Age Group Source: FlipkartTrends, 2016

According to two of India's burgeoning domestic e-commerce companies, Flipkart and Snapdeal, more than 80% of online shoppers made purchases through their smartphones, accessing the portals via mobile sites or apps.

The most popular purchases in 2016 included mobile phones, tablets, computers, and other electronics, according to Flipkart and Snapdeal. "Indians were seen buying aspirational products and high-value items such as premium phones, consumer electronics, and appliances," the #FlipTrends2016 report said. Bengaluru-based Flipkart attributed over 60% of its sales to men.

Although shoppers between 25 and 34 years of age were most active on e-commerce portals, a surprising number of older people also shopped online in 2016.

A study conducted by comScore, co-sponsored by Searchandise Commerce and iProspect, resulted in the following;

• Shoppers usually consulted about four websites for price and feature information (on average)

• Amongst all consumers who are purchasing products offline, roughly two-thirds begin their searches online, using a combination of search websites and the retailer's website.

• 70% of shoppers make purchases within one month of their searching on the internet and one-third of the shoppers buy within one week of starting their searches.

It is shown that online search has become the norm nowadays and most of the customers out there have become more educated and know how to use the internet. Therefore, it is significant to develop a system that provides information needed for consumers' shopping. The development of "FreeCom" will help consumers to increase their price consciousness, help them make informed decisions to save money as well as help the sellers advertise for free.

1.4 OBJECTIVE

The main objectives of our web application are as follows:

1. To compare the prices of the same product from different e-commerce sites and show the cheapest of the two products.
2. To compare any two electronic devices based on their specifications and show the comparison to the customer.
3. To ensure the authenticity of the product that the customer bought by scanning the QR code available on the product.
4. To increase price consciousness among consumers.
5. Obtaining leads by marketing our web app to consumers who want hassle-free services by providing QR-based comparison in retail stores.
6. Trending products are displayed to help the companies analyze the trends and the market.

1.5 MODULES OF THE SYSTEM

The web application can be separated into six modules which are as follows: -

1. Price Comparison:

Customers will enter the product name and our site will compare the price of the same product from different e-commerce sites and show the cheapest products as the result in a tabular format.

- The system must allow the user to enter the product name.
- The system must show the result to the user in tabular format.
- The system must show the respective link to buy the product for each item in the table.

2. Product Comparison:

The customer will enter the product name and our site will compare any two electronic devices based on their specifications and show that compared to the customer.

- The system must allow the user to enter the first product name.
- The system must allow the user to enter the second product name.
- The system must show the comparison result to the user in tabular format.

3. QR-based Authentication:

The customer will scan the QR code with the help of our site, which will redirect the Customer to the company/brands authenticity mechanism for the product validity

- The system must scan the QR code provided by the user.
- The system must decode the QR code.
- The system must open the link contained in the code in a new tab for the user to access.

4. QR-based Comparison:

Customers will scan the QR codes of any two electronic devices and our site will compare those products based on their specifications.

- The system must scan two QR codes provided by the user for the comparison.
- The system must show the comparison result to the user in tabular format.

5. Redeem Code (Steganography)

The customer will upload the encrypted image with the discount/offer code hidden in it and our site will decrypt the image to redeem the code and show it to the user.

- The system must allow the user to upload the image.
- The system must decrypt the image and show the hidden code (if any) to the user.

- The system must be able to check the authenticity of the code hidden in the image.

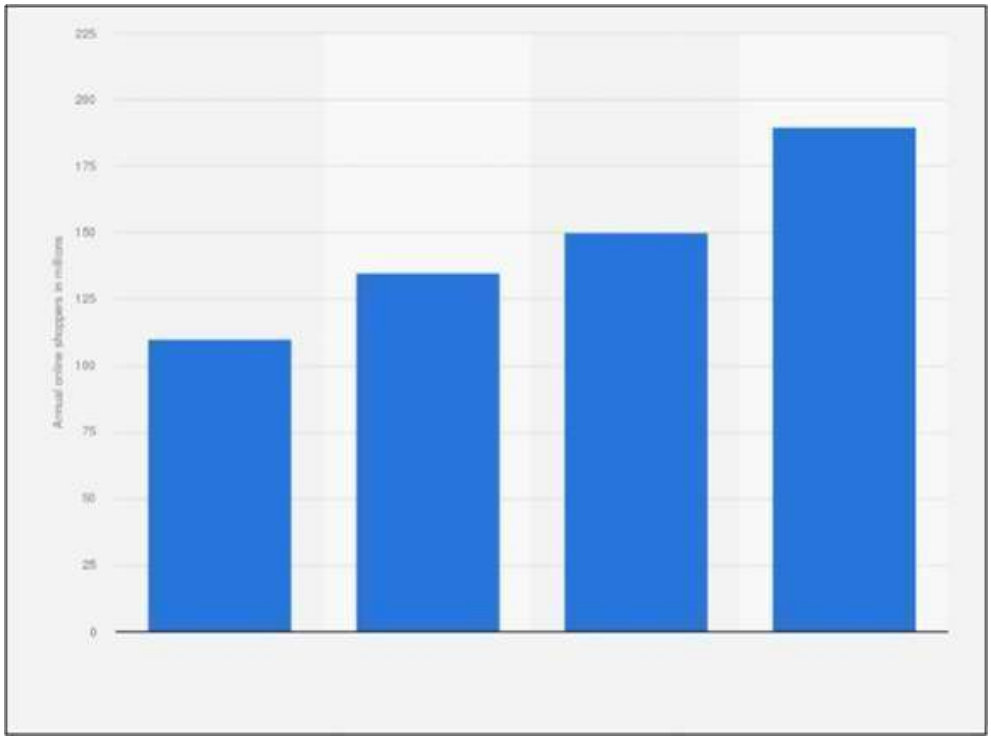
6. Product Analysis (Recommendation Engine):

Customers will be able to see various ranked various products based on their popularity using the weighted rating formula (used by IMDB).

- The system must accept the dataset provided to it by the admin.
- The system must prevent any redundancy regarding the dataset.
- The system must show the ranked trending products with their image, information, score, and link to buy.

1.6 SCOPE

The scope of the study for this "FreeCom" project will be all internet users and it is narrowed down to those who are using the internet for business-related purposes, especially in India. Satista.com has provided a statistic for Indian online shopping based on the number of internet buyers. Refer to the figure below to see the number of annual shoppers, in India.



Number of annual shoppers, India 2018-2020 Source: statista.com

In 2020, there were approximately 150 million online shoppers annually, compared to about 135 million online shoppers in 2019 in India. This increase can be attributed to the growth of the e-commerce industry in India and to the coronavirus (COVID-19) pandemic, which led to a change in the shopping behavior of consumers. In 2021, the number of online shoppers is expected to increase further.

With the internet, a price comparison website is accessible anytime and anywhere. The observation made by the author has resulted that people usually going online when they are on the way back from work, especially those who are using public transport. Therefore, visiting "FreeCom" can be one of their choices to fill up their free time. They also can share the link of the promotion through the social website such as Facebook and Twitter which has the most Indian internet users according to the research made by gs.statcounter.com (https://gs.statcounter.com/social-media-stats/all/india).
Meanwhile, for the sellers/retailers, the target will be focusing more on the business that operating at the shop lot. Based on the interview done by the author with some of the owners of the shops, they admit that it will be useful for them if there is a service for them to advertise their products on the web for free because they don't have much time and insufficient skills to maintain website/blog on their own.

CHAPTER 2
LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING SYSTEM

Nowadays every user who uses the internet wants to buy the product online and searches for the product which costs them less and there are many competitors in the e-Commerce market for selling the product at fewer rates with huge discounts. There are many price comparison sites available online that try to provide the best price for the same product across different e-commerce websites.

1. Indian Sites

Naaptol

Perhaps, this particular site is one of the oldest players in the price comparison sector. Irrespective of the product, you can compare costs and then finalize your purchase.

PricePanda

If you love to buy electronic items, laptops, computers, and gaming consoles, PricePanda will be your best online price comparison partner. The site caters to users in Latin American and South-East Asian countries like Indonesia, Mexico, Malaysia, and the Philippines.

2. International Sites

Google Shopping

Google Shopping is one of the largest price comparison shopping engines available to online shoppers. Products available on Google Shopping are also visible on standard Google search results. Google Shopping is also integrated with Google Ads – one of the best pay-per-click platforms.

Yahoo Shopping

Yahoo Shopping is a great price comparison website for online shoppers. You can create a wish list of the products you desire to track the prices of, and Yahoo Shopping will monitor the price changes over time for you.

2.2 PROPOSED SYSTEM

"FreeCom" will overcome the limitations of the existing systems. "FreeCom" will provide: -

1. **Price Comparison:**

Customers will enter the product name and our site will compare the price of the same product from different e-commerce sites and show the cheapest products as the result in a tabular format.

2. **Product Comparison:**

The customer will enter the product name and our site will compare any two electronic devices based on their specifications and show that compared to the customer.

3. **QR-based authentication:**

The customer will scan the QR code with the help of our site, which will redirect the Customer to the company/brands authenticity mechanism for the product validity.

4. **QR-based comparison:**

The customers will scan the QR codes of any two electronic devices and our site will compare those products based on their specifications.

5. Redeem Code (Steganography)

The customer will upload the encrypted image with the discount/offer code hidden in it and our site will decrypt the image to redeem the code and show it to the user.

6. Product Analysis (Recommendation Engine):

Customers will be able to see various ranked various products based on their popularity using the weighted rating formula (used by IMDB).

2.3 FEASIBILITY STUDY

A feasibility study evaluates the project's potential for success; therefore, perceived objectivity is an important factor in the credibility of the study for potential investors and lending institutions. It must, therefore, be conducted with an objective, unbiased approach to provide information upon which decisions can be based. Here, we discuss three major feasibility studies required for our project.

2.3.1 TECHNICAL FEASIBILITY

Technical feasibility is carried out to determine whether the project is feasible in terms of software, hardware, personnel, and expertise, to handle the completion of the project. It considers determining resources for the proposed system.

“FreeCom” will be available as a Web Application. An open framework might be used to host this Web Application. The usage of such powerful frameworks and programming languages would help in better satisfying the requirements and constraints of the Web Application.

2.3.2 OPERATIONAL FEASIBILITY

Operational feasibility is the measure of how well a proposed system solves the problems with the users. Operational feasibility is dependent on human resources

available for the project and involves projecting whether the system will be used if it is developed and implemented.

It is noteworthy that the timeframe of the project is critical given the complexity of the project. Thus, in the early stage of the project, only the basic features would be incorporated. For instance, the purchase from our Web Application cannot be implemented in the initial phase. Moreover, the user interface would be very basic and reflect only the main services offered in the Web Application.

2.3.3 ECONOMICAL FEASIBILITY

Economic feasibility defines whether the expected benefit equals or exceeds the expected costs. It is also commonly referred to as cost/benefit analysis. The procedure is to determine the benefits and the savings expected from the system and compare them with the costs.

The project is economically feasible as the only cost involved is having a computer with the minimum requirements mentioned in the system specifications. For the users to access the application, the only cost involved will be in getting access to the Internet.

CHAPTER 3
REQUIREMENTS ANALYSIS

CHAPTER 3

REQUIREMENTS ANALYSIS

3.1 METHOD USED FOR REQUIREMENT ANALYSIS

Group Interviews:

A group interview also has an advantage when there is a time constraint. More thoughts and discussion can be generated, as someone in the group may state or suggest an idea that may have been overlooked by others, which in turn can lead to a discussion or provide more information on a particular issue.

Analyzing Existing Documents:

Analyzing existing documents can prove to be a useful technique in requirement gathering, on its own as well as using it to supplement other techniques. Reviewing the current process and documentation can help the analyst understand the business, or system, and its current situation. Existing documentation will provide with the analyst the titles and names of stakeholders who are involved with the system. This method gives what are the stakeholders of the software.

User Observation:

User observation should be planned to ensure that all elements are constantly surrounding the observation. This will assist in uncertainty, and the consultant can focus on the user and assist in knowing what to look for. The analyst will not be distracted and record, or note, irrelevant issues. The more useful information gathered, the less time it will take for the analyst to dissect and evaluate afterward. Timing of the observation can also prove relevant when planning. In this method, we observe the user i.e. what type of user uses this module and what the user can

use this data. In this method, we examine what data we should show to the user. Which data is important to the user?

Research work under this domain:

Previous projects.

3.2 DATA REQUIREMENTS

The Data Requirements section of the SRS provides information on the data used by the software application/system. Data requirements are prescribed directives or consensual agreements that define the content and/or structure that constitute high-quality data instances and values. Data requirements can thereby be stated by several different individuals or groups of individuals.

From users, we gather data in the form of product names, encoded images, and QR codes for authentication and comparison. We provide service based on the above data given and provide comparisons, specifications, discount codes, and detailed analysis of the trending product in the market. The data needed to avail above services is being scraped from various renowned e-commerce websites. For the Recommendation engine, we used the Amazon Product dataset which contains approx. 70 lakh products with their detail. We work on Transient data which is a type of data that is relevant for a limited period, meaning we don’t have to create a databased for storing the Transient data.

About Dataset: -

Online E-commerce websites like Amazon, and Flipkart uses different recommendation models to provide different suggestions to different users. Amazon currently uses item-to-item collaborative filtering, which scales to massive data sets and produces high-quality recommendations in real-time. This type of filtering matches each of the users' purchased and rated items to similar items and then combines those similar items into a recommendation list for the

user. In this project, we are going to build a recommendation model for the electronics products of Amazon.

The dataset here is taken from the below website.

Source - Amazon Reviews data (http://jmcauley.ucsd.edu/data/amazon/) The repository has several datasets. For this case study, we are using the Electronics dataset.

Attribute Information:

● userId: Every user identified with a unique id (First Column)

● productId: Every product identified with a unique id (Second Column)

● Rating: Rating of the corresponding product by the corresponding user (Third Column)

● timestamp: Time of the rating (Fourth Column)

3.3 FUNCTIONAL REQUIREMENTS

Functional requirements are product features or functions those developers must implement to enable users to accomplish their tasks. So, it's important to make them clear both for the development team and the stakeholders. Generally, functional requirements describe system behavior under specific conditions.

1. **Price Comparison:**
   - The system must allow the user to enter the product name.
   - The system must show the result to the user in tabular format.
   - The system must show the respective link to buy the product for each item in the table.

2. **Product Comparison:**
   - The system must allow the user to enter the first product name.
   - The system must allow the user to enter the second product name.

- The system must show the comparison result to the user in tabular format.

3. QR-based Authentication:

- The system must scan the QR code provided by the user.
- The system must decode the QR code.
- The system must open the link contained in the code in a new tab for the user to access.

4. QR-based Comparison:

- The system must scan two QR codes provided by the user for the comparison.
- The system must show the comparison result to the user in tabular format.

5. Redeem Code (Steganography)

- The system must allow the user to upload the image.
- The system must decrypt the image and show the hidden code (if any) to the user.
- The system must be able to check the authenticity of the code hidden in the image.

6. Product Analysis (Recommendation Engine):

- The system must accept the dataset provided to it by the admin.
- The system must prevent any redundancy regarding the dataset.
- The system must show the ranked trending products with their image, information, score, and link to buy.

3.4 NON-FUNCTIONAL REQUIREMENTS

Non-Functional Requirements are the characteristics or attributes of the system that are necessary for the smooth operation of the system. Non-functional requirements address aspects of the system other than the specific functions it

performs. These aspects include system performance, costs, and such general system characteristics as reliability, security, and portability. The non-functional requirements also address aspects of the system development process and operational personnel. Those requirements are listed below.

• The system should perform the process accurately and precisely to avoid problems.

• The system should be easy to modify for any updates. Any errors or bugs that are identified should be easy to mend.

• The system should be easy to understand and use.

• Execution of the operation should be fast.

• The system was user-friendly and consistent

• The system provided an attractive graphical interface for the user The system allowed developer access to the installed environment

• The system focuses targeted customer base.

• The system should not have a fatal error during run time.

3.5 SOFTWARE SPECIFICATION

System requirements are a statement that identifies the functionality that is needed by a system to satisfy the customer's requirements. System requirements are a broad and also narrow subject that could be implemented to many items. Whether discussing the system requirements for certain computers, software, or business processes from a broad viewpoint. Also, taking it down to the exact hardware or coding that runs the software. A system specification describes the operational and performance requirements of a system, such as a computer. It is considered a high-level document that dictates global functions.

3.5.1 HARDWARE SPECIFICATION

OS : Windows 7 and Above.

Processor : Intel(R) Dual Core or higher.
RAM : 2.00 G.B. or More.
Disk Space : At least 100 G.B.

3.5.2 SOFTWARE SPECIFICATION

Technologies used in various modules:

1. Web Scraping: For Product comparison, price comparison, and QR-based comparison.

2. Computer Vision: For QR based authentication and QR based comparison.

3. Pattern Recognition: To Redeem Code (Steganography).

4. Cyber Security: For Redeem Code (Steganography).

5. Data analysis: For price comparison, QR-based comparison, and product analysis (Recommendation Engine).

6. AI: For Product Analysis (Recommendation Engine).

7. API: For Product comparison, QR-based comparison, and product analysis (Recommendation Engine).

Libraries used:

1. Beautiful Soup, Scrappy and Selenium for Web Scraping.

2. Pyzbar, Cv2, Types for computer vision and steganography.

3. NumPy, Matplotlib and Pandas for data analysis and recommendation engines.

Tools used:

1. Jupiter Notebook and VS Code for IDE.

2. Flask framework for creating web applications.

3. HTML, CSS, JavaScript, and Bootstrap V4 for web designing.

4. Anaconda for Python + useful packages.

CHAPTER 4
DESIGN

CHAPTER 4

DESIGN

4.1 SOFTWARE REQUIREMENT SPECIFICATION

This section of the SRS contains all the system requirements to a level of detail sufficient to enable designers to design a system that satisfies those requirements. Testers can use this section to test that the system satisfies those requirements and technical writers can create the necessary support documentation for operations and maintenance.

4.1.1 GLOSSARY

"FreeCom" is a Web Application that helps customers to make informed decisions while buying electronic devices. It allows customers to search for products, compare them, authenticate the product and get discounts for future purchases.

Its objective is to help consumers decide while buying electronic products from e-commerce website.

4.1.2 SUPPLEMENTARY SPECIFICATION

FreeCom is Web application which will help the customer to make an informed decision while using e-commerce website or retail stores for buying an electronic products.

FreeCom is designed to compare the price and specifications of electronic goods from a range of providers, which will help consumers in making decision to choose products that will save their money through online. It will also provide a mechanism to verify the authenticity of the product by the use of QR code Reader.

User/Customers will get creative art/logos/images from the purchases they have made from the brands, and they may get future discount/offers. There is also a trending products panel which will help user to find trending products from Amazon.

Features: -

1. Price Comparison:

Customer will enter the product name and our site will compare price of the same product from different e-commerce sites and show the cheapest products as the result in a tabular format.

2. Product Comparison:

Customer will enter the product name and our site will compare any two electronic devices on the basis of their specifications and show that comparison to the customer.

3. QR based authentication:

Customer will scan the QR code by the help of our site, which will redirect the Customer to the companies/brands authenticity mechanism for the product validity

4. QR based comparison:

Customer will scan QR code any two electronic devices and our site will compare those products based on their specifications.

5. Redeem Code (Steganography)

Customer will upload the encrypted image with the discount/offer code hidden in it and our site will decrypt the image to redeem the code and show it to the user.

6. Product Analysis (Recommendation Engine):

Customer will be able to see various ranked various products on the basis of their popularity using weighted rating formula (used by Imdb).

4.1.3 USE CASE MODEL

Use-Case model is a model of how different types of users interact with the system to solve a problem. As such, it describes the goals of the users, the interactions between the users and the system, and the required behavior of the system in satisfying these goals. A use-case model consists of a number of model elements. The most important model elements are: use cases, actors and the relationships between them. A use-case diagram is used to graphically depict a subset of the model to simplify communications. There will typically be several use-case diagrams associated with a given model, each showing a subset of the model elements relevant for a particular purpose. The same model element may be shown on several usecase diagrams, but each instance must be consistent. If tools are used to maintain the use-case model, this consistency constraint is automated so that any changes to the model element (changing the name for example) will be automatically reflected on every use-case diagram that shows that element. The use-case model may contain packages that are used to structure the model to simplify analysis, communications, navigation, development, maintenance and planning. The use-case model serves as a unifying thread throughout system development. It is used as the primary specification of the functional requirements for the system, as the basis for analysis and design, as an input to iteration planning, as the basis of defining test cases and as the basis for user documentation.

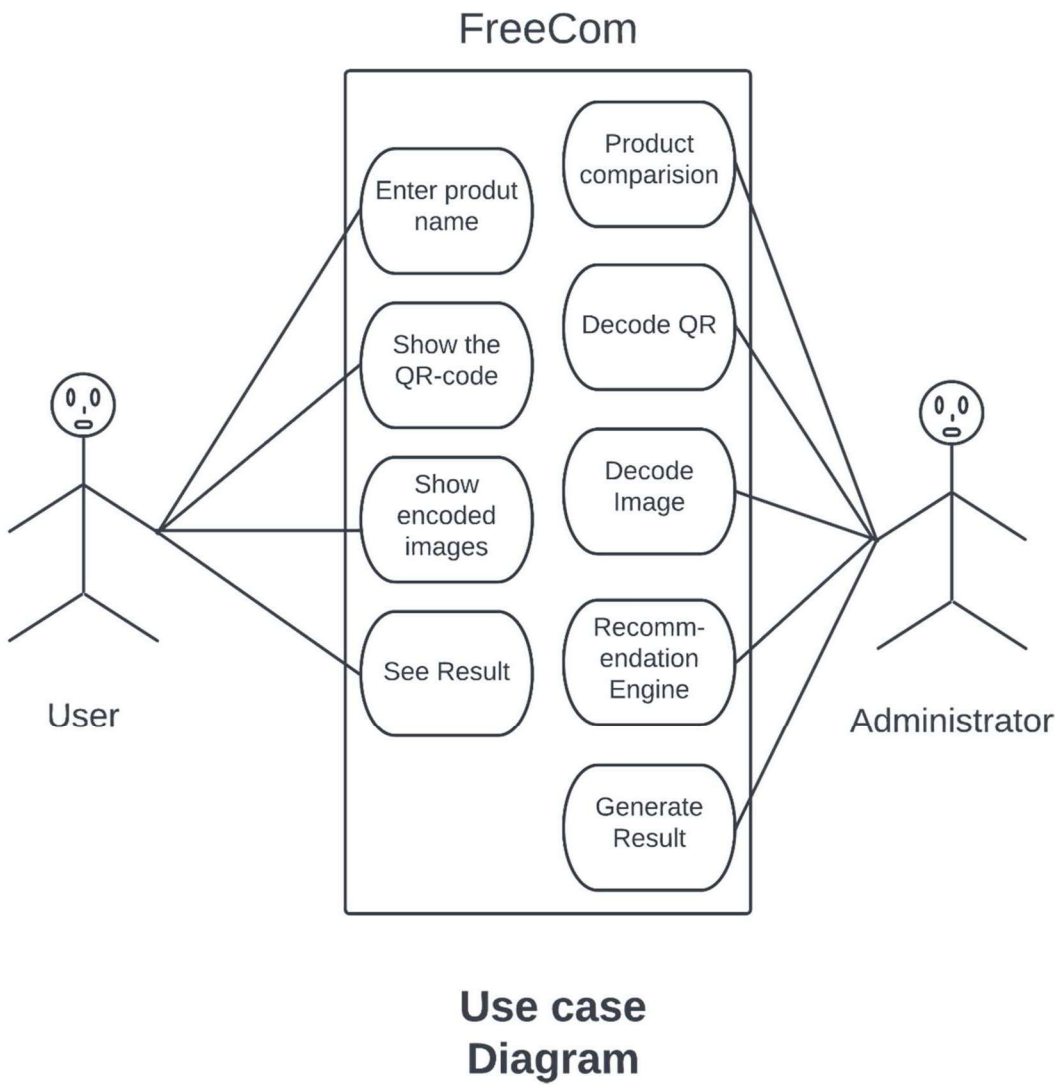


Figure 1 – Use Case Diagram

4.2 CONCEPTUAL LEVEL CLASS DIAGRAM

The main purpose of class diagrams is to build a static view of an application. It is the only diagram that is widely used for construction, and it can be mapped with object-oriented languages. It is one of the most popular UML diagrams. Following is the purpose of class diagrams given below:

1. It analyses and designs a static view of an application.

2. It describes the major responsibilities of a system.

3. It is a base for component and deployment diagrams.

4. It incorporates forward and reverse engineering.

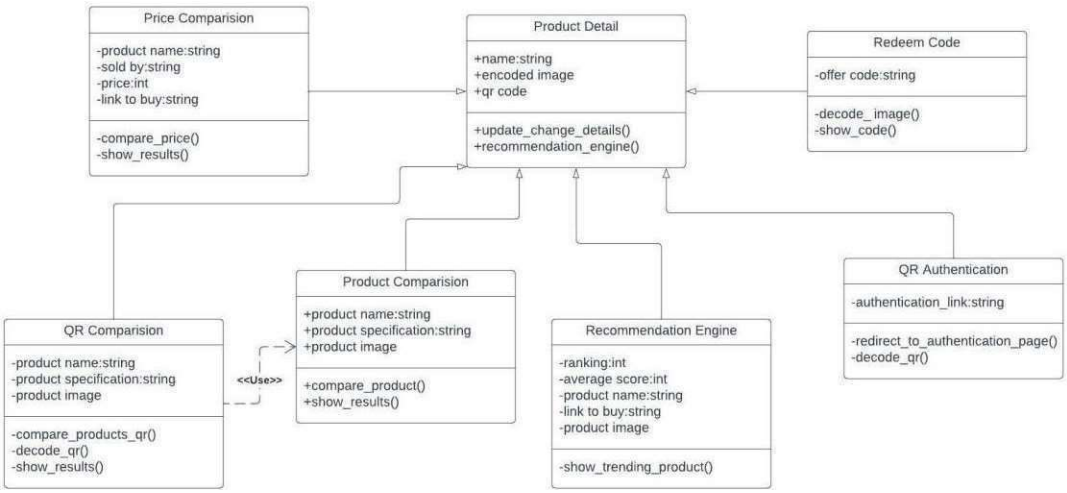


Figure 2 – Class Diagram

4.3 IPO DIARGRAM

An IPO (Input-Process-Output) Diagram is a very high-level diagram used for systems analysis that visually describes business processes with the description of each component in word. It shows a process key inputs and resulting outputs after a set of operations. IPO diagrams are also widely used in software engineering applications.

An Input-Process-Output (IPO) Model (or IPO Diagram) is a visual representation of a process or system showing the key inputs, resulting outputs, necessary controls and essential enablers of a system life cycle that is used to approach in systems analysis and software engineering for describing the structure of an information processing program or other process. The IPO chart describes business processes with the description of each component in word, not code or mathematical formulas.

The input–process–output (IPO) model, or input-process-output pattern, is a widely used approach in systems analysis and software engineering for describing the structure of an information processing program or other process. Many

introductory programming and systems analysis texts introduce this as the most basic structure for describing a process.

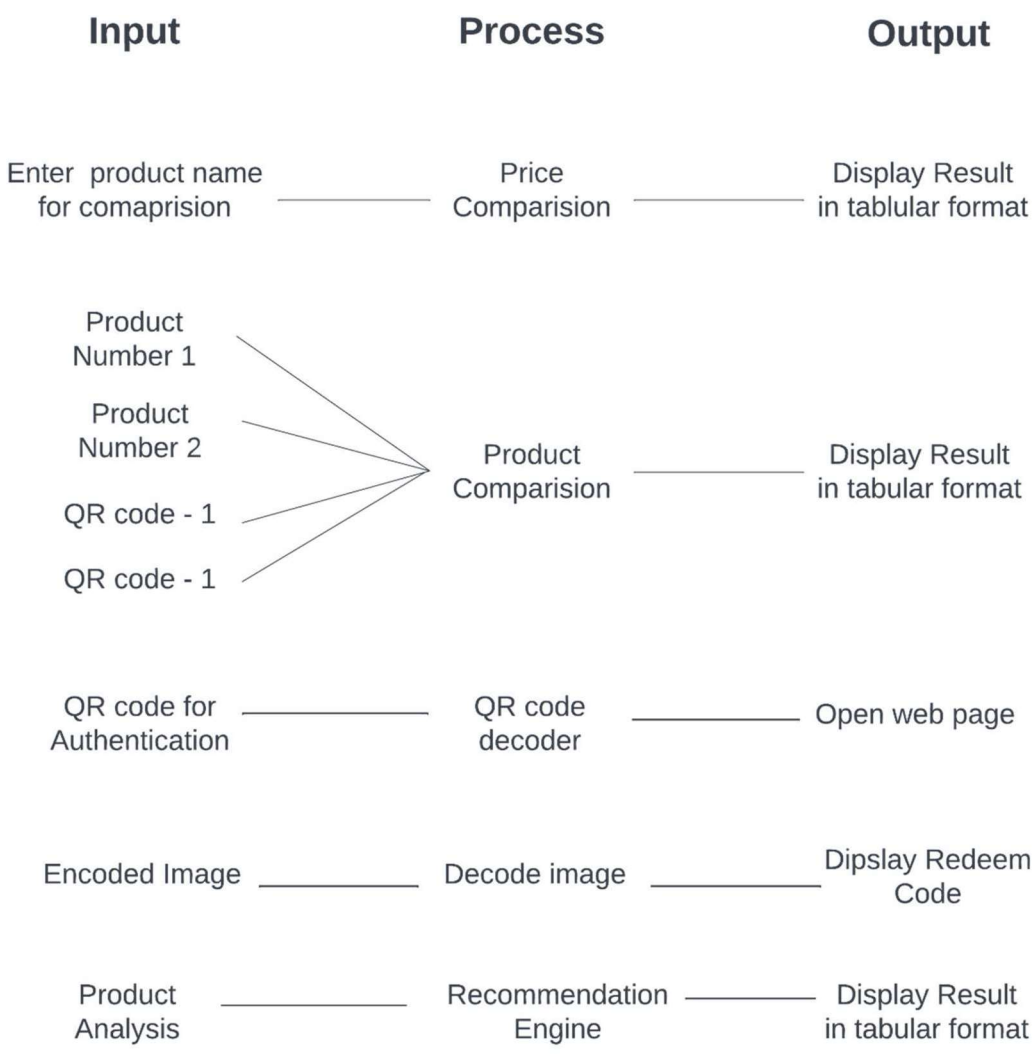


Figure 3 – IPO Diagram

4.4 CONCEPTUAL LEVEL ACTIVITY DIAGRAM

An activity diagram is a UML diagram that models the dynamic aspects of a system. It is a simplification of the UML state chart diagram for modelling control flows in computational and organizational processes. It allows you to represent a functional decomposition of a system behavior. An activity diagram provides a complete specification of a behavior and not, like the interaction diagrams, a single possible scenario. The activity diagram gives a simplified representation of a process, showing control flows (called transitions) between actions performed in the system (called activities). These flows represent the internal behavior of a model element (use case, package, classifier or operation) from a start point to several potential end points.

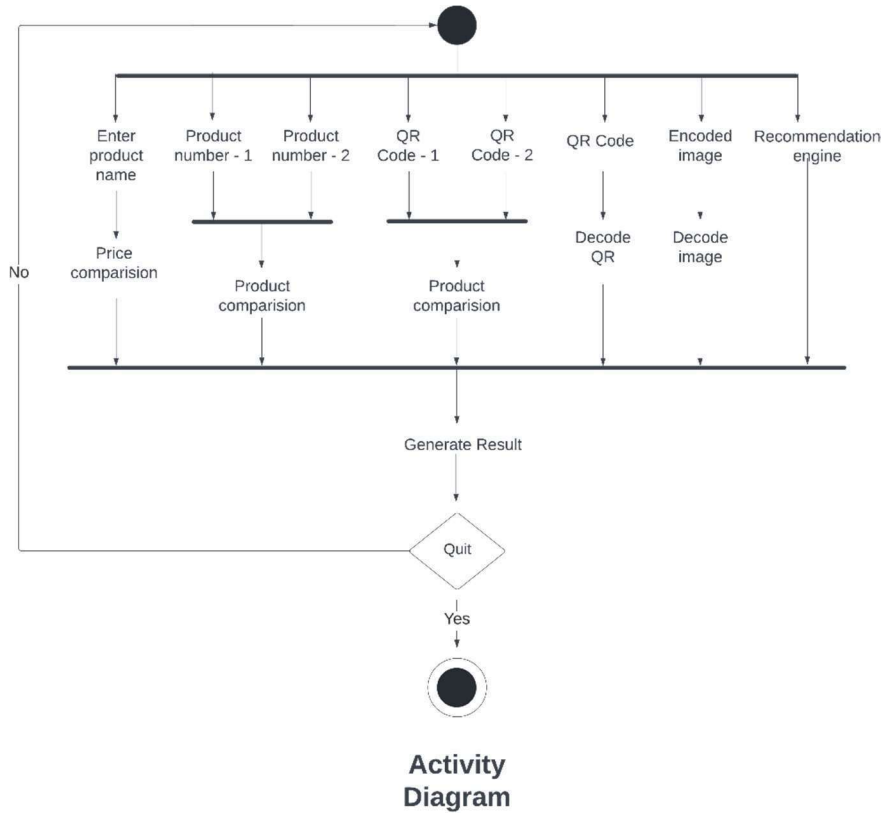


Figure 4 – Conceptual Level Activity Diagram

CHAPTER 5
SYSTEM MODELING

CHAPTER 5

SYSTEM MODELING

5.1 DETAILED CLASS DIAGRAM

The main purpose of class diagrams is to build a static view of an application. It is the only diagram that is widely used for construction, and it can be mapped with object-oriented languages. It is one of the most popular UML diagrams.

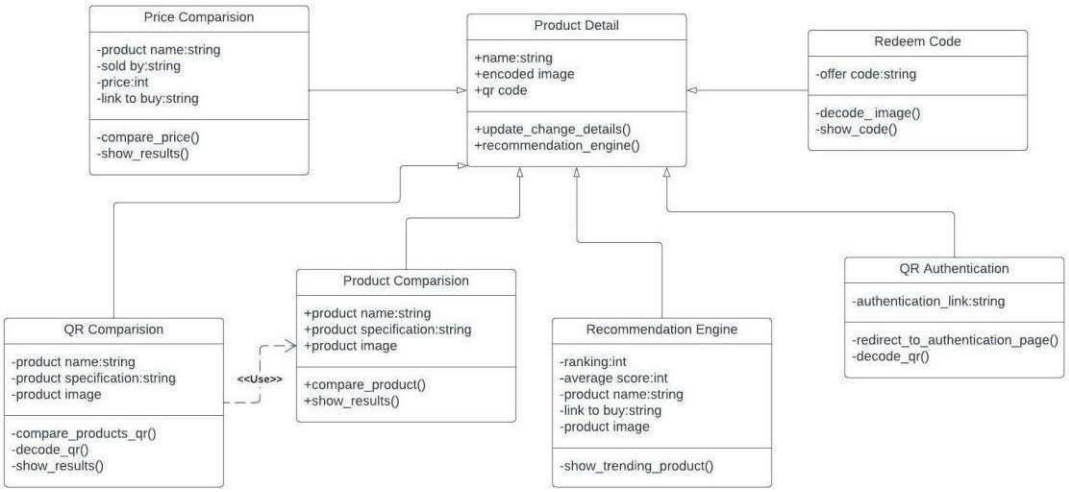


Figure 5 – Detailed Class Diagram

5.2 INTERACTION DIAGRAM

Interaction diagram is used to describe some type of interactions among the different elements in the model. This interaction is a part of dynamic behavior of the system. This interactive behavior is represented in UML by two diagrams known as Sequence diagram and Collaboration diagram. The basic purpose of both the diagrams are similar. Sequence diagram emphasizes on time sequence

of messages and collaboration diagram emphasizes on the structural organization of the objects that send and receive messages.

5.2.1 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.

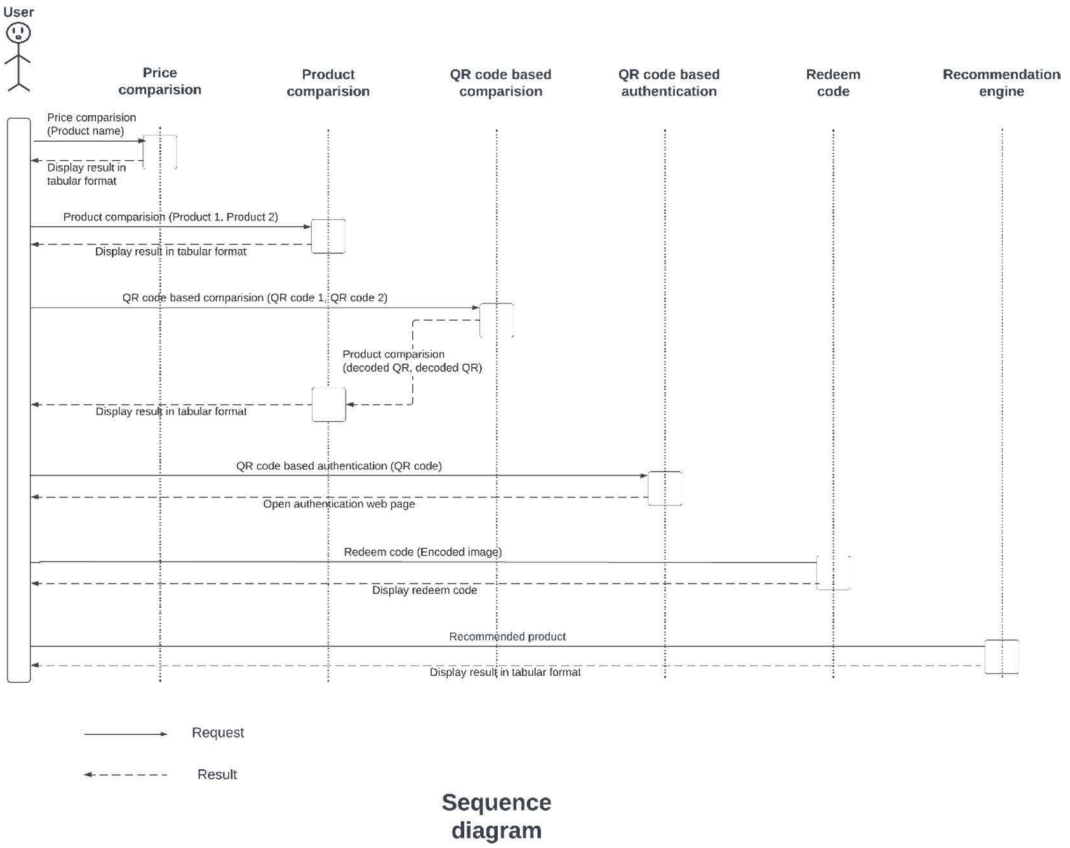


Figure 6 – Sequence Diagram

5.2.2 COLLABORATION DIAGRAM

The second interaction diagram is the collaboration diagram. It shows the object organization as seen in the following diagram. In the collaboration diagram, the method call sequence is indicated by some numbering technique. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. Method calls are similar to that of a sequence diagram. However, difference being the sequence diagram does not describe the object organization, whereas the collaboration diagram shows the object organization. To choose between these two diagrams, emphasis is placed on the type of requirement. If the time sequence is important, then the sequence diagram is used. If organization is required, then collaboration diagram is used.

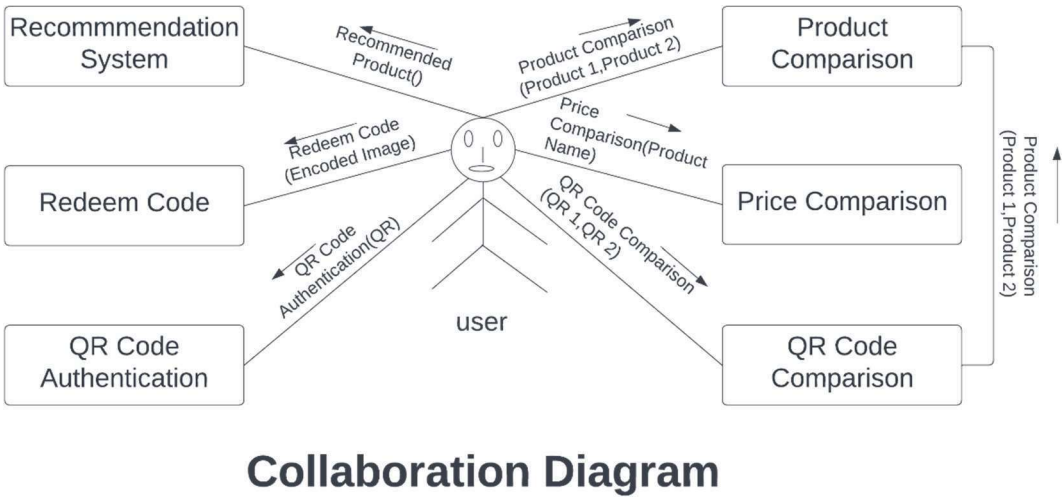


Figure 7 – Collaboration Diagram

5.3 STATE DIAGRAM

A state diagram is used to represent the condition of the system or part of the system at finite instances of time. It's a behavioral diagram and it represents the behavior using finite state transitions. State diagrams are also referred to as State machines and State-chart Diagrams. These terms are often used interchangeably.

So simply, a state diagram is used to model the dynamic behavior of a class in response to time and changing external stimuli. We can say that each and every class has a state but we don't model every class using State diagrams. We prefer to model the states with three or more states.

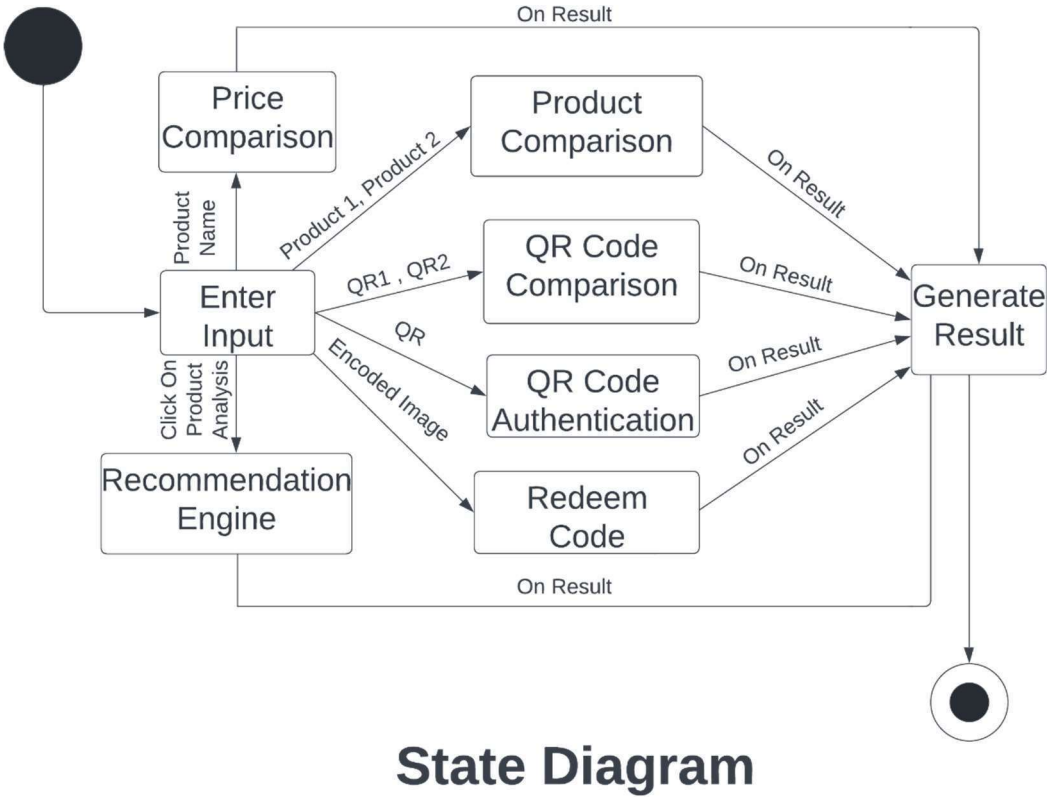


Figure 8 – State Diagram

5.4 ACTIVITY DIAGRAM

Activity diagram is another important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flow chart that modeling the flow from one activity to another activity. Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity

can be described as an operation of the system. The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc.

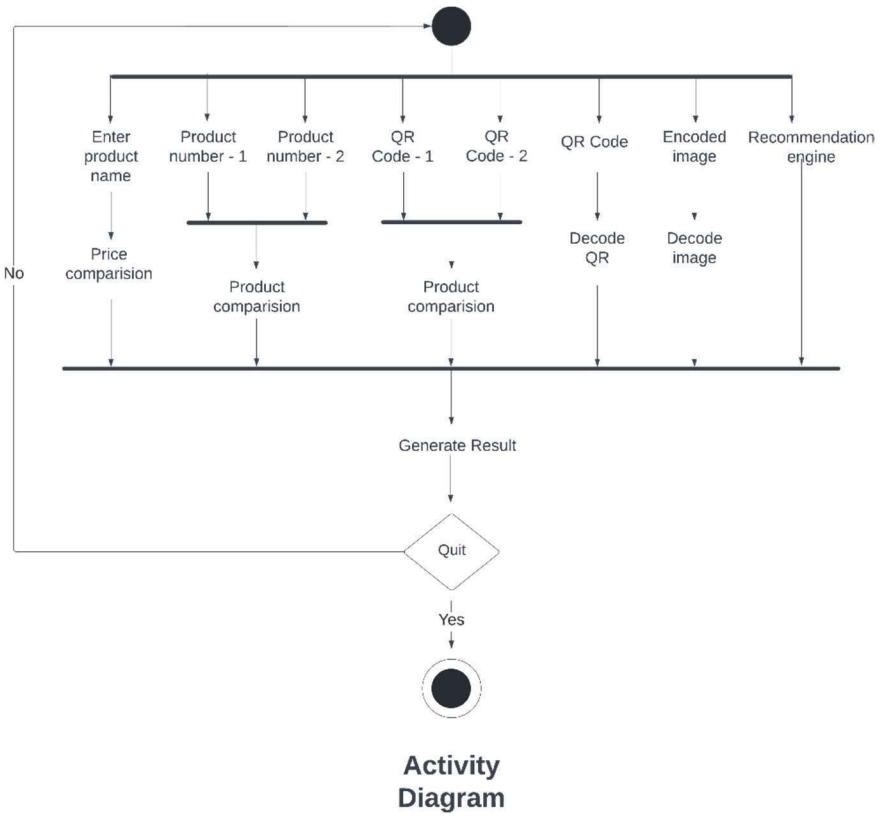


Figure 9 – Activity Diagram

5.5 OBJECT DIAGRAM

Object is an instance of a class in a particular moment in runtime that can have its own state and data values. Likewise a static UML object diagram is an instance of a class diagram; it shows a snapshot of the detailed state of a system at a point in time, thus an object diagram encompasses objects and their relationships which may be considered a special case of a class diagram or a communication diagram. Object diagrams are derived from class diagrams so object diagrams are

dependent upon class diagrams. Object diagrams represent an instance of a class diagram. The basic concepts are similar for class diagrams and object diagrams. Object diagrams also represent the static view of a system but this static view is a snapshot of the system at a particular moment. Object diagrams are used to render a set of objects and their relationships as an instance.

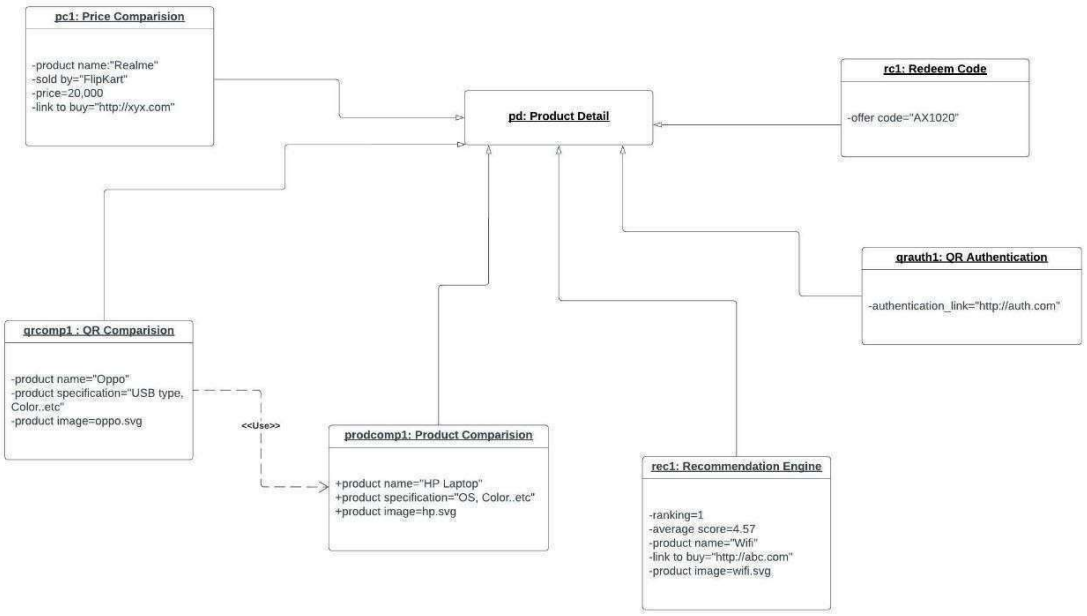


Figure 10 – Object Diagram

5.6 COMPONENT DIAGRAM

Component diagrams are used in modeling the physical aspects of object-oriented systems that are used for visualizing, specifying, and documenting component-based systems and also for constructing executable systems through forward and reverse engineering. Component diagrams are essentially class diagrams that focus on a system's components that often used to model the static implementation view of a system. Component diagrams are different in terms of nature and behavior. Component diagrams are used to model the physical aspects of a system. Now the question is, what are these physical aspects? Physical aspects are the elements such as executables, libraries, files, documents, etc. which reside in a node. Component diagrams are used to visualize the

organization and relationships among components in a system. These diagrams are also used to make executable systems.

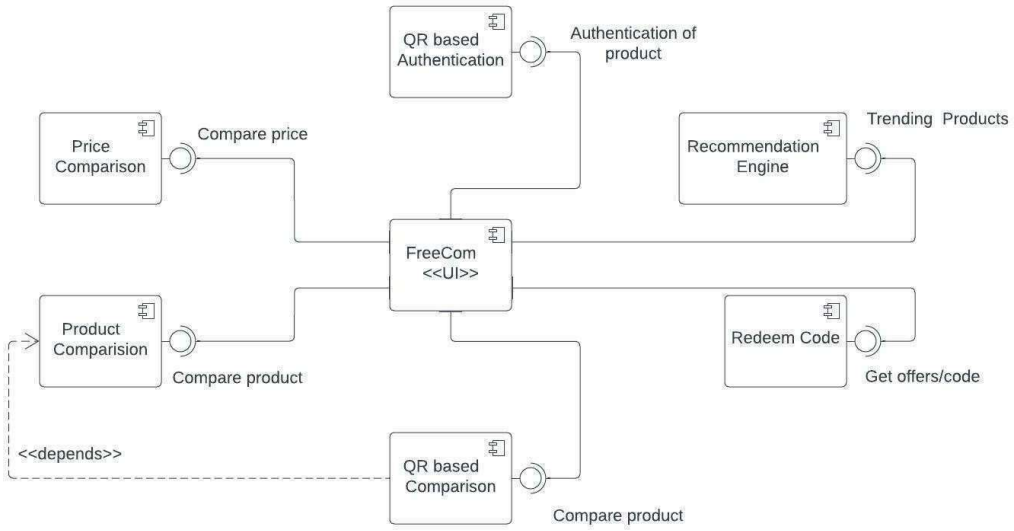


Figure 11 – Component Diagram

DEPLOYMENT DIAGRAM

A deployment diagram is a UML diagram type that shows the execution architecture of a system, including nodes such as hardware or software execution environments, and the middleware connecting them.

Deployment diagrams are typically used to visualize the physical hardware and software of a system. Using it you can understand how the system will be physically deployed on the hardware.

Deployment diagrams help model the hardware topology of a system compared to other UML diagram types which mostly outline the logical components of a system.

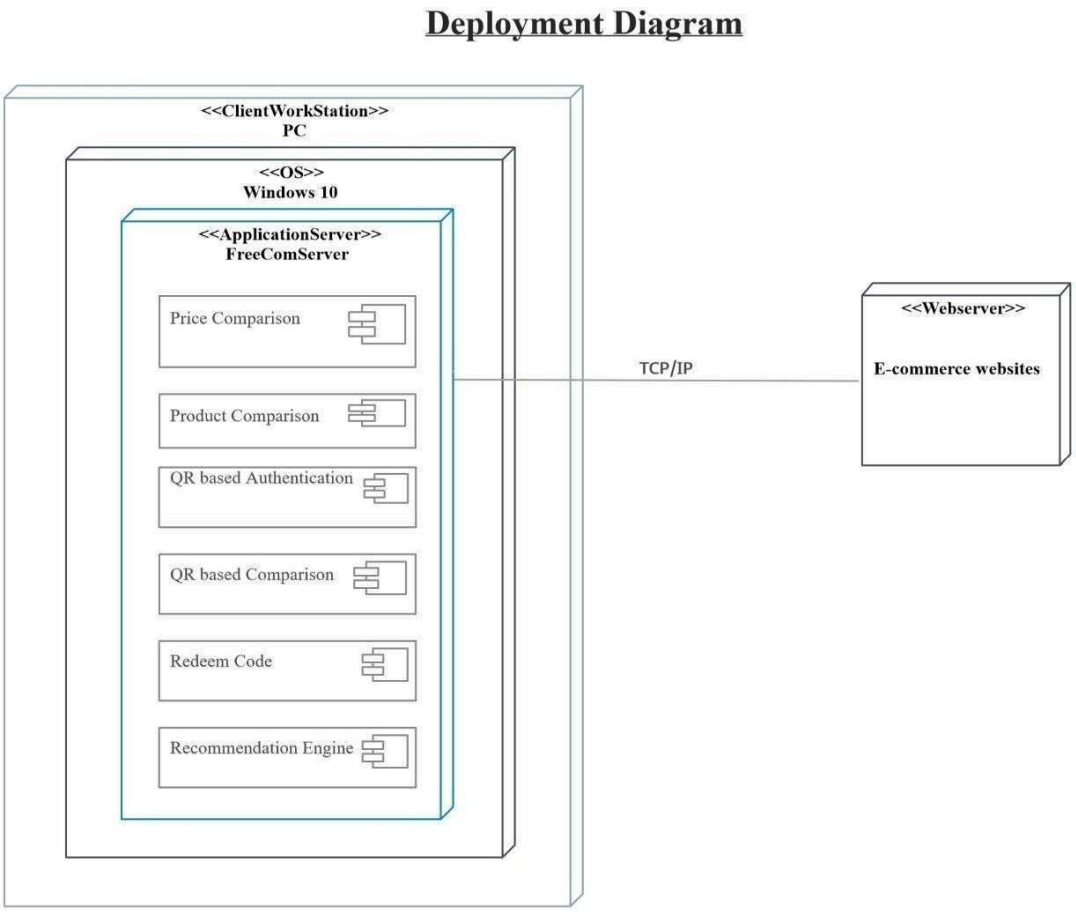


Figure 12 – Deployment Diagram

5.7 TESTING

Testing is a group of techniques to determine the correctness of the application under the predefined script but, testing cannot find all the defect of application. The main intent of testing is to detect failures of the application so that failures can be discovered and corrected. It does not demonstrate that a product functions properly under all conditions but only that it is not working in some specific conditions.

Testing furnishes comparison that compares the behavior and state of software against mechanisms because the problem can be recognized by the mechanism. The mechanism may include past versions of the same specified product,

comparable products, and interfaces of expected purpose, relevant standards, or other criteria but not limited up to these.

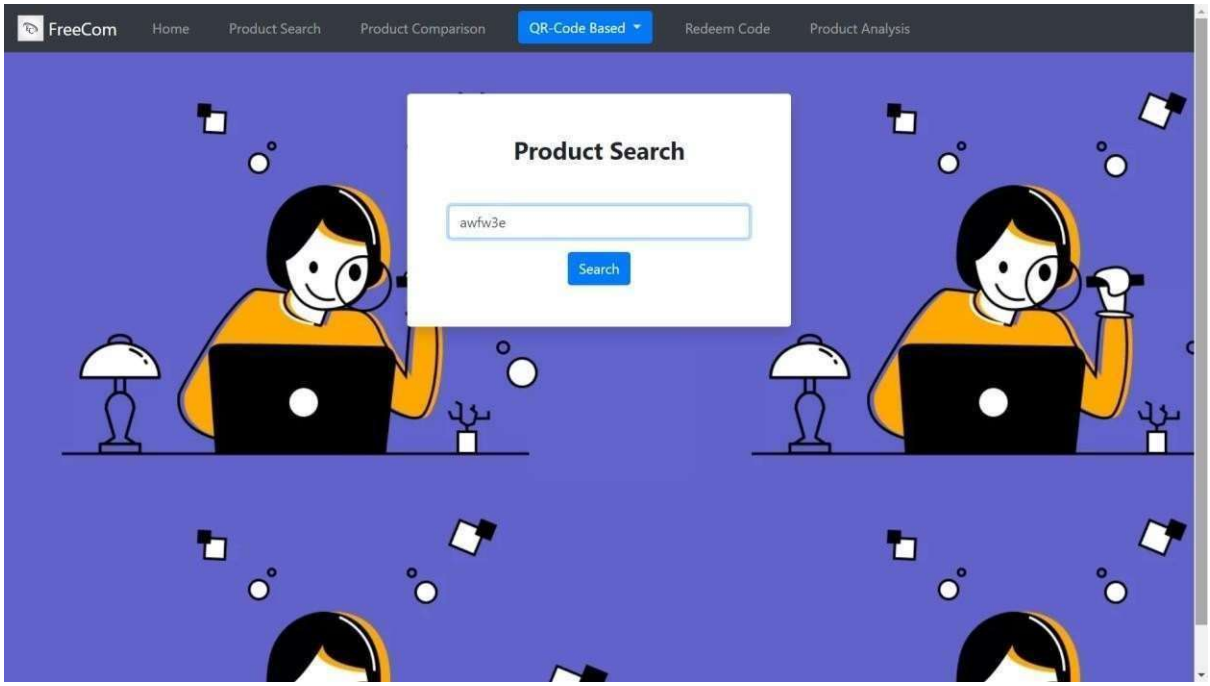
Testing includes an examination of code and also the execution of code in various environments, conditions as well as all the examining aspects of the code. In the current scenario of software development, a testing team may be separate from the development team so that Information derived from testing can be used to correct the process of software development.

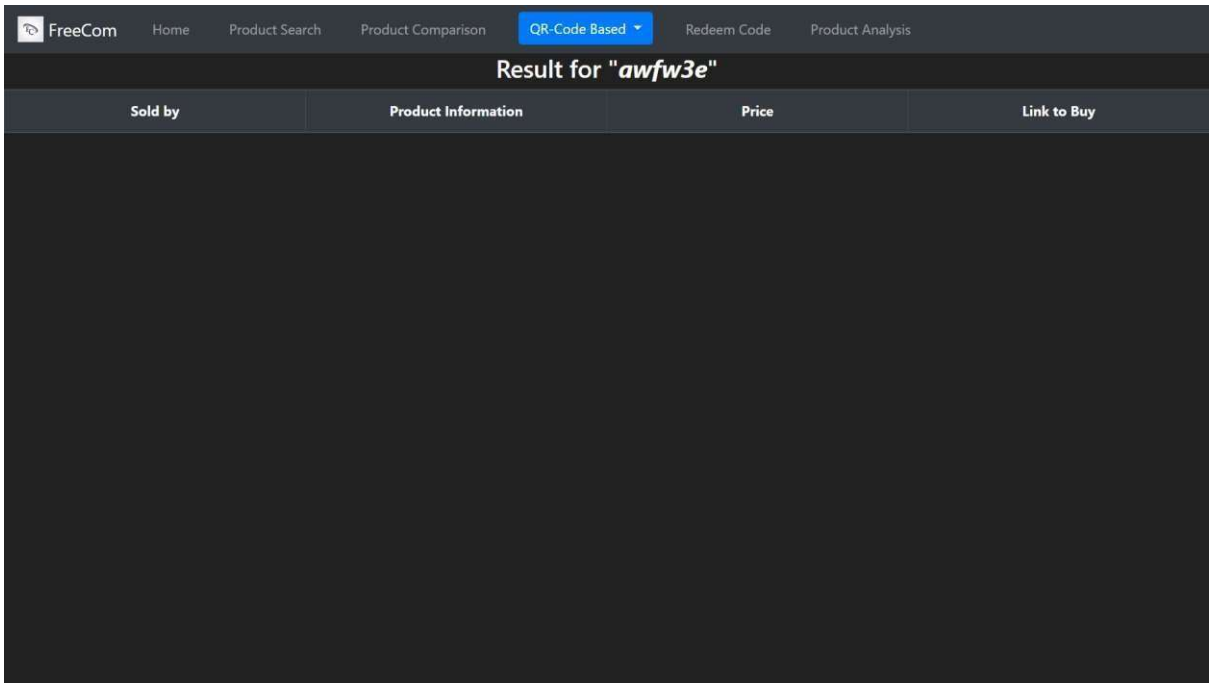
The success of software depends upon acceptance of its targeted audience, easy graphical user interface, strong functionality load test, etc. For example, the audience of banking is totally different from the audience of a video game. Therefore, when an organization develops a software product, it can assess whether the software product will be beneficial to its purchasers and other audience.

Testing is an essential phase in the software development cycle. In addition to the assessment of the software quality, the tests help detects and identify the differences between given input and expected output. Due to the limited time, the FreeCom platform was tested using two known testing mechanisms: Black Box testing and Unit testing. Prior to the testing, I have prepared few test cases scenarios to cover a diverse range of possibilities. Starting with the Black Box testing, this approach ignores the internal perspective of the system and rather focuses on the behavior of the system. Throughout this testing method, I have changed my developer hat to a user one.

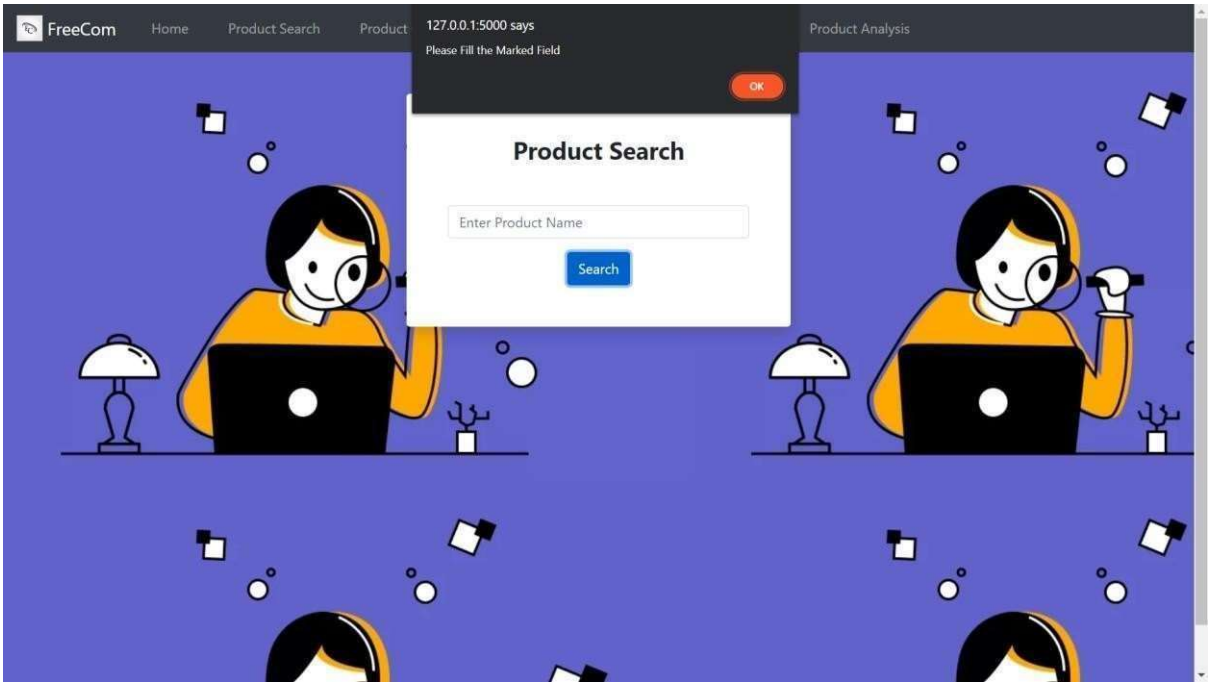
The second testing method used is Unit Testing. This method tests individual unit or modules and determine if there any issues. For instance, the login module in FreeCom was tested in different cases to assure that the module is free from bags. The initial tests showed several bugs that were later fixed.

1. Product Search



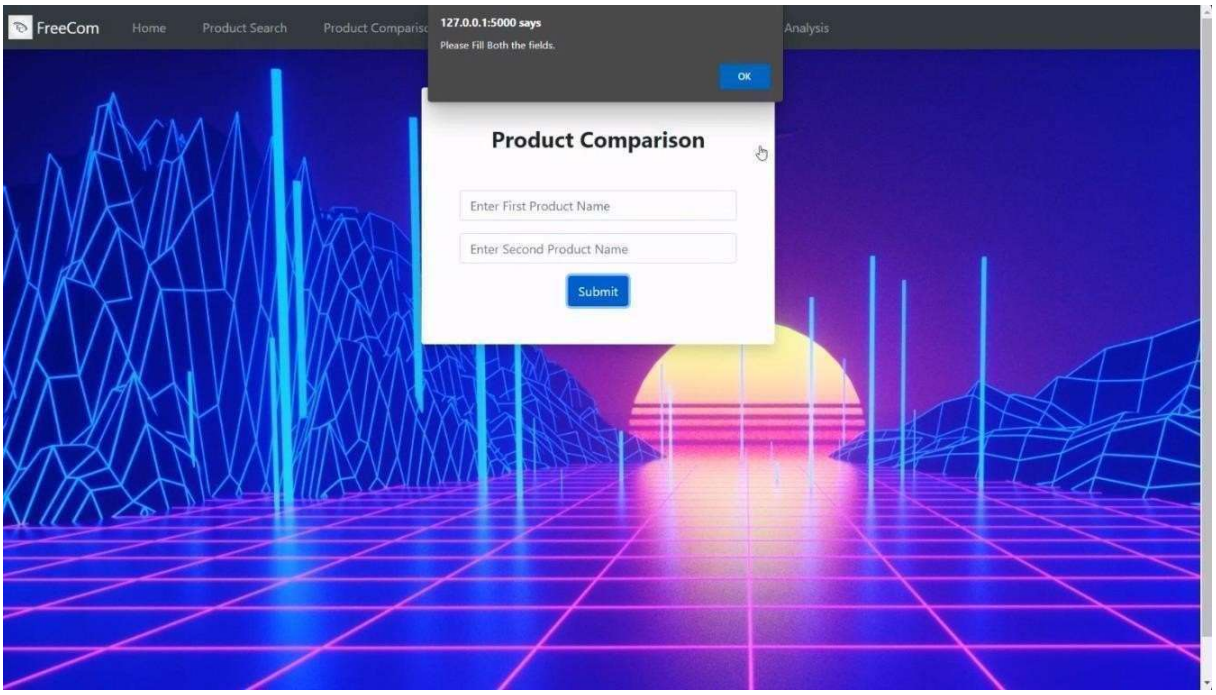


If the user enters a product that does not exists then our web-app will show no results.

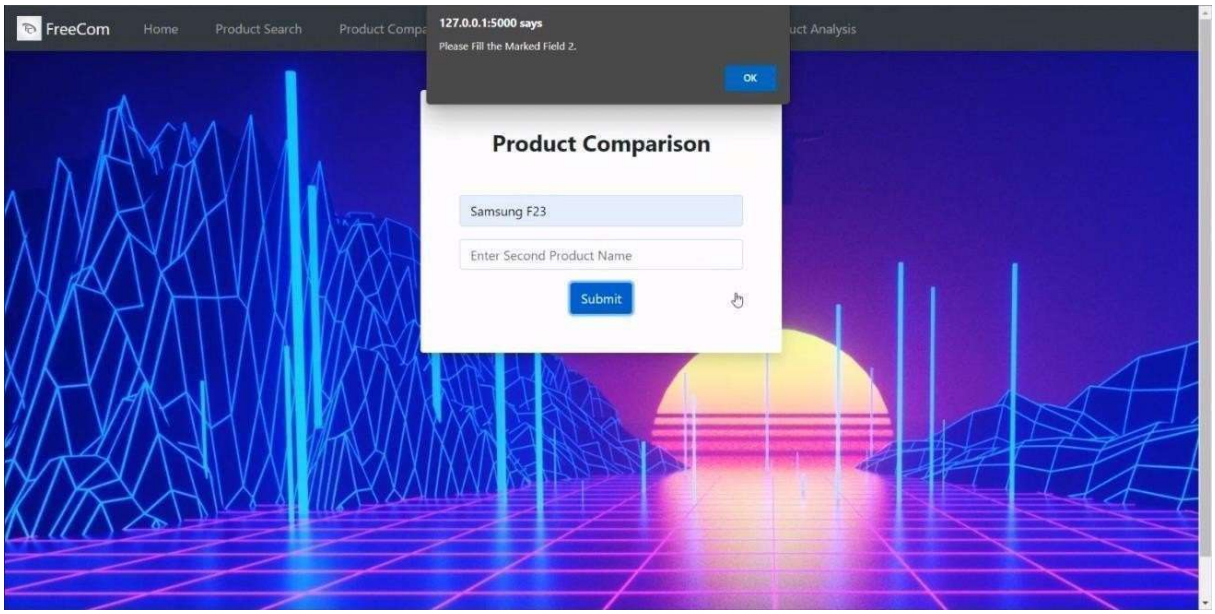


If the user doesn't enter a product name and click on Search button then they will be prompt to Fill the field i.e., Product News.

2. Product Comparison

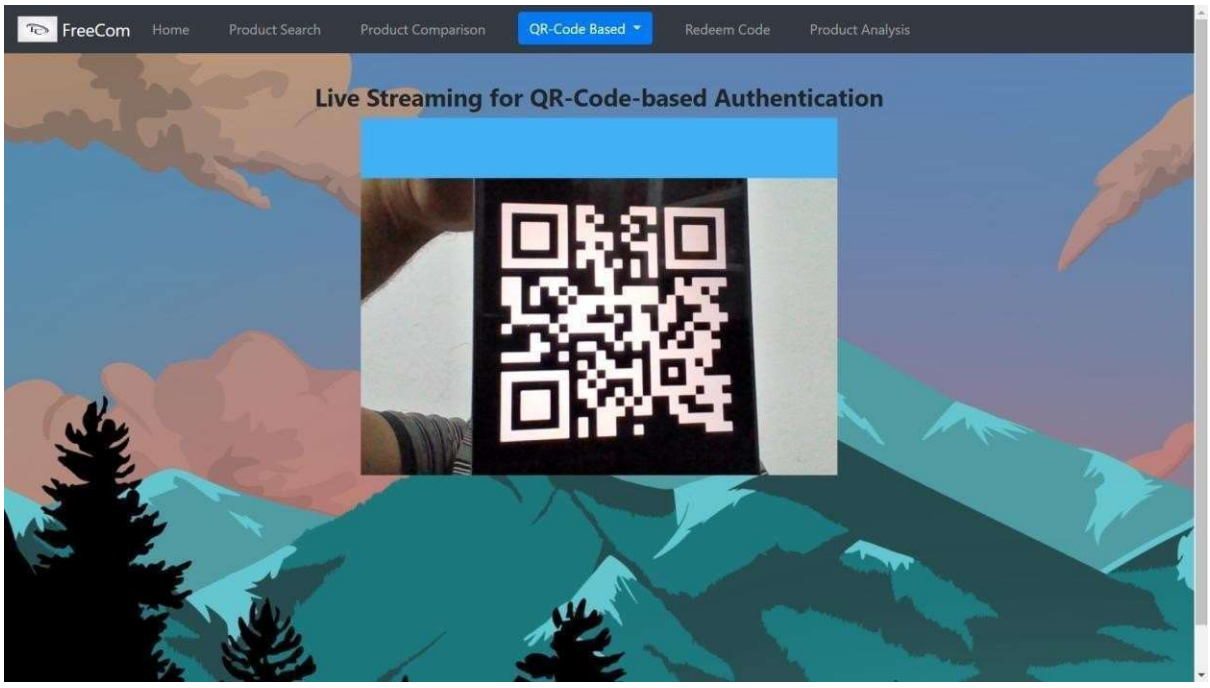


If the user doesn't enter both the product names and click on Search button then they will be prompt to Fill both the fields i.e. Product Names.



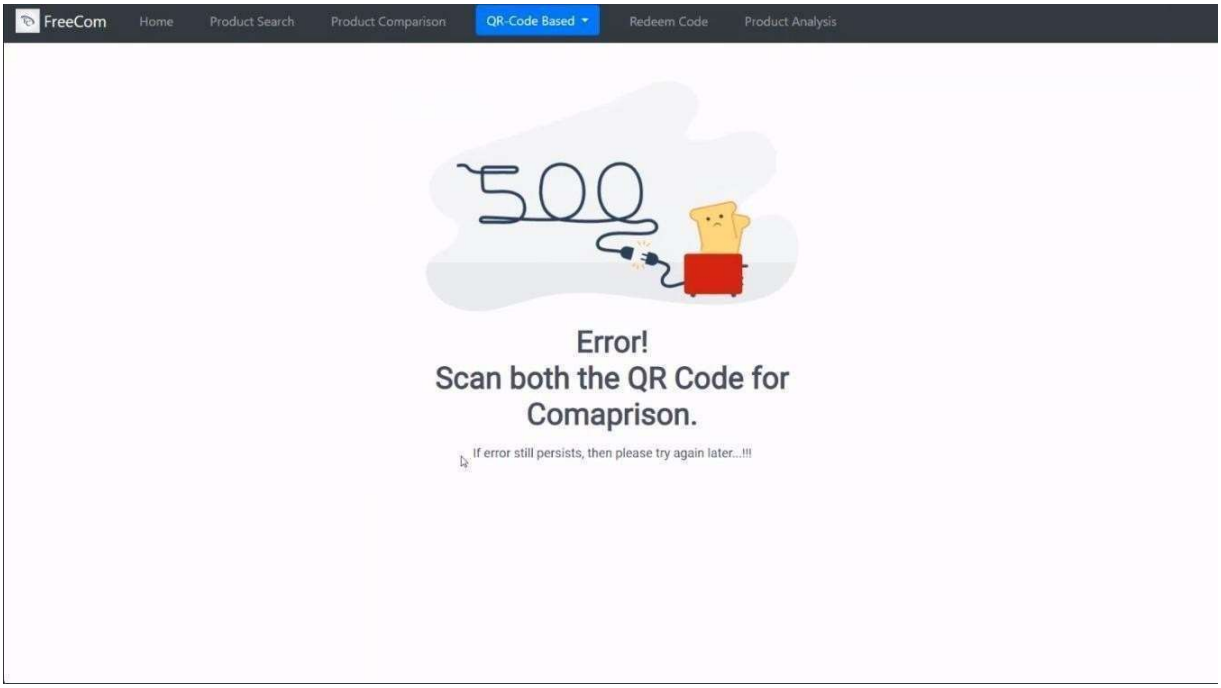
If the user only enters one product name and click on Search button then they will be prompt to Fill the field i.e. Name of other Product to compare with.

3. QR Code Authentication



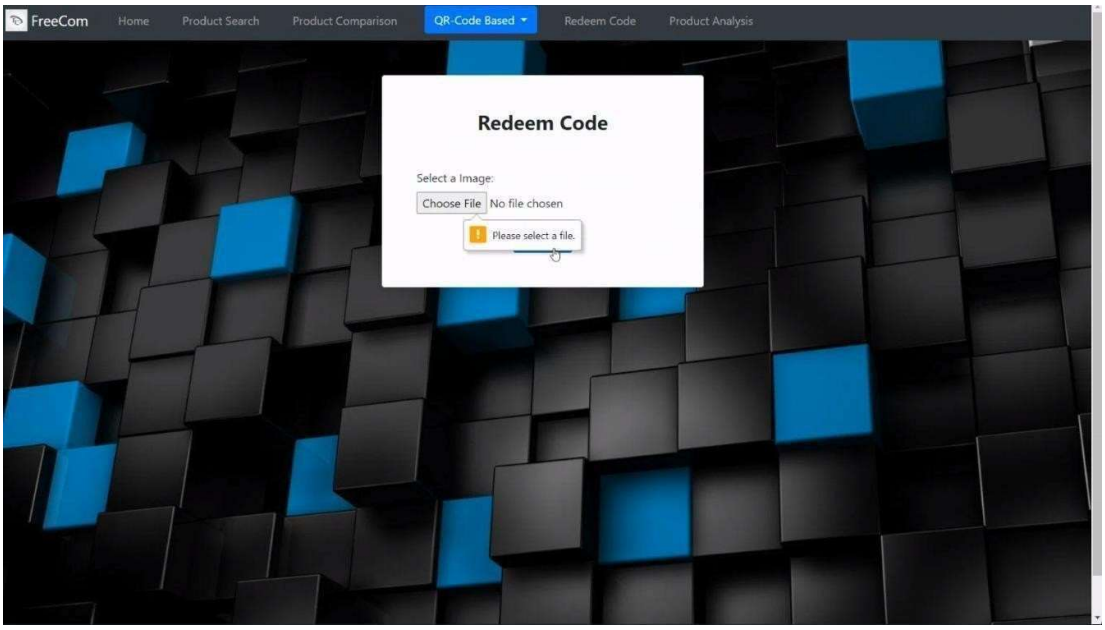
If the user shows an invalid QR Code then the web-app will not redirect to any page for Authentication.

4. QR Code Based Comparison

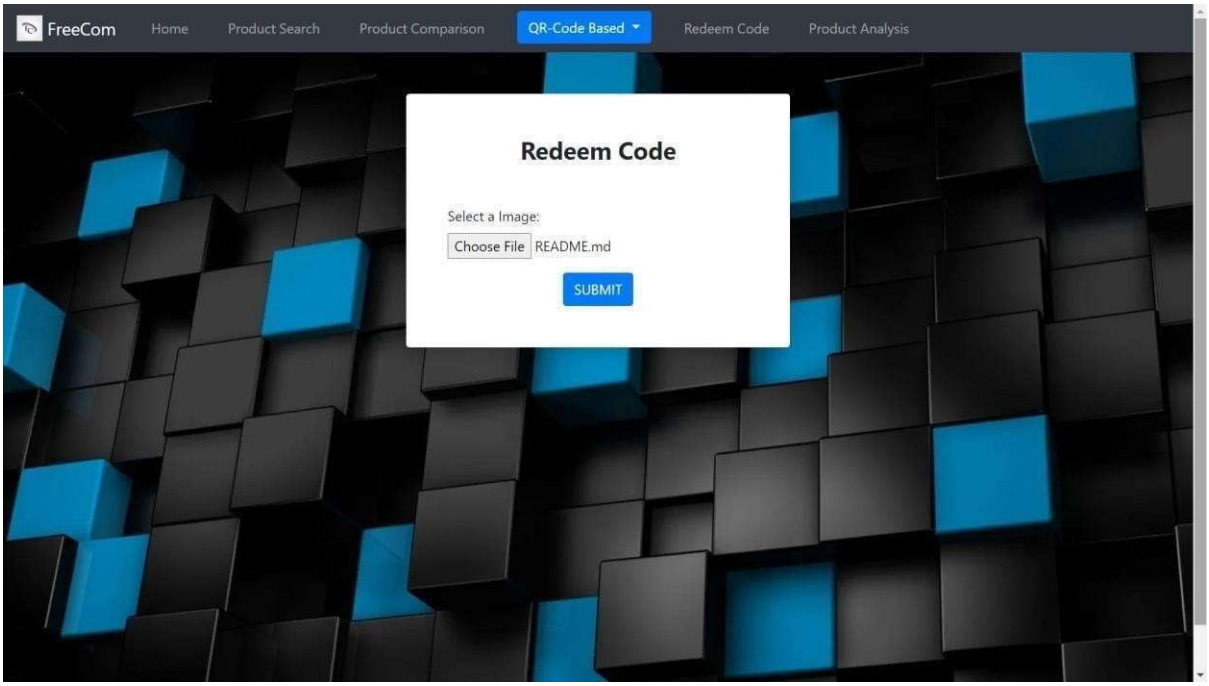


If the user doesn’t scan both the QR Codes and click on Search button then an Error page will be shown to scan both the QR-Codes for Comparison.

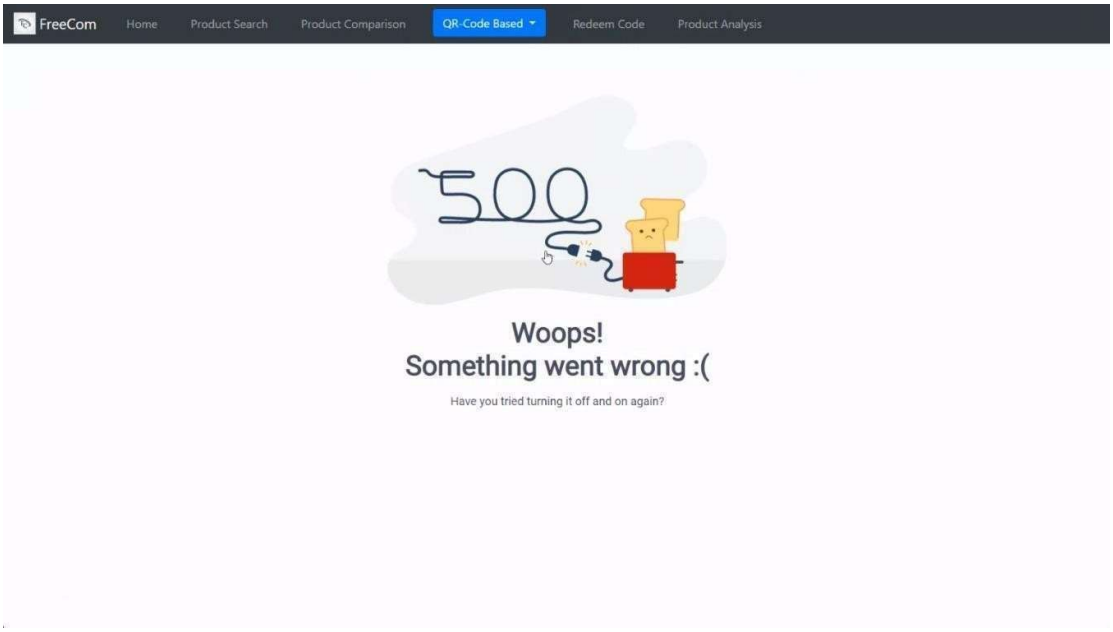
5. Redeem Code



If the user does not upload the Encoded Image clicks on Search button then they will be prompt to select a file.



If the user uploads an unsupported file and clicks on Submit button then and Error page is displayed saying "Woops! Something went wrong :(".



CHAPTER 6
CONCLUSION & FUTURE WORK

CHAPTER 6

CONCLUSION & FUTURE WORK

6.1 LIMITATION OF PROJECT

Need to change the web framework to bring scalability. Also, users cannot save the shopping carts so that they can access later i.e., they cannot create wish lists which they can access later. This application does not have features by which user can set price ranges for products and receive alerts once the price reaches the particular range.

6.2 FUTURE ENHANCEMENT

The following things can be done in future.

• The current system can be extended to allow the users to create accounts and save products in to wish list.

• The users could subscribe for price alerts which would enable them to receive messages when price for products fall below a particular level.

• The shopping cart process system can be added to the current system. It can be extended to have an easy to use check out process.

• User can use QR code of the product to by the item.

• QR code could be generated and distributed as coupons.

• Current Systems product buying links could be replaced by affiliate links to generate revenue.

• Stenography can be used to hide info in the image or advertisement of the product. And can be decrypted to get discount.

CHAPTER 7
BIBLIOGRAPHY & REFERENCES

CHAPTER 7

BIBLIOGRAPHY & REFERENCES

7.1 REFERENCE BOOKS

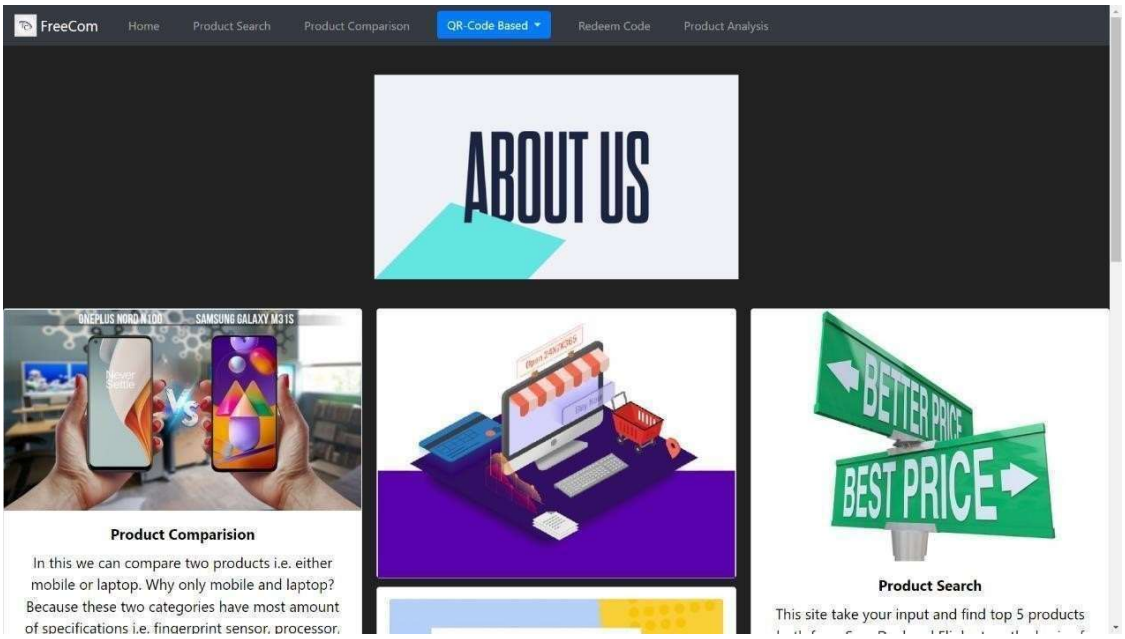
- *Front-End Developer Handbook 2017 by Cody Lindley*
- *Web Scraping with Python by Richard Lawson*
- *Steganography in Digital Media by Jessica Fridrich*
- *Learning OpenCV 3.0 by Adrian Kaehler and Gary Bradski*
- *Learning Python by Mark Lutz*

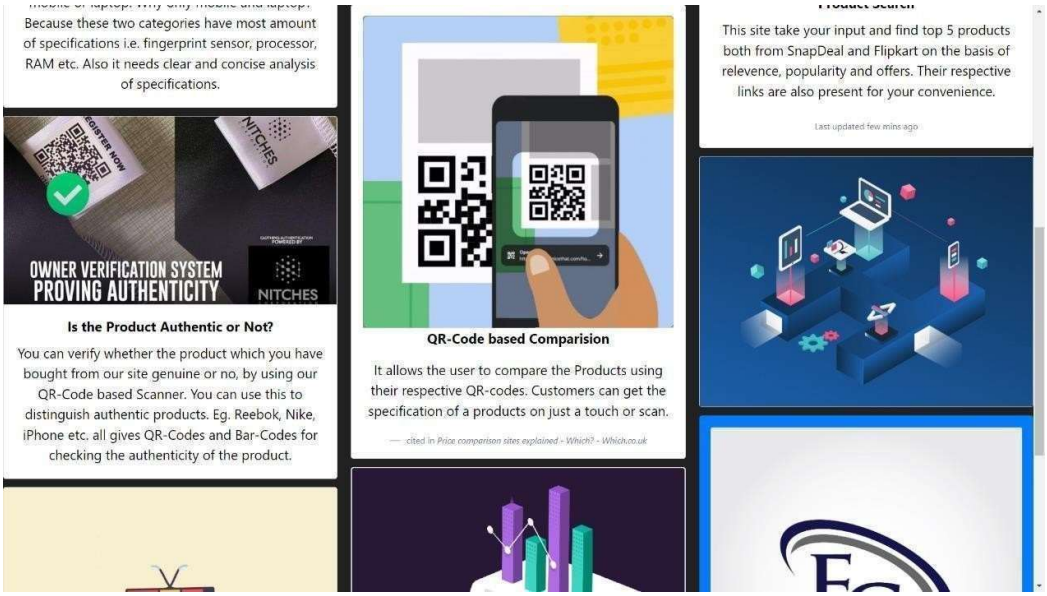
7.2 OTHER DOCUMENTATION & RESOURCES

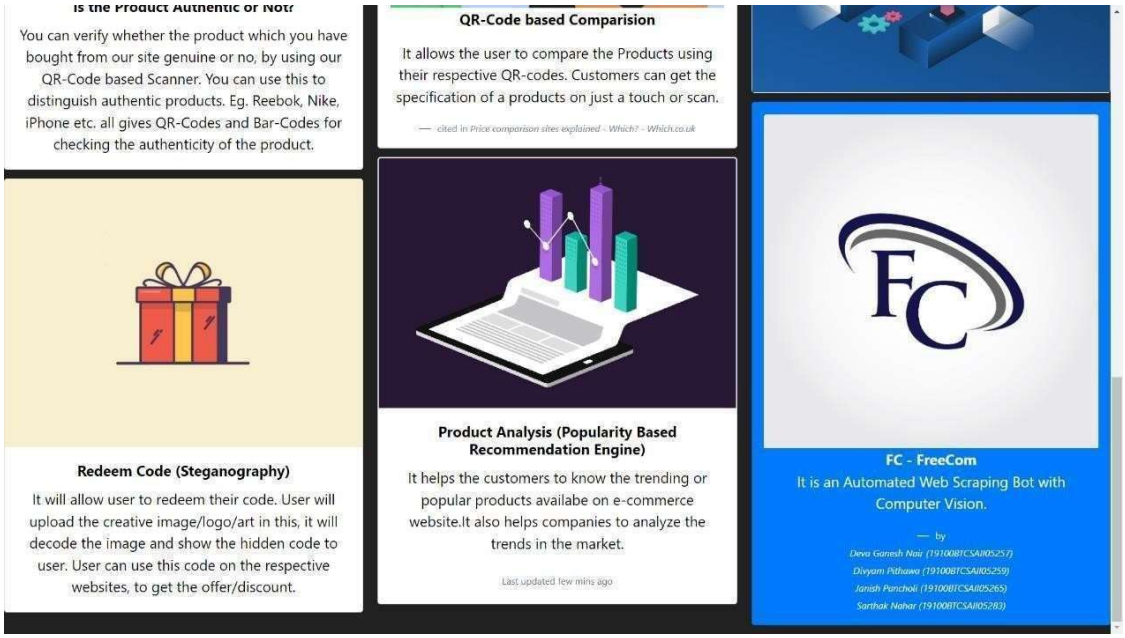
- *https://www.researchgate.net/publication/335580087_The_Application_of_Artificial_Intellig ence_in_Electronic_Commerce*
- *https://www.naaptol.com/*
- *https://www.pricepanda.com/*
- *https://www.cloudways.com/blog/price-comparison-websites/*
- *https://influencermarketinghub.com/best-price-comparison-sites/*
- *https://gs.statcounter.com/social-media-stats/all/india*
- *"Online Consumer in India by Age Group" https://qz.com/india/872834/an-average-online-shopper-in-india-is-a-man-aged-25-34-years-buying-electronics-through-his-mobile-phone/*
- *"Number of annual shoppers, India 2018-2020" https://www.statista.com/statistics/1191958/india-number-of-annualonline-shoppers/*
- *"Most of the Indian internet users" https://gs.statcounter.com/social-media-stats/all/india*

7.3 SNAPSHOT (WITH DESCRIPTION)

HOME PAGE of our Project

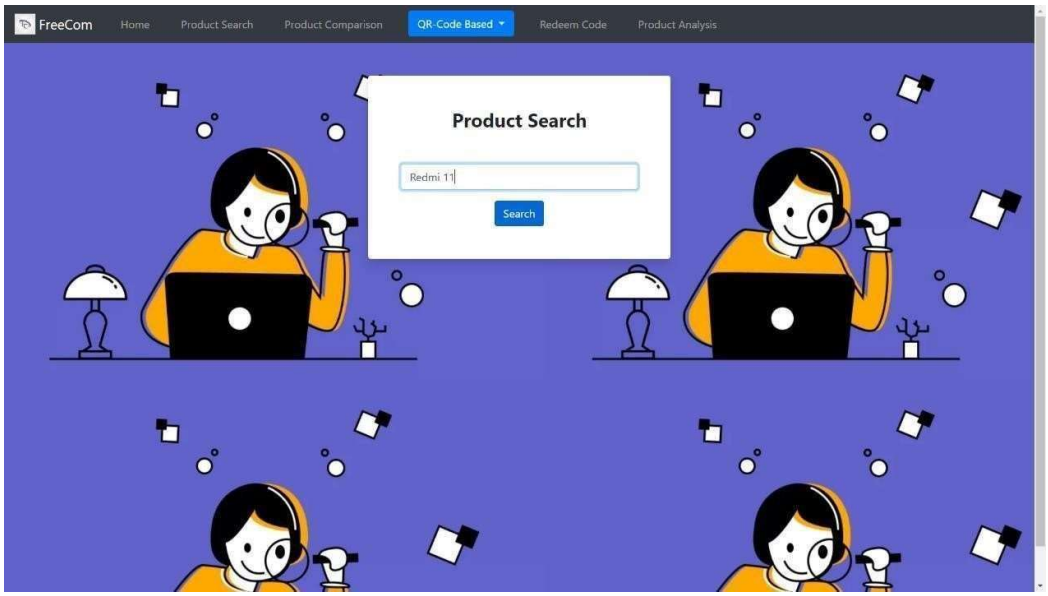


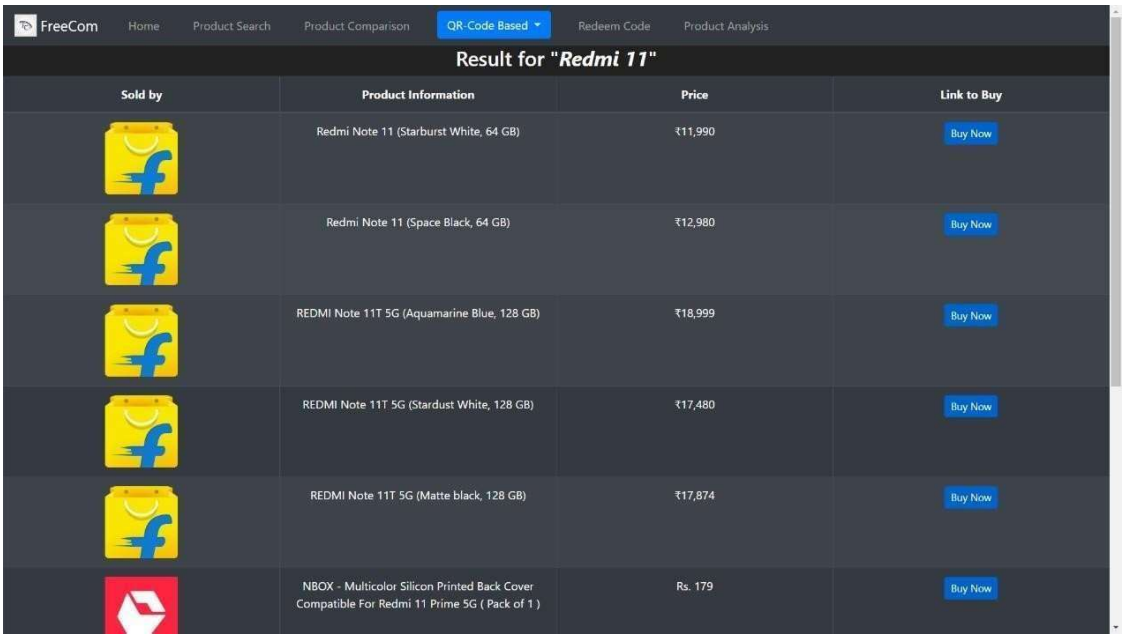




Product Search (Price Comparison)

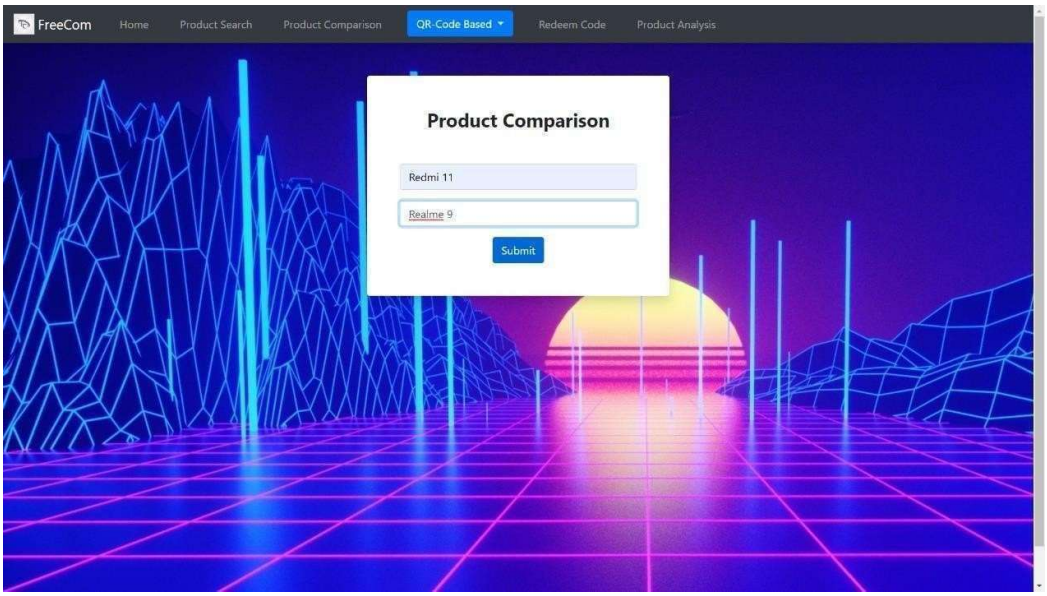
In Product Search, the user will search for the product they want in the search box and the top 10 results from Flipkart and Snapdeal will be displayed in the tabular format to the user.

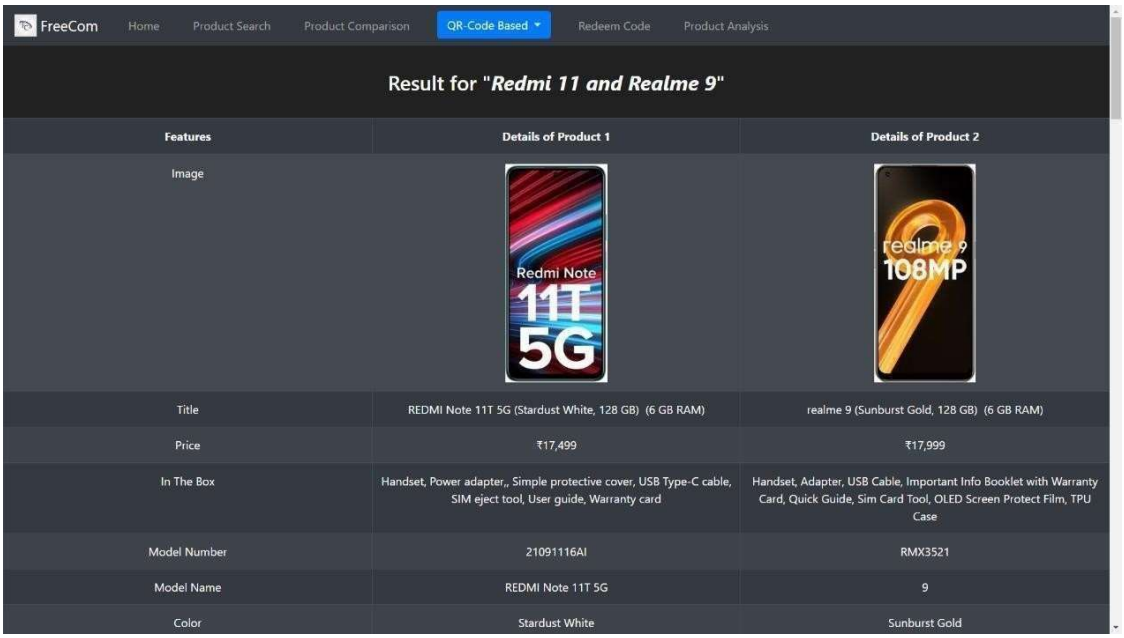




Product Comparison

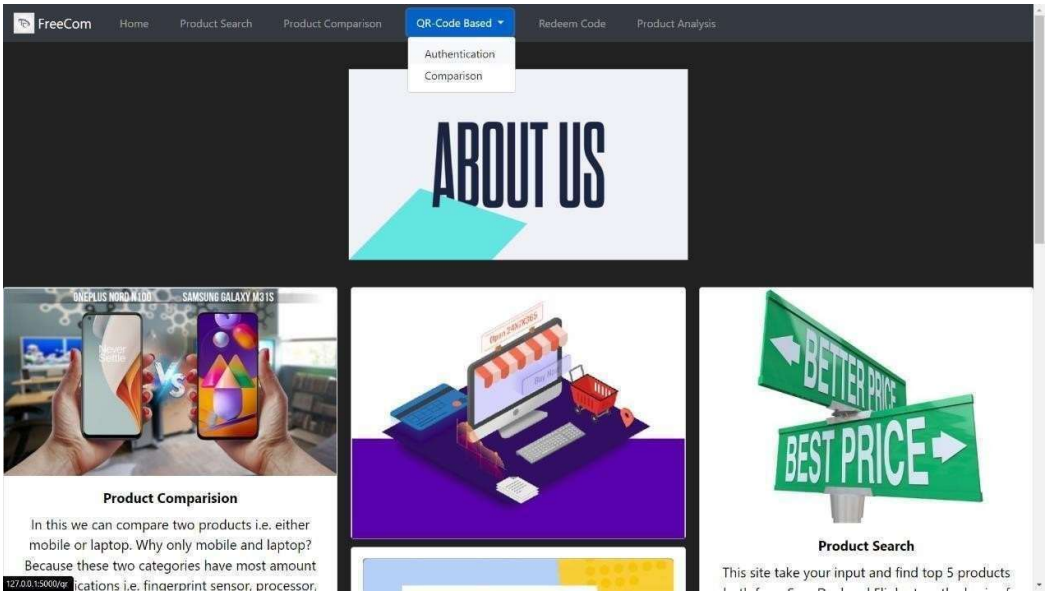
In Product Comparison, the user will enter the name of two electronic product they want to compare. The comparison result will be displayed to the user in the tabular format along with the product image from Flipkart.

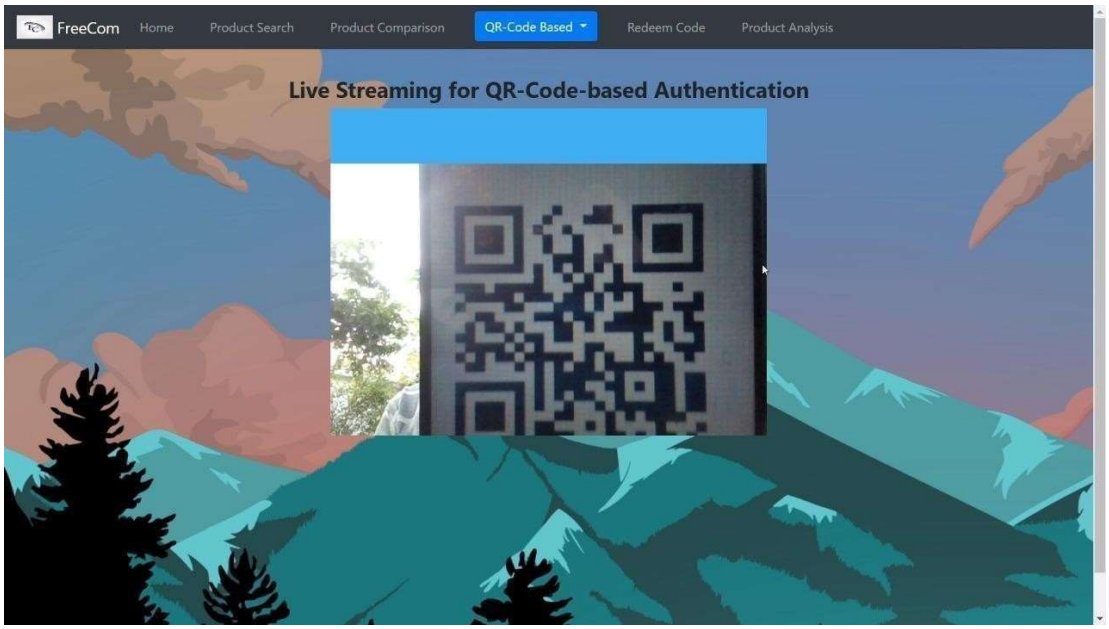


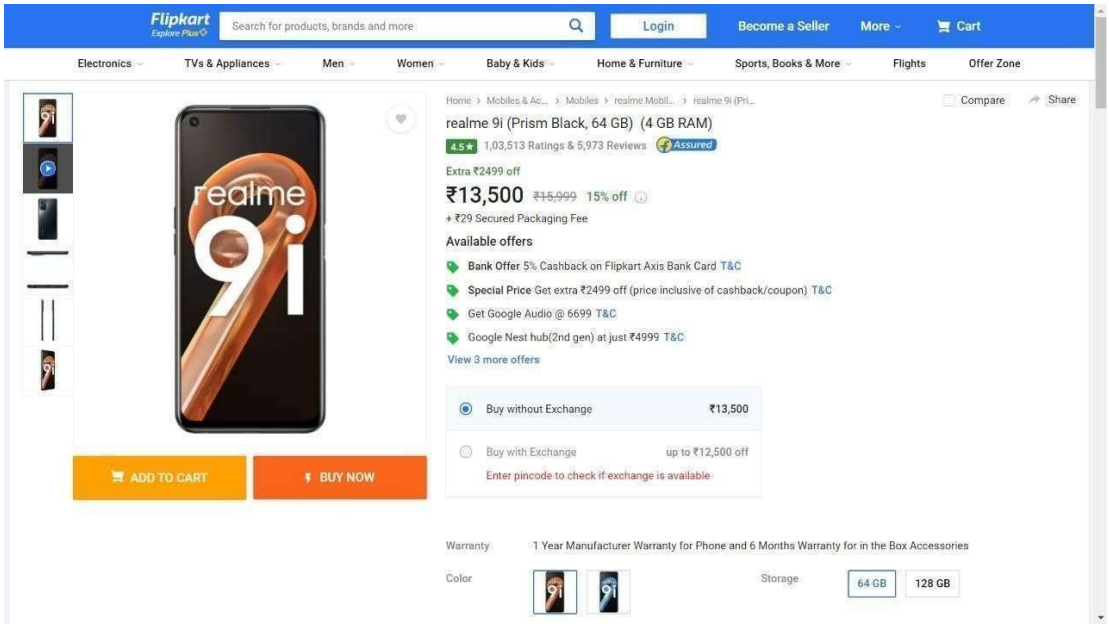


QR-Code Based Authentication

In QR-Code-based Authentication, the user will show the QR-code they get with the product in the Live Streaming box, a green box follows the QR-Code in real-time, and once the QR-Code has been scanned the user will be redirected to the company's website.

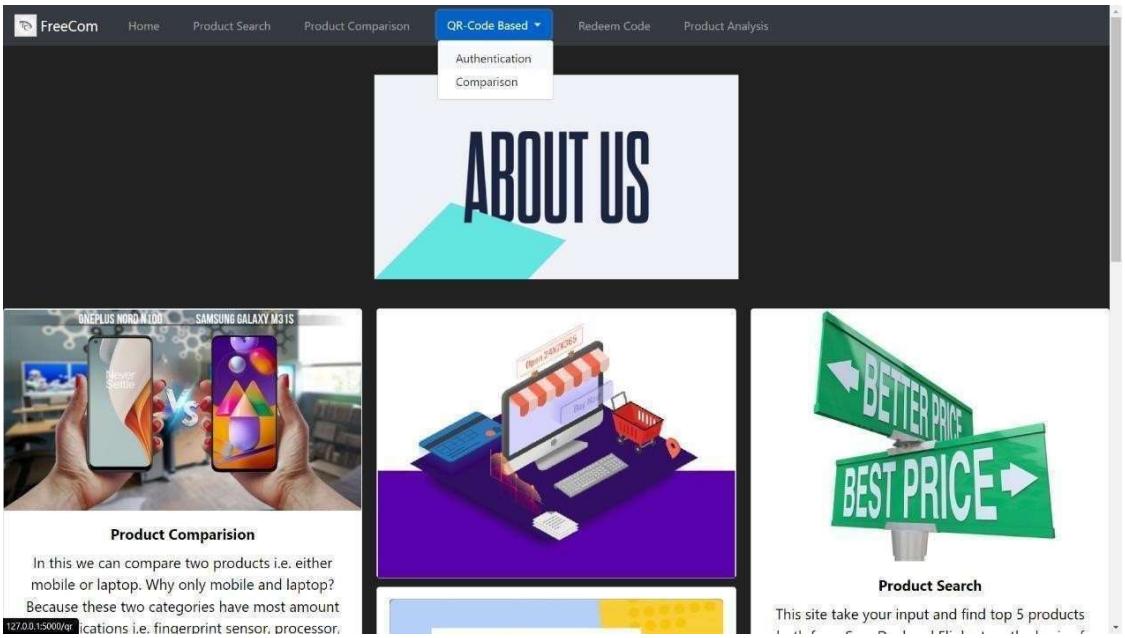




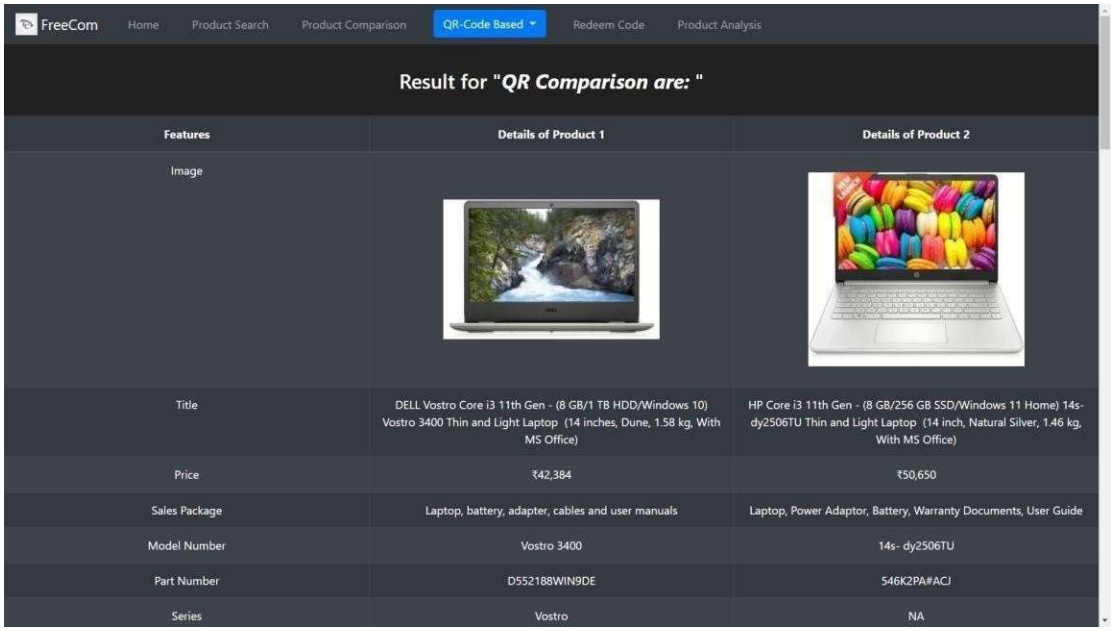


QR-Code Based Comparison

In QR-Code-based Comparison, the user will show two QR-code of the products in the Live Streaming box, a green box follows the QR-Code in real-time, and once the QR-Codes has been scanned the comparison of the two products will be displayed to the user in tabular format.

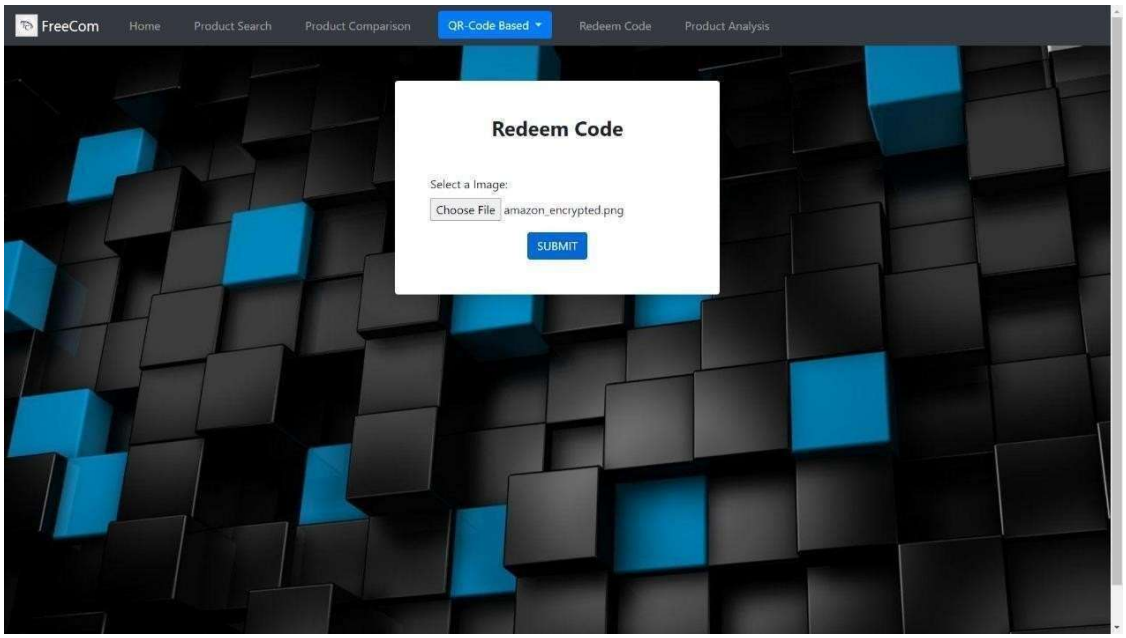

FreeCom
Home
Product Search
Product Comparison
QR-Code Based
Redeem Code
Product Analysis
Authentication
Comparison
ABOUT US
ONEPLUS NORD N100
SAMSUNG GALAXY M31S
Never Settle
VS
BETTER PRICE
BEST PRICE
Product Comparision
In this we can compare two products i.e. either mobile or laptop. Why only mobile and laptop? Because these two categories have most amount
Product Search
This site take your input and find top 5 products
127.0.0.1:5000/qr

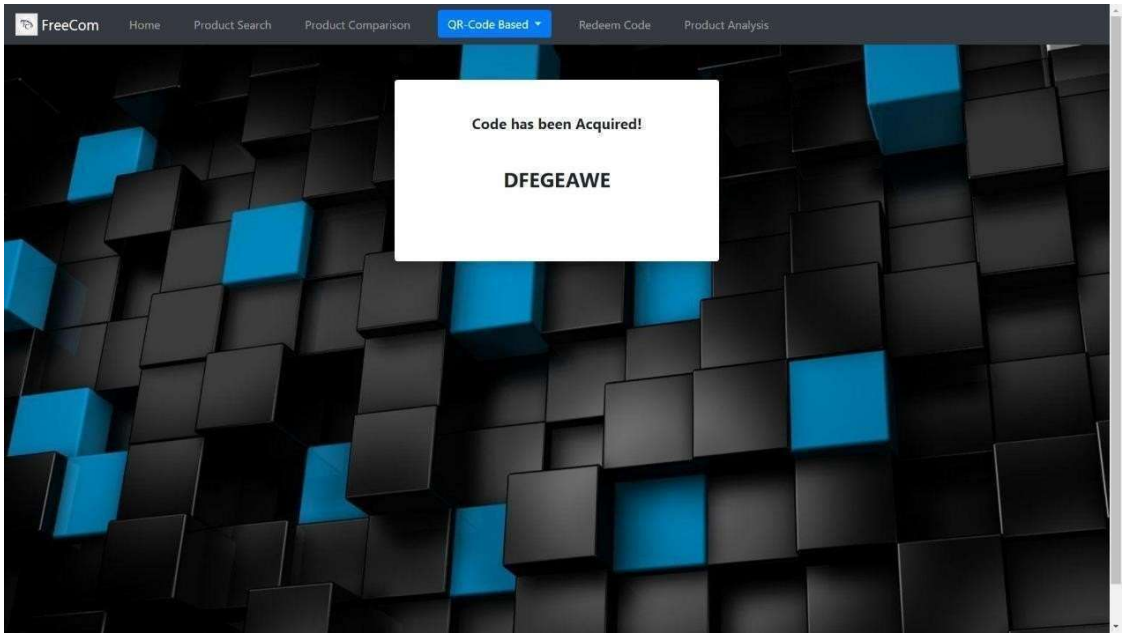

Live Streaming for QR-Code-based Comparison



Redeem Code

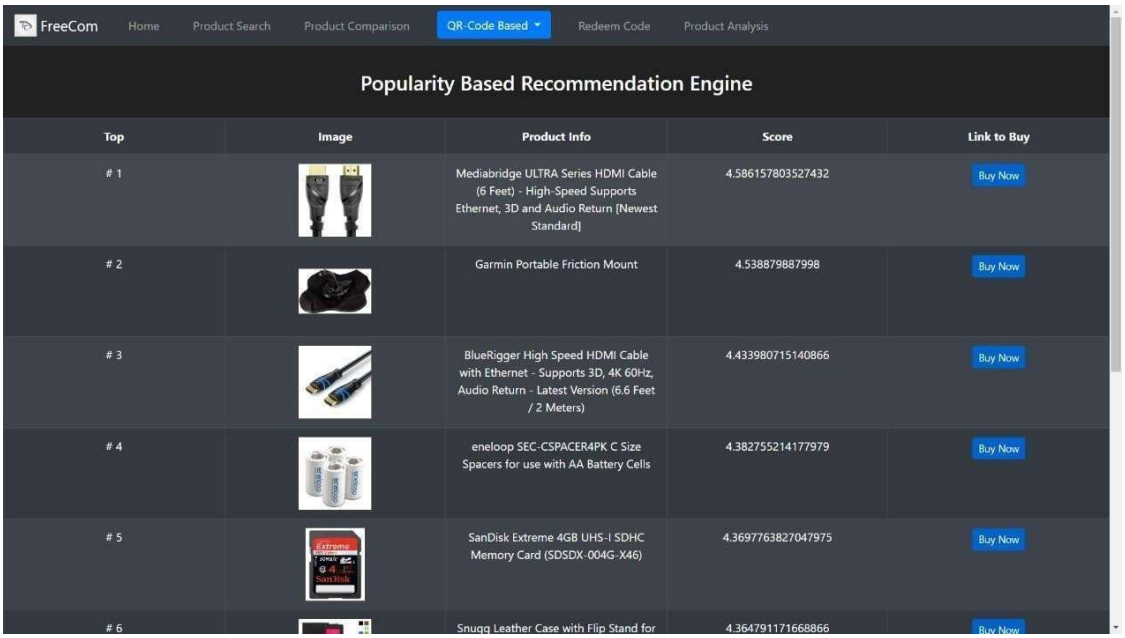
In Redeem Code, the user has to upload an image that they will reserve on their registered email id from the company. The image may contain a hidden code that will be displayed to the user that they can use to get exclusive deals or offers on future purchases.





Product Analysis

In the Product Analysis, the user will find the top 10 products based on their popularity which will be calculated using IMDB Weighted Rating Formula from the Amazon dataset.



Error Page

When there is an Internet connection error or when the user uploads any file other than the image file in Redeem Code Module of the system then it will give an error.