SPEECH-TO-TEXT AND SENTIMENT ANALYSIS FOR A HOTEL FEEDBACK SYSTEM

BY

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ABSTRACT

Natural language processing (NLP) refers to a set of AI techniques that enable computers to understand human communication in the form of text or speech. NLP leverages computational linguistics and rule-based modeling in conjunction with statistical, machine learning, and deep learning models to effectively handle human language. By utilizing these technologies, computers are capable of comprehending the meaning and intention behind human language, as well as identifying the sentiment expressed. One key application of NLP is multiclass text categorization, which allows computers to classify text as positive or negative.

The proposed project aims to develop a mobile application for a hotel feedback system with speech-to-text and sentiment analysis features. The speech input from customers will be converted into text and then subjected to a classification task using machine learning to identify positive and negative feedback. By analyzing the feedback data, the hotel management can determine the rate of customer feedback and make improvements accordingly.

Once the hotel management obtains information on the rate of customer feedback, they will be encouraged to enhance the hotel's value and prevent negative feedback from customers. Additionally, in the event of negative feedback, the hotel management will take appropriate action to address the issues and prevent them from recurring. This feedback system will enable the hotel to make informed decisions and improve its performance.

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LIST OF SYMBOLS

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LIST OF ABBREVIATIONS

NLP   Natural Language Processing

AI   Artificial Intelligence

ML   Machine Learning

VoC   Voice of Customers

STT   Speech-To-Text

NLP   Natural Language Processing

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Chapter 1 Introduction

Text plays a vital role in our daily lives, serving as a means of communication and a valuable source of information. It holds a wealth of data that can offer businesses valuable insights into customer preferences, needs, and emerging trends. Text analysis is a crucial method for extracting meaningful information from written content, and Natural Language Processing (NLP) is a powerful tool employed for this purpose. NLP empowers machines to understand human language in a manner akin to humans, enabling them to comprehend spoken or written inputs through the application of artificial intelligence-driven processes. In this context, machine learning algorithms convert data into numerical representations, granting computers the capability to learn and make predictions, encompassing tasks such as speech recognition, image classification, and text document categorization. This technology finds practical utility across a wide array of industries, including the hospitality sector, where hotels can leverage it to enhance their feedback systems and elevate the overall guest experience.

Within the realm of Natural Language Processing (NLP), VADER Sentiment analysis plays a pivotal role. It serves as a tool for scrutinizing textual data to ascertain sentiment polarity, indicating whether the text conveys a positive, negative, or neutral sentiment, typically assessed on a scale ranging from -1 (indicating negativity) to 1 (indicating positivity). VADER Sentiment relies on a lexicon, which is a compiled list of words or phrases assigned sentiment scores, to compute the polarity score for a given text or sentence. This score serves as a valuable metric for comprehending the sentiment expressed within the text.

For hotels, guest feedback holds paramount importance in evaluating their performance, directly impacting their ratings, business prospects, and overall success. Online feedback has garnered significant trust, with a staggering 88% of individuals relying on it more than personal recommendations. Furthermore, a noteworthy 81% of travelers deem online feedback as a crucial factor when selecting a hotel. Negative feedback can result in a substantial loss of business, with just one unfavorable review potentially leading to a hotel losing up to 30 reservations. Conversely, positive feedback can substantially bolster a hotel's revenue. For instance, a mere one-star

increase in ratings on platforms such as TripAdvisor can translate into a notable 5% to 9% surge in revenue.

The transition from traditional word-of-mouth feedback to digital platforms, encompassing websites, social media, and mobile applications, has streamlined the process of collecting and analyzing feedback. Diverse methods, including star ratings, comments, and like/dislike buttons, serve as invaluable tools for scrutinizing feedback and pinpointing areas necessitating improvement. This feedback empowers hotel managers to actively engage with guests, address their concerns, and elevate their hotel's performance. With an effective feedback system in place, hotels gain deeper insights into their strengths and weaknesses, facilitating the delivery of consistent and dependable services to their guests.

1.1   Problem Statement and Motivation

In today's world, hotel feedback systems have grown more and more important in helping travelers find the right places to stay and ensure they have enjoyable trips. These systems allow guests to share their thoughts about their hotel stay, which helps hotels assess how well they're doing and make sure guests are happy. However, there are some challenges to overcome, like when customers struggle to write down their feedback. To make things easier, hotels can add a voice recognition system so customers can speak their feedback, which can express their feelings better. Right now, most hotel feedback systems can't tell how customers are feeling, but with voice recognition, they might be able to understand emotions too. It's important for hotels to ask customers for their feedback so they can learn more about their guests and improve their services. To handle all the feedback they get, hotels could create a tool that automatically analyzes it. But sometimes, it's hard to figure out if feedback is positive or negative, especially when it has both good and bad parts. To fix this, the feedback system could include a word tracker that figures out if the feedback is more on the positive or negative side as customers type it.

- **Customers struggle to express themselves effectively in written feedback.**
  In the context of a hotel feedback system, a significant issue arises when customers struggle to effectively communicate their thoughts and experiences through written text feedback. This difficulty arises from various factors, including language proficiency discrepancies, personal preferences, and physical limitations. Language barriers can hinder customers from accurately conveying their thoughts, while some individuals may simply prefer more interactive and expressive forms of communication than typing. Additionally, those with physical limitations face obstacles in providing detailed written feedback.

  Overcoming this challenge is vital for hotels as it directly impacts the guest experience and long-term customer relationships. By actively addressing the limitations of written feedback and finding ways to accommodate diverse communication preferences, hotels can foster a more positive and memorable guest experience. For example, responding to a guest's suggestion by offering a

complimentary upgrade or a special celebratory gesture can create lasting impressions that guests enthusiastically share with others, bolstering the hotel's reputation and customer loyalty.

Conversely, hotels that fail to recognize and alleviate these difficulties in feedback may risk negative repercussions. Unresolved issues can lead to frustrated guests airing their grievances on online review platforms, damaging the hotel's reputation and bottom line. Traditional feedback methods reliant solely on written text may not capture the full spectrum of guest experiences, making it challenging to make informed decisions and improvements. Therefore, addressing the challenge of effective customer expression in written feedback is a pivotal aspect of ensuring a hotel's success and competitiveness in the hospitality industry.

- **Difficult to detect and differentiate positive feedback and negative feedback for further actions to be taken**

  The current feedback system utilized by hotels plays a crucial role in understanding customer satisfaction and nurturing customer loyalty. However, a notable challenge is that the existing system lacks the ability to automatically discern whether a customer's feedback is positive or negative as they express their opinions. This challenge arises when analyzing customer feedback and accurately determining its sentiment. The intricacies of human language add a layer of complexity to this issue, making it difficult for hotels to determine whether a customer is subtly expressing dissatisfaction while using positive language or, conversely, expressing contentment while using negative terms to describe their experience. As a result, hotels face the challenge of accurately interpreting feedback to take appropriate actions, whether it involves addressing negativity or capitalizing on positive insights.

  Feedback from customers holds immense significance for hotels, serving as a guide for refining their services and operational practices. The type of feedback received, whether it is filled with positivity or tinged with negativity, has the potential to profoundly impact a hotel's trajectory. Positive feedback brings substantial benefits to a hotel's business, while negative feedback can have

adverse effects on various aspects, including performance metrics, revenue generation, and the overall perception of the brand. The process of implementing effective improvements and responsive measures becomes crucial, particularly when faced with negative feedback.

- **Consume lot of time and workforce to manage feedback data**
  A hotel's feedback system accumulates a diverse range of responses from various customers. The process of evaluating these feedback entries involves the hotel management categorizing them as either negative, neutral, or positive. However, adhering to these traditional methods demands a substantial allocation of time and manpower, rendering them inefficient. Particularly when a hotel's feedback system amasses a substantial volume of input from customers, the task of managing this data becomes a formidable challenge. Categorizing feedback, especially into the categories of positive or negative, necessitates manual collection, organization, processing, and classification by dedicated personnel. As the customer base and the influx of feedback grow, the effectiveness of feedback management diminishes.

  Hotel staff are compelled to meticulously review each piece of feedback, assign it a category, and subsequently take appropriate actions. Nevertheless, when faced with an overwhelming volume of feedback, there's a heightened risk of errors or crucial feedback being overlooked or dismissed. The management of feedback morphs into a continuous, labor-intensive undertaking, particularly as the quantity of feedback escalates over time. Consequently, the endeavor of effectively managing feedback data translates into a significant investment of resources, encompassing both time and workforce efforts.

1.2 Project Objectives

- **To develop a hotel feedback system to let customer use voice/ speech to provide feedback more effectively.**

  Adding voice recognition to the proposed application can make giving feedback much easier for customers. Voice recognition understands spoken words and then shows them on the screen for customers to check. This makes providing feedback more effective compared to the old way of typing it out on forms. With voice recognition, customers can talk about their hotel experience in a natural way, almost like having a conversation. This improves how customers share their thoughts and makes their experience better. Voice recognition also helps customers who might not have a high level of education. They can just press a button, talk about their experience, and share their thoughts with the hotel easily. This feature helps hotels understand their customers better and improve their services based on what customers say. Overall, using voice recognition makes giving feedback smoother and gives customers a better way to share their opinions.

- **Develop a hotel feedback system in mobile application that will analyze and differentiate customer feedbacks using sentiment analysis.**

  Customer feedback plays a pivotal role in shaping the success of hotels. However, the absence of a dependable feedback system presents a significant challenge for hotels in comprehending the extent of guest satisfaction and initiating necessary enhancements. Customer feedback, whether positive or negative, holds utmost importance for hotels, forming the foundation for their analytical endeavors.

  The proposed feedback system within a mobile application for hotels incorporates sentiment analysis, a tool that proves invaluable in dissecting, discerning, and categorizing customer feedback into distinct positive and negative segments. By leveraging sentiment analysis, hotels can directly extract insights into guest satisfaction levels post their stays. This strategic utilization empowers hotels to pinpoint areas of strength and areas that warrant improvement in their services, all driven by the feedback they receive. To

illustrate, a hotel that garners extensive positive feedback about its staff can respond by offering additional training programs to maintain their exceptional service levels. Conversely, if a hotel encounters negative feedback regarding its rooms, it can undertake measures to enhance these aspects and thereby elevate the overall guest experience.

The incorporation of sentiment analysis equips hotels to delve into the emotions and perceptions of their customer, thereby unveiling the underlying factors that contribute to positive or negative experiences. Furthermore, this tool serves as a potent means for hotels to gain a competitive edge in their industry. By assimilating insights regarding the elements that cultivate either positive or negative guest experiences, hotels can tailor their services to better align with customer expectations. This personalized approach subsequently fosters an increase in customer loyalty and repeat business and it is a critical cornerstone for the long-term triumph of any hotel.

- **Hotel feedback system that will automate the classification of feedback data.**
  Automated classification stands as a valuable asset within the hotel industry's arsenal for effectively managing customer feedback. This mechanism transcends the scope of mere time-saving and reduction of staff workload; its impact extends to bolstering customer satisfaction and cultivating loyalty. In the current landscape, a significant portion of hotel feedback management relies on manual procedures. However, the expeditious categorization of feedback into positive or negative realms empowers hotels to uncover areas ripe for enhancement. This swift identification process equips hotels to promptly address negative feedback, consequently uplifting the caliber of their services. This, in turn, culminates in heightened customer satisfaction, augmenting the likelihood of their return visits.

Furthermore, the implementation of automatic classification equips hotels with a proactive stance towards emerging issues, such as concerns related to room cleanliness. By facilitating immediate intervention, this system averts these nascent challenges from blossoming into more substantial problems. The

efficacy of automated classification in identifying negative feedback, especially in relation to specific facets of the hotel experience, positions it as a swift and streamlined method for categorizing and dissecting feedback. This not only elevates the quality of service and customer contentment but also economizes time and resources. In parallel, it furnishes a comprehensive snapshot of both positive and negative feedback, enabling hotels to efficiently discern domains necessitating refinement in response to the negative feedback received.

1.3   Project Scope and Direction

The goal of this project is to develop a mobile application for hotel feedback on the Android platform. This app will enable customers to easily share their hotel experiences using their mobile devices. The main aim is to improve the customer experience by offering a convenient and effective way for them to provide feedback about their stay.

The features and capabilities that can enhance the customer experience and streamline the process of providing hotel feedback through the mobile app include:

1) The mobile app for the hotel feedback system can gather customer information.
2) The app allows customers to provide feedback about their hotel experience.
3) It includes a voice recognition feature.
4) The app can convert spoken feedback into text using voice recognition.
5) It can analyze customer feedback to determine if it's positive or negative.
6) The app displays both positive and negative feedback to customers.
7) Feedback data can be sent to the admin system.
8) The admin system for the mobile app can access customer information, feedback content, and feedback categorization.
9) Admins can provide comments on the feedback.
10) The admin system can filter feedback based on whether action has been taken or not.
11) The admin system can generate reports, allowing for the selection of positive or negative feedback and whether action has been taken or not.

1.4 Contributions

The hotel industry is really important for tourism, and hotels need to make sure they give their customers the best experiences. To do this, hotels can set up a system to get feedback from their guests. This system can automatically figure out if the feedback is positive or negative without needing employees to do it by hand. This makes things easier for the staff because they don't have to spend time sorting through feedback. It helps the hotel managers understand how well they're doing and make improvements.

Also, this system lets the hotel know more about its customers. If someone gives negative feedback, the hotel can reach out to them to get more details. This way, the hotel can really understand what they need to work on from the customer's point of view. Once they look at the feedback, the hotel can make changes to fix any problems and make their overall service better.

What's more, my idea for this project makes things easier for customers too. Hotels have all sorts of guests with different backgrounds and preferences. Some people might have trouble typing out their feedback, so we've added a feature where they can just talk, and the system will turn their words into text. This helps those who find it hard to type or want to share their thoughts more freely.
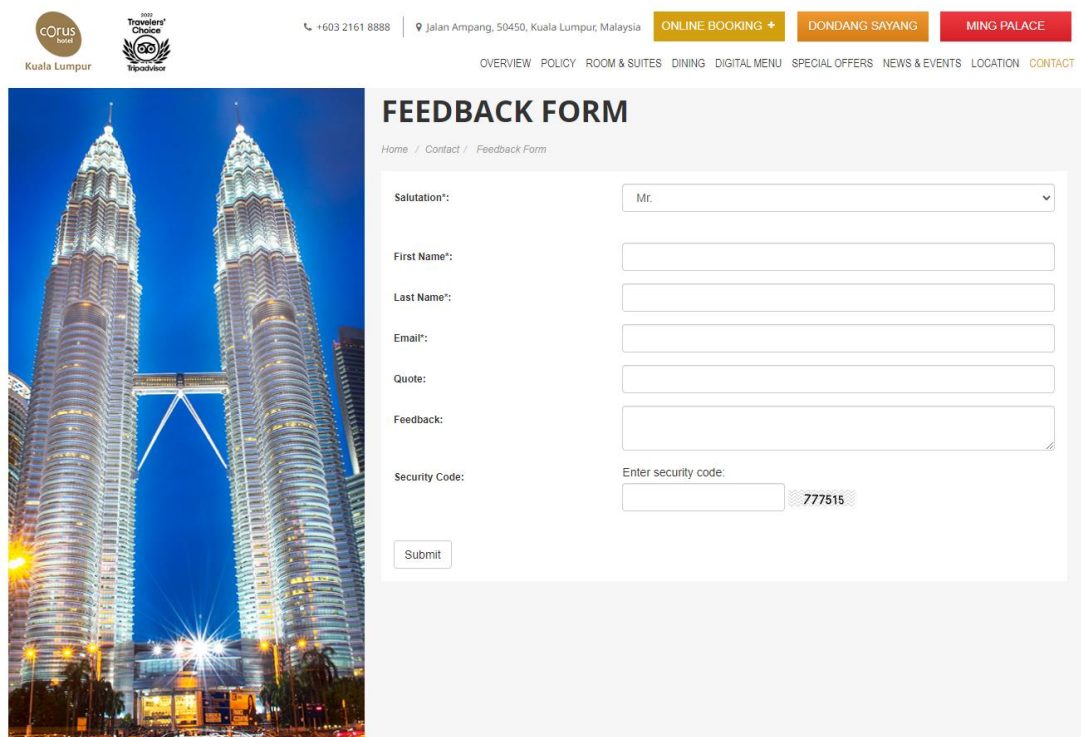
1.5   Report Organization

This report is divided into seven chapters. The first chapter serves as an introduction and covers the problem statements, project objectives, project scope and direction, and project contributions. Moving on to the second chapter, it focuses on a literature review and assesses the strengths and weaknesses of existing hotel feedback systems. The third chapter delves into system design, explaining the methodology, system equations, and presenting a use case diagram. Chapter four revolves around the application's system design and details the flow of the application. Chapter five addresses implementation and testing, encompassing hardware and software setup, configuration, and system operation. Chapter six is also dedicated to implementation and testing, discussing the results of a system evaluation survey, testing setup and outcomes, challenges encountered, and objective evaluations. Finally, in chapter seven, the project is concluded.

CHAPTER 2 - Literature Reviews

This chapter will focus on the hotel that have feedback system. In literature review, which show hotel that have their own feedback system have found which is Corus Hotel Kuala Lumpur, Swiss-Garden International, Ramada Suites by Wyndham KLCC and Hotel De' La Ferns.

2.1 Corus Hotel Kuala Lumpur

Figure 2.1.1 Corus Hotel Kuala Lumpur feedback system

The Katerina hotel is a 4-star hotel that located in Batu Pahat. The Katerina Hotel have developed their own website. On the website have their own feedback system to record feedback from their customer.

Strength

- **Able to collect customer feedback**

  Customers can write feedback to the about their experience after staying that hotel on the website. Those feedback will help hotel to analyze and let hotel know about did their service satisfy their customer or their performance have met their own requirement to their customer.

- **Customer able to fill their information while doing feedback.**

  Customers need to fill in their information when doing the feedback. For example, customer need to fill their name and email. This will let the hotel collect the data of their customer and easy to reply to their customer that have give feedback.

Weakness

- **Does not provide voice recognition**

  Corus Hotel Kuala Lumpur does not have voice recognition for their feedback system. This will let those customers that education level is not high are willing to feedback hard to do feedback.

- **Does not have emotion detection from the customer**

  Corus Hotel Kuala Lumpur can't detect the emotion form the customer to predict feedback is positive or negative review.

2.2 Swiss-Garden International

Figure 2.2.1 Swiss-Garden International feedback system

Swiss-Garden International was created in 1991 that manage hotel for OSK group as a hotel operator and it also a hotel management company to help owners of hotels that are handled by third parties. In their website have their own feedback system to let customer to fill in the feedback form.

Strength

- **Customers can fill their information.**

  Swiss-Garden International feedback system are able their customer to fill in their information and it is compulsory to fill in. For example, customer first name and last name, contact number, email, and country that customer are from. This will help them to record the information of their customer.

- **Customer able to write their feedback on the website**

  Customer can list down their feedback to about their performance or service after they stay at Swiss-Garden International. It also has asked customer to give some suggestion to improve their hotel. It will let Swiss-Garden International to maintained and improve their performance and service in the future.

Weakness

- **Does not have voice recognize feedback to customer.**

  Swiss-Garden International is well-known in Malaysia. There are many senior-citizen know about this hotel and when there to take a vacation. But

some of senior-citizen education level are not so high and cannot type those word that wanted to express. So that, they cannot do feedback to Swiss-Garden International and Swiss-Garden International hard to receive the feedback from senior-citizen.

- **Does not have feedback analysis to the feedback**

  Swiss-Garden International hard to analyse the feedback is positive feedback or negative feedback.

2.3 Ramada Suites by Wyndham KLCC

Figure 2.3.1 Ramada Suites By Wyndham KLCC feedback system
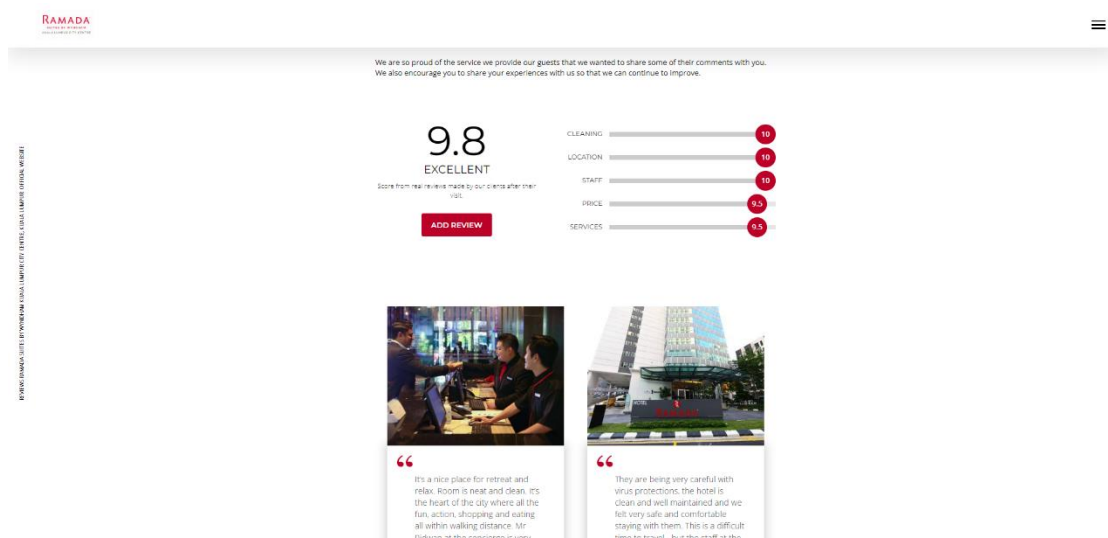
Figure 2.3.2 Ramada Suites by Wyndham KLCC show feedback

Ramada Suites By Wyndham KLCC is a 4-star hotel that located in Bukit Bintang. Ramada Suites is a 106-suite property in Wyndham KLCC. It has their own feedback system in their website for their customer.

Strength

- **Customer information is collected**

    Ramada Suites By Wyndham KLCC will collect their customer information for their analysis. This will let Ramada Suites by Wyndham KLCC know their

customer base such as name, e-mail, type whether their customer is couple, individual, family or a group of friend and which country are they from.

- **Able to collect customer feedback by rating and writing**

  Ramada Suites By Wyndham KLCC can collect their customer feedback from their feedback system by rating and writing. This feedback system will help Ramada Suites by Wyndham KLCC collect their customer feedback and analyze it. After analyzing the feedback Ramada Suites by Wyndham KLCC can use the analyze to advance the hotel in the future to the let customer have a better experience.

- **View rating from other customer.**

  In Ramada Suites by Wyndham KLCC website have shown the rating of their customer. The rating system rate the cleaning, location, staff, price and service of Ramada Suites by Wyndham KLCC. This will let other customer have more confident to their hotel.

Weakness

- **Does not include voice recognize system.**

  Ramada Suites by Wyndham KLCC does not include voice recognize system in their feedback system. This is let Ramada Suites by Wyndham KLCC have lesser feedback to analysis this is because there are many customers that prefer using voice to do feedback to the hotel. So that, Ramada Suites by Wyndham KLCC have lost much feedbacks from their customer.

2.4 Hotel De' La Ferns

Figure 2.4.1 Hotel De' La Ferns logo

Please complete the following with details:

Check In	Check Out	Room No

Name (Mr/Mrs/Ms)	Other Title

Company	Profession

Mail Address

Tel (Residence)	Tel (Office)

Fax (Residence)	Fax (Office)

Mobile No	Email

Are you holding any privilege card membership?

○ Yes ○ No

If Yes, please state your membership

Overall service provided by our team at De' La Ferns Hotel

○ Excellent ○ Good Fair ○ Poor

Based on your experience, how likely are you to return to this hot

○ Very likely ○ Likely ○ Not ar all

Would you recommend this hotel to others?

○ Very likely ○ Likely ○ Not ar all

Figure 2.4.1 Hotel De' La Ferns feedback system about customer information

Please indicate your score and give comments where necessary
Arrival

Hotel	Excellent	Good	Fair
Overall Appearance	○	○	○
Ambience of Lobby Area	○	○	○
Design of Lobby	○	○	○
Safety and Security	○	○	○
Reception and Service	○	○	○

Commant

Rooms	Excellent	Good	Fair
Overall Appearance	○	○	○
- Cleanliness	○	○	○
- Comfort	○	○	○
- Quietness (Noise)	○	○	○
- Lighting (Reading and Room)	○	○	○
- In-Room Working Space	○	○	○
- Selection of TV Channels	○	○	○
- Bathroom Amenities	○	○	○
- Maintenance or Room	○	○	○

Figure 2.4.2 Hotel De' La Ferns feedback system about rating

In Room Dining	○	○	○
- Food Selection (Menu)	○	○	○
- Pricing	○	○	○
- Food Quality	○	○	○
- Food Presentation	○	○	○

Commant

Restaurant	Excellent	Good	Fair
Overall Appearance	○	○	○
- Ambience	○	○	○
- Food Selectction	○	○	○
- Food Quality	○	○	○
- Food Presentation	○	○	○
- Wine & Beverage Selection	○	○	○
- Pricing (Value for Money)	○	○	○
- Service	○	○	○

Commant

Figure 2.4.3 Hotel De' La Ferns feedback system about rating

If you encountered any dissatisfactions during your stay, please indicate by marking all that apply. If there were none, please skip to next question.

- [ ] Check In
- [ ] Quality of Food
- [ ] Reservation Accuracy
- [ ] Outlet Service
- [ ] Staff Attitude
- [ ] Room Service Delivery
- [ ] Noise Outside Hotel
- [ ] Air Conditioning
- [ ] Noise Inside Hotel
- [ ] Toilet / Bath Tub / Sink

- [ ] Hotel Maintenance
- [ ] Web Access (spped)
- [ ] Access To The Room
- [ ] TV Reception
- [ ] Room Cleanliness
- [ ] Water Supply
- [ ] Bathroom Amenities
- [ ] Bathroom Cleanliness

Did you contact anyone at the hotel regarding the dissatisfaction (s)?

○ Yes ○ No

If yes, were the problem (s) resolved as per expectation?

○ Yes ○ No

What was the dissatisfaction

Reason of visit?

- [ ] Business [ ] Leisure [ ] Meeting [ ] Conference

If you were here for a leisure visit, was it part of a

- [ ] Tour Package [ ] Group [ ] Independent

If you were here for business, please indicate industry

Figure 2.4.4 Hotel De' La Ferns feedback system about satisfaction

How was this hotel booked?

- [ ] Direct with hotel [ ] Hotel website [ ] Travel agent [ ] Corporate Office [ ] Other travel website

Prior to this visit, have you stayed at any Cameron Highlands Hotel before?

○ Yes ○ No

If yes, which hotels

- [ ] Hotel Rainbox [ ] Hotel Casa Dela Rosa [ ] Hotel Rosa Passadena

Would you recommend De' La Ferns Hotel to others?

○ Yes ○ No

Based on your knowledge of other similarly priced/similar category hotel in the area, how does this hotel compare to others?

○ Excellent ○ Good ○ Fair ○ Poor

Who do you compare us to?

If you have any comments or suggestions, please state here

SEND

Figure 2.4.5 Hotel De' La Ferns feedback system about booking

Hotel De' La Ferns is it the name after Luxuriant Fern that located between Tanah Rata and Brinchang. They have their own feedback system in their website.

Strength

- **Collect customer personal information**

    Hotel De' La Ferns able to collect customer information very details. In figure 2.4.2, Hotel De' La Ferns ask about their customer about name, company, profession, telephone number, address, membership etc. That information will help Hotel De' La Ferns to collect information of their customer and know more about customer. That information also will let them know their hotel attract which category of customer willing to go their hotel and stay.

- **Details customer feedback system**

    Hotel De' La Ferns can collect feedback data from their customer. They have separated many sections for their feedback to let their customer feedback such as customer rating, customer satisfaction, where did their customer book their hotel and give feedback about their hotel. In figure 2.4.3 and figure 2.4.4 Hotel De' La Ferns are collecting score form customer after staying their hotel. Hotel De' La Ferns can use collected score data of their customer and let Hotel De' La Ferns easier to analysis the rating from their customer. They will use those data that have been collect form their customer to improve their service and performance. In figure 2.4.5 Hotel De' La Ferns have ask their customer about their hotel service and performance and they will collect the dissatisfaction from their customer about their hotel. This information will help them improve their hotel. Hotel De' La Ferns also have ask their customer to compare their hotel with others hotel in figure 2.4.6. So that, Hotel De' La Ferns will know about the different between them and another hotel. So that Hotel De' La Ferns can compete with their competitor and improve themselves to attract more customer.

Weakness

- **Provide text feedback only does not provide voice recognition.**

    Hotel De' La Ferns have very details feedback in their hotel, but most are text feedback. They do not provide voice recognition for their customer this will be troubled to their customer. This is because their feedback system takes a lot of

time to let customer fill in. If they provide voice recognition to their customer, it will help their customer have a big help to fill in their feedback system which is let their customer easier and save more time to fill in their feedback.

- **Did not provide automate feedback analysis.**

  Hotel De' La Ferns did not provide automate feedback analysis to customer there have some rating to customer. But customer need to click the rating manually.

2.5 Summary of Limitation

This limitation of literature review is the combination of every literature review that have been review and make conclusion limitation that majority literature review has.

- **Did not provide voice recognition to their customer.**

  Many hotel feedback systems do not offer voice recognition capabilities, which can make it difficult for certain customers to provide feedback. Senior citizens or customers with lower levels of education may have difficulty typing out their thoughts and feelings, making it challenging for them to express their feedback. As a result, hotels may have difficulty receiving feedback from these customers.

- **Did not provide automate feedback analysis to customer.**

  The majority of hotel feedback systems do not offer automated feedback analysis to customers. Instead, customers must manually rate their experience, and some may have mixed feelings about leaving feedback. Unfortunately, these systems lack the ability to analyze feedback and determine whether it is positive or negative.

2.6   *Comparison Table*

	Corus Hotel Kuala Lumpur	**Swiss-Garden International**	**Ramada Suites by Wyndham KLCC**	**Hotel De' La Ferns**	**Proposed project**
Collect customer information	✓	✓	✓	✓	✓
Collect customer feedback	✓	✓	✓	✓	✓
Show customer feedback	×	×	✓	×	✓
Customer able to do feedback by voice recognition	×	×	×	×	✓
Hotel able to analysis customer feedback	×	×	×	×	✓

Table 2.6: Comparison between similar system and proposed system

Chapter 3 System Methodology

3.1 Methodology

The sentiment analysis project underwent various phases, which encompassed project pre-development, data preparation, model training, and prediction.

Within this project, the approach employed to establish a hotel feedback system that incorporates speech-to-text and sentiment analysis comprises several critical stages. Initially, we gather data from users in either speech or text format. If the data is provided in speech, we convert it into text. Subsequently, we perform data cleaning, which involves eliminating special characters such as ",", ".", and standardizing all text to lowercase for uniformity. Additionally, we remove common words like "and" or "or" from the text.

After cleaning, we use a lexical method to link words with feelings, which helps us figure out if a sentence has a negative, neutral, or positive sentiment. Sometimes, we represent it as a score between -1 and 1 to show how strong the sentiment is. By analyzing the cleaned data this way, we can tell if a sentence is negative, neutral, or positive.

In real-life situations, users enter sentences as feedback, either by speaking or typing. Then, they get predictions about whether their sentence is negative, neutral, or positive. For example, if a user says, "The hotel is disgusting," our model predicts a "negative" sentiment, which matches the feeling in the sentence.

In this project, we'll create a prototype model to build a mobile app for gathering customer feedback and understanding their needs better. We like using a prototype model because it's flexible and helps us quickly find and fix issues.

Fig: Prototype Model
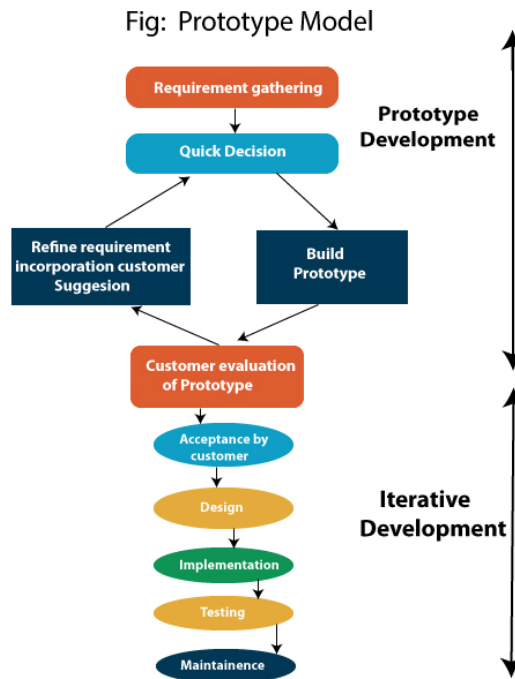
Figure 3.1 Prototype Model

Phase 1: Comprehensive Requirement Gathering

The primary stage of the prototyping model is a meticulous process of system planning. It involves the exhaustive task of gathering user requirements, where every detail and nuance of the project's needs is collected and analyzed in depth.

Phase 2: Thorough Quick Design

In the second phase, a comprehensive blueprint for the system's implementation takes shape. This is achieved by developing an initial, yet detailed design, using the information acquired in the first phase as a foundation. The design aims to encompass a holistic view of the system's structure and functionality.

Phase 3: Prototype Construction

The third phase revolves around the actualization of a functional prototype. This prototype is meticulously crafted, drawing upon the insights and discoveries from the initial design phase. It may comprise a miniature working model or a substantial segment of the complete system, embodying key functionalities.

Phase 4: Client Evaluation and Feedback

During the fourth phase, the proposed system is showcased to the client for a thorough assessment and gathering of feedback. This crucial stage acts as a significant

milestone for refining the system, as the client's insights play a pivotal role in guiding its ongoing development.

Phase 5: Iterative Prototype Enhancement

Building upon the feedback and suggestions received, the prototype undergoes a process of refinement. Should the client express any dissatisfaction with the existing prototype, it is subjected to further improvements, incorporating their valuable insights. This iterative refinement process persists until the prototype aligns precisely with the customer's specifications and expectations.

Phase 6: Product Engineering and Deployment

The final phase is dedicated to the engineering of the ultimate system. It entails the meticulous development, rigorous testing, and seamless deployment of the system for production. Concurrently, maintenance activities are initiated to ensure the sustained performance, stability, and reliability of the finalized system.

3.2 System Equation

The normalization that use in the diagram below

$$x = \frac{x}{\sqrt{x^2 + \alpha}}$$

Figure 3.2 Normalization calculation

In this context, "X" serves as a quantitative measure of sentiment within a sentence, evaluating the sentiment scores assigned to individual words within the sentence. These sentiment scores are numerical values representing the emotional polarity of words in the context of sentiment analysis.

The parameter "alpha," denoted as α, plays a crucial role in this process as a normalization parameter. Its purpose is to standardize the scaling of sentiment scores, ensuring their consistency within a defined range.

The advantage of normalization techniques lies in providing a clear and standardized framework for interpreting sentiment scores. This ensures that sentiment scores align with the understanding of extreme negative (-1) and positive (1) sentiments, facilitating easier interpretation and comparison of sentiment scores.

3.3 Use Case Diagram
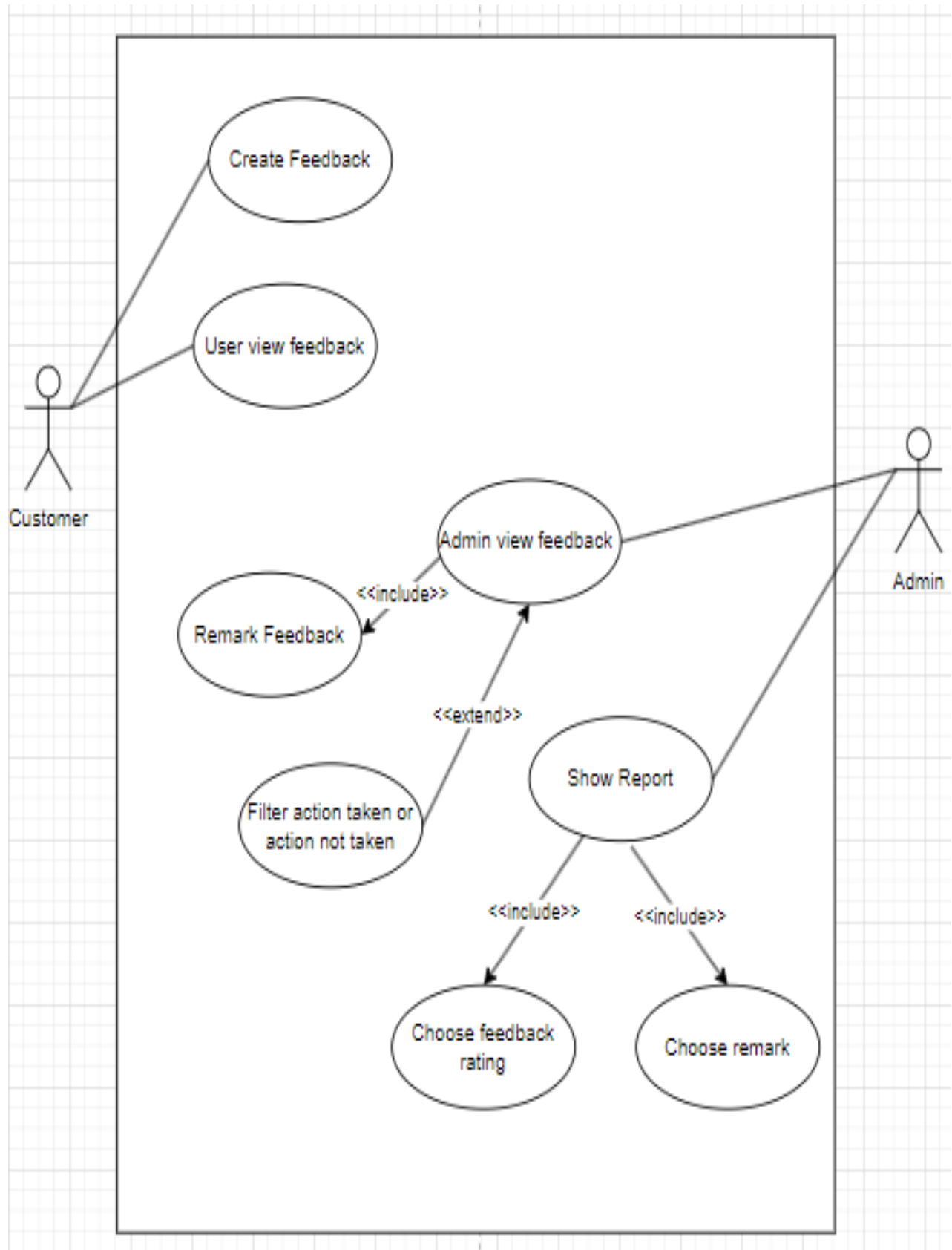
Figure 3.3 Use Case Diagram

Use Case ID	1
Use Case Name	Create Feedback
Purpose	User can create new feedback
Actor	User, System
Trigger	User want to create a hotel feedback
Main Flow	1) Click feedback button of user mobile application. 2) User need insert information that needed to be fill such as name, phone, e-mail, date, feedback information. 3) If user want to use voice recognition to do feedback it have a record button to let user use and convert speech-to-text. 4) System will automate calculate the rate of feedback sentence. 5) Press submit button 6) All information will save in firebase
Sub Flow	None
Alternate Flow	None

Table 3.3.1 Use Case Description: Create Feedback

Use Case ID	2
Use Case	User view feedback
Purpose	User can view feedback
Actor	User, System
Trigger	User want to view all the feedback that given by other customer.
Main Flow	1) Click history button of user mobile application 2) System will redirect to history page 3) System will display a list of all past feedback
Sub Flow	None
Alternate Flow	None

Table 3.3.2 Use Case Description: User view Feedback

Use Case ID	3
Use Case	Admin view feedback
Purpose	Admin can view feedback
Actor	Admin, system
Trigger	Admin want to view all the feedback that given by customer.
Main Flow	1) Click feedback button of admin mobile application 2) System will redirect to history page 3) System will display a list of all past feedback
Sub Flow	None
Alternate Flow	None

Table 3.3.3 Use Case Description: Admin view Feedback

Use Case ID	4
Use Case	Remark feedback
Purpose	Admin can update remark
Actor	Admin, system
Trigger	Admin want to give remark to the feedback
Main Flow	1) Click feedback button of admin mobile application 2) Click the feedback that need to remark for action taken 3) Insert all the information into the remark page. 4) Press submit to send all information to system
Sub Flow	None
Alternate Flow	None

Table 3.3.4 Use Case Description: Remark feedback

Use Case ID	5
Use Case	Show report
Purpose	Admin can view report
Actor	Admin, system
Trigger	Admin want to see the report of all feedback
Main Flow	1) Click feedback button of admin mobile application 2) Choose feedback rating and remark 3) System will list all chosen choice output and display it out
Sub Flow	None
Alternate Flow	None

Table 3.3.5 Use Case Description: Show Report

Chapter 4 System Design

4.1 System flow of Sentiment Analysis
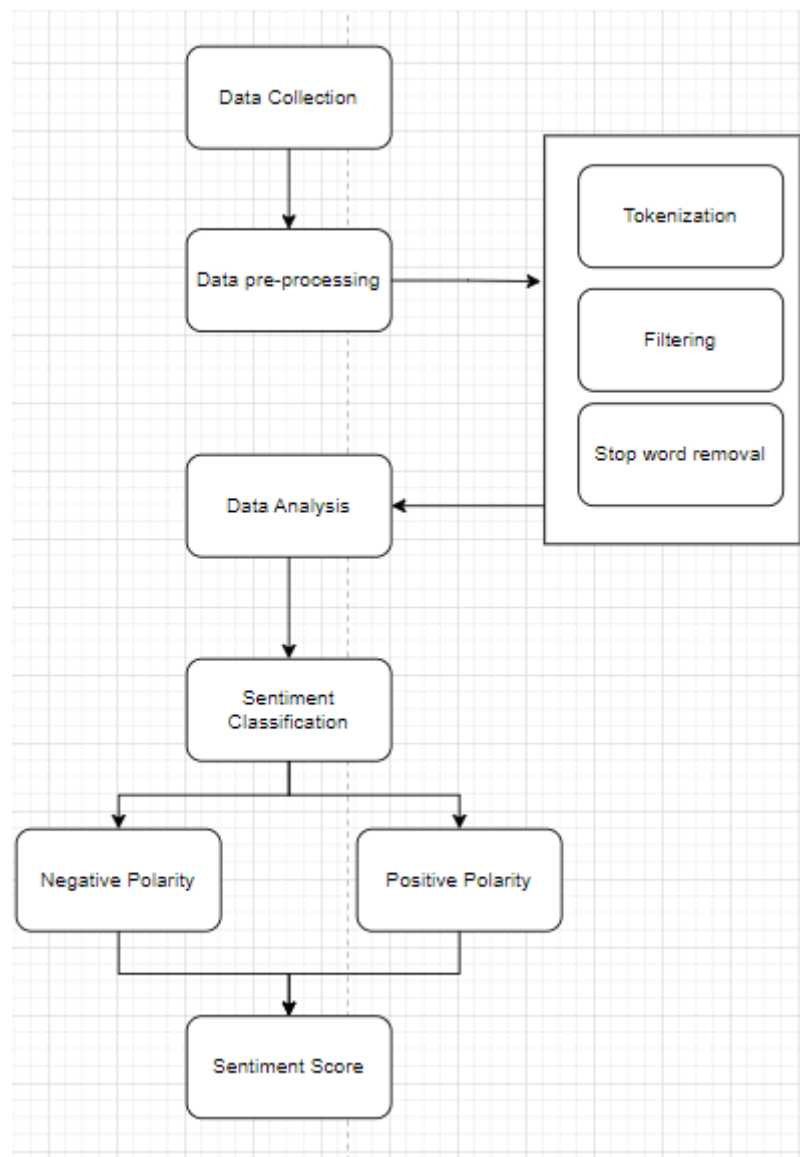
Figure 4.1 System Design Diagram of Sentiment Analysis

4.1.1 Data collection

The initial stage of sentiment analysis involves data collection. To perform sentiment analysis, users are required to provide input data for analysis. For this particular project, the input data comprises customer feedback.

4.1.2 Data pre-processing

Once the user's data has been collected, the subsequent task involves data preprocessing, which employs a series of techniques. The initial technique, called

tokenization, involves breaking down the text into meaningful fragments. Following this, there is a process of filtering and stop word removal. This step occurs after tokenization and involves filtering out and eliminating stop words from sentences; these stop words are commonly used words in the language. Additionally, special characters such as "," and "." are eliminated, and all letters are converted to lowercase to enhance clarity. After the data has undergone preprocessing, the model shifts its focus to the pivotal words that are essential for effectively representing the data.

4.1.3 Data Analysis

Once the process of data preprocessing is completed, the system will proceed to analyze the data, thereby achieving a more profound comprehension of the text. Additionally, during this analysis phase, the system will take into consideration the length of the sentences, which further contributes to the comprehensive sentiment analysis process.

4.1.4 Sentiment classification

Once the analysis of the data is complete, the subsequent phase involves sentiment classification, a pivotal step that bifurcates sentiments into two primary categories: positive polarity and negative polarity. Within this stage, the model undertakes a calculated process to determine the presence and prominence of either positive or negative sentiment within the data. This classification mechanism adds a layer of understanding, enabling a nuanced interpretation of the emotional context conveyed by the text. By quantifying the levels of positive and negative polarity, the model contributes to a more comprehensive comprehension of the overall sentiment encapsulated within the data.

4.1.5 Sentiment score

Once the sentiment classification process has been completed, during which the model computes both the positive and negative polarities, the subsequent step involves deriving a sentiment score. This score serves as the ultimate metric for determining whether the data carries a positive or negative sentiment.

4.2 System flow of User Mobile Application
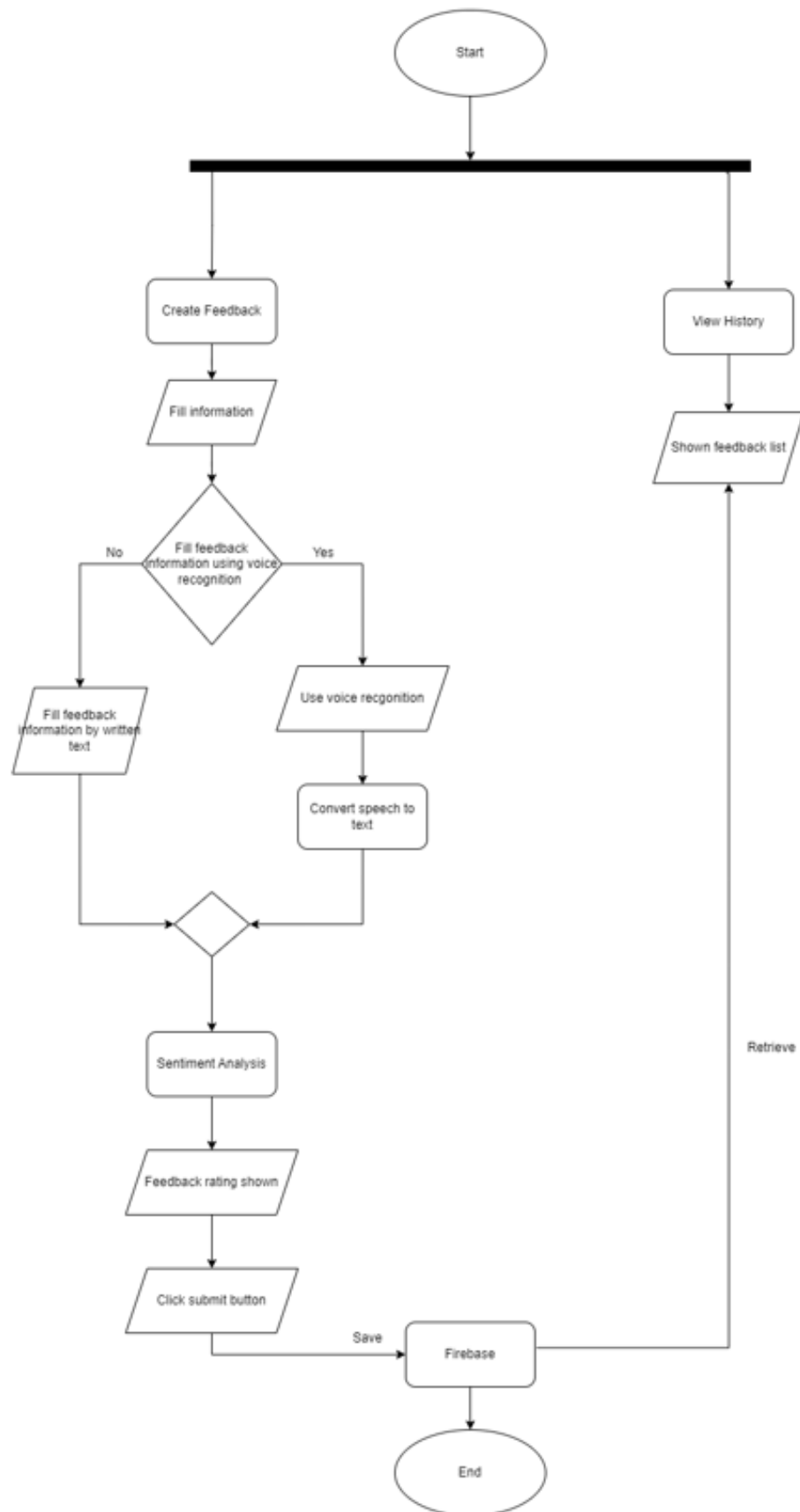
Fiegure 4.2 System Design Diagram of User Mobile Application

Diagram 4.2 illustrates the user flow within the mobile application. To begin using the application, users must establish an internet connection. Once connected, users will be directed to a feedback page where they can provide input about their hotel experience. Completing this feedback requires filling out all the necessary information. While providing feedback, users have the option to enter text manually or employ voice recognition.

If users choose voice recognition, their spoken words will be converted into text and automatically populated into the feedback form. Once all information is provided, the system initiates sentiment analysis to evaluate the feedback and generate a corresponding rating. This rating can range from slightly positive, positive, neutral, slightly negative, to negative. After thoroughly reviewing and confirming the accuracy of their input, users can click the submit button, saving their feedback to Firebase.

The mobile application not only allows users to submit feedback but also provides access to a history feature. By clicking the history button, users can retrieve feedback data stored in Firebase and view a comprehensive list of comments and reviews from previous customers. This feature enables users to explore feedback from other customers easily.

4.3 System flow of Admin Mobile Application
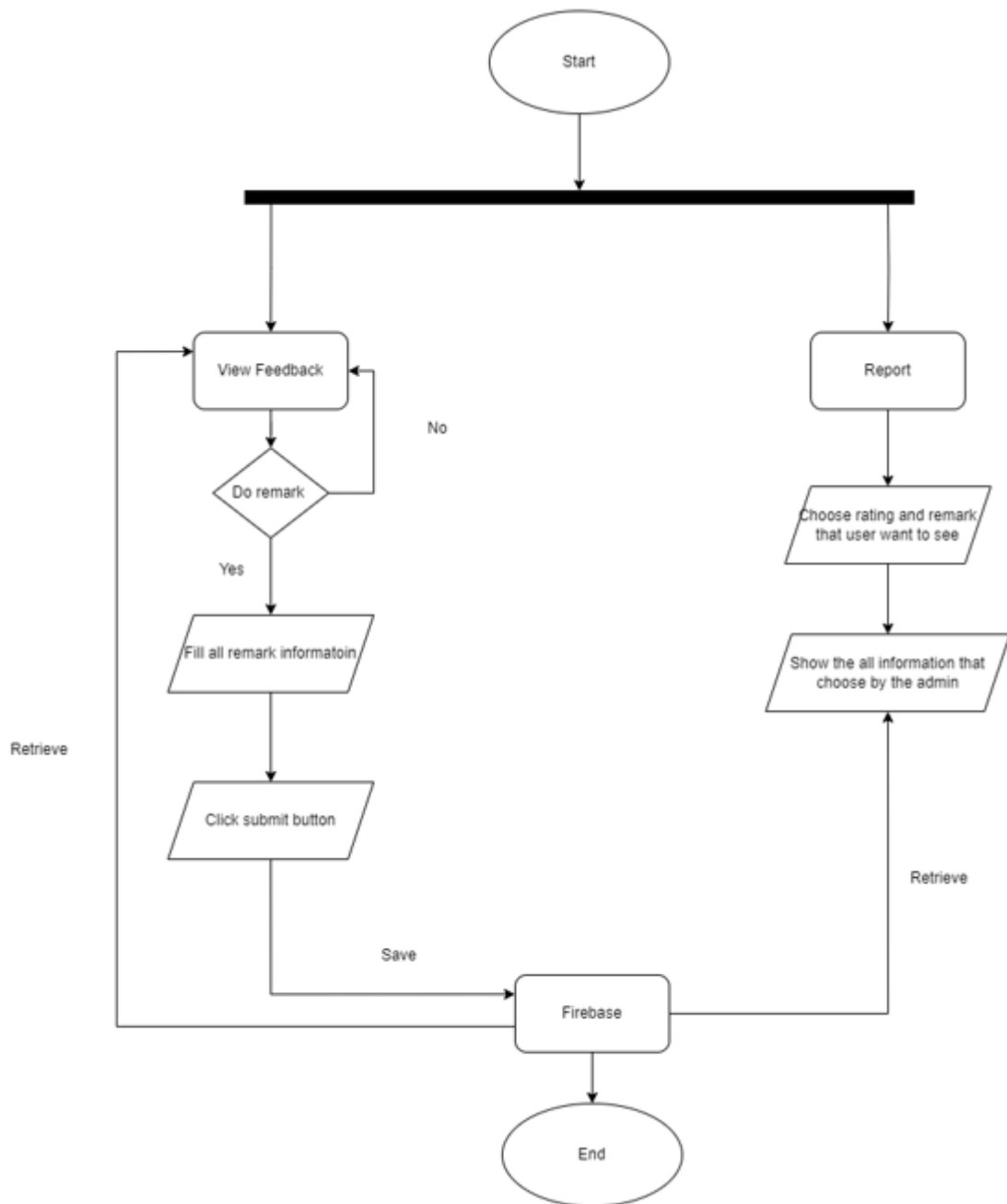
Figure 4.3 System flow of Admin Mobile Application

The Admin Mobile Application, as depicted in the diagram above, outlines a streamlined workflow for administrators. Administrators have the capability to access and review all feedback data by retrieving it from the Firebase database. Additionally, the application features a filtering mechanism that allows administrators to sort feedback based on whether any action has been taken in response to it.

When management wishes to provide a response to a particular feedback entry, administrators can initiate the process by clicking the "Remark" button. This action prompts a data entry form where the manager can input essential information, including the manager's name, the date of the response, and the actual response or remark. Once all the required information is provided, administrators can confirm their input by clicking the "Submit" button, securely saving this data into the database.

Beyond feedback management, the Admin Mobile Application offers a reporting feature. Administrators can generate reports by specifying criteria such as rating and the presence of a response or remark such as positive rating and action non-taken. After selecting their preferences, the application retrieves the relevant data from Firebase and displays it on the screen, offering managers a concise and customized overview of the feedback and its status. This functionality enhances the efficiency of feedback analysis and action tracking.

Chapter 5 Implementation and Testing

5.1 Hardware Setup

In this project, we're using two main pieces of hardware: a computer and an Android mobile device. The computer plays a crucial role in developing the sentiment analysis and the mobile application for the hotel feedback system. It also acts as a bridge, helping the application connect to Firebase, where data is stored and managed. On the other hand, the Android mobile device is used for testing and deploying the mobile application, making sure it works smoothly for users who want to provide feedback.

Description	Specifications
Processor	INTEL CORE i5-10400F
Motherboard	GIGABYTE B460M HD GAMING
Ram	8GB PC3200 RGB X2
Storage	KINGSTON NVME NV1 500GB + PATRIOT P210 512GB
Graphic Card	GeForce® GTX 1660 Ghost
Operation System	Window 10

Table 5.1 Specification of Desktop

5.2 Software Setup

Software requirement for android studio

Description	Specifications
Operating System	Windows 8/10/11
Processor	2nd generation Intel Core or newer, or AMD CPU with support for a Windows Hypervisor and x86_64 CPU architecture
Display Resolution	Minimum 1280 x 800
Memory	8 GB RAM or more
Storage	Minimum 8GB

Table 5.2.1 Requirement for android studio

Description	Specifications
Operating System	Android 11.0 and above
Display Resolution	1080 x 2340 and above
Memory	4GB and above
Storage	4GB and above

Table 5.2.2 Requirement for system

In this project, we've employed the Python programming language specifically version 3.8 for conducting sentiment analysis.

5.3 Setting and configuration

Once the development of the application is completed, the developer initiates the launch process by clicking the "run" button to deploy the application on an Android mobile device or emulator. In this particular project, I have opted to use my own smartphone for running the application. However, prior to running the application, some essential steps are taken. These include setting my phone to developer mode and enabling USB debugging.

Once these modifications are made, my Android smartphone, operating on Android 13 with a screen resolution of 1080x2400, becomes a suitable platform for running the application. To facilitate the integration of Python into Android Studio, I employ the Chaquopy tool, which establishes a connection between the two.

Furthermore, the project relies on Firebase Realtime Database as the primary data storage solution. This robust database is responsible for housing all the crucial information gathered from the user mobile application, including user details such as name, phone number, email, date, feedback, and rating. It acts as the central repository for data management and retrieval.

5.4 System Operation (with Screenshot)

In this hotel feedback system have two application one application is for user which is customer to use and another application is admin which is for manager to use.

5.4.1 User application

When user launch application, user will in feedback page.
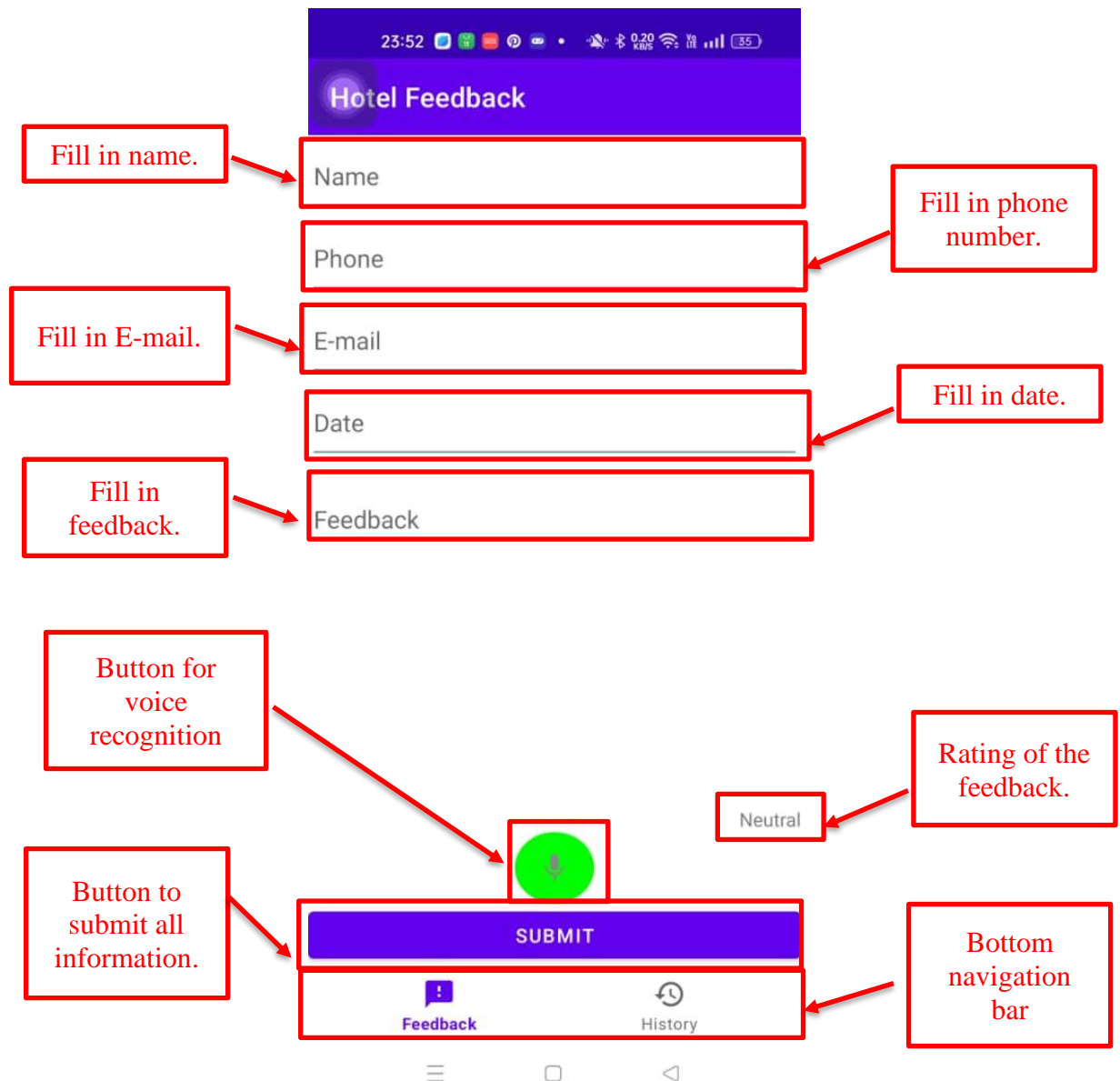
Figure 5.4.1.1 Create feedback

When users launch the application, they are greeted by a feedback form where they are required to input various details into designated text boxes. These details include their name, phone number, email address, date, and their feedback about their

experience. At the bottom right of this form, there is a "neutral" indicator displaying the rating of the feedback, ensuring users are aware of the feedback's rating.

To enhance user convenience, a green-colored microphone button is also provided. Users can utilize this button to employ voice recognition technology for inputting their feedback verbally. This feature adds an additional layer of user-friendliness to the feedback process.

At the bottom of the application, a navigation bar is prominently displayed. Within this navigation bar, users have two options represented by buttons. These buttons allow users to seamlessly switch between the feedback page and the history page, providing them with the flexibility to access the desired section of the application.
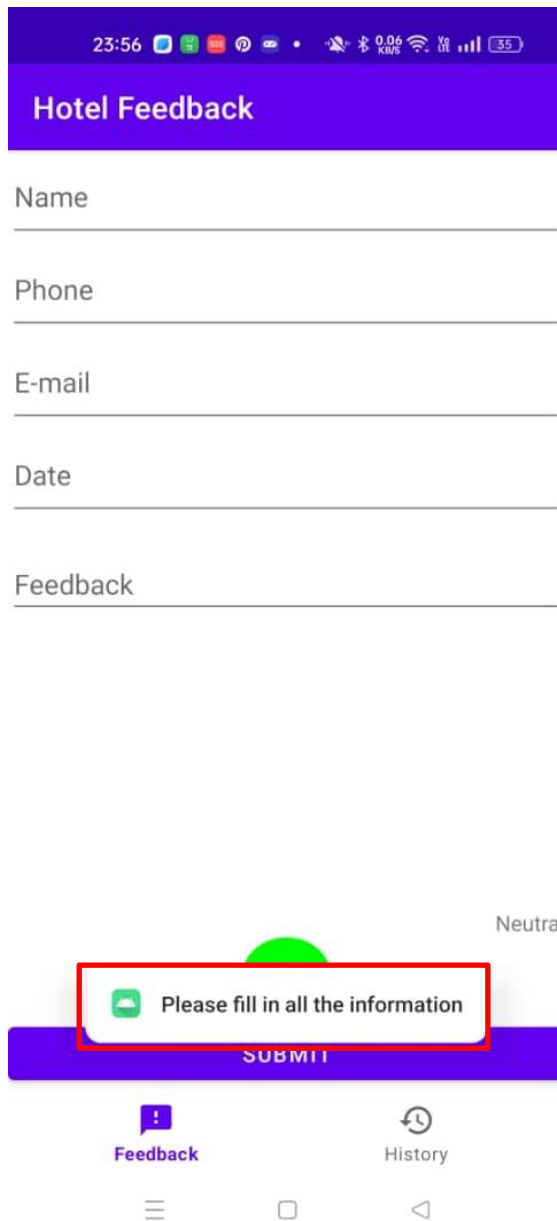
Figure 5.4.1.2 Validation of feedback page

If a user accidentally taps the submit button, a pop-up message will appear, displaying the text "Please ensure all information is filled out." Importantly, this action prevents the incomplete data from being recorded in Firebase.
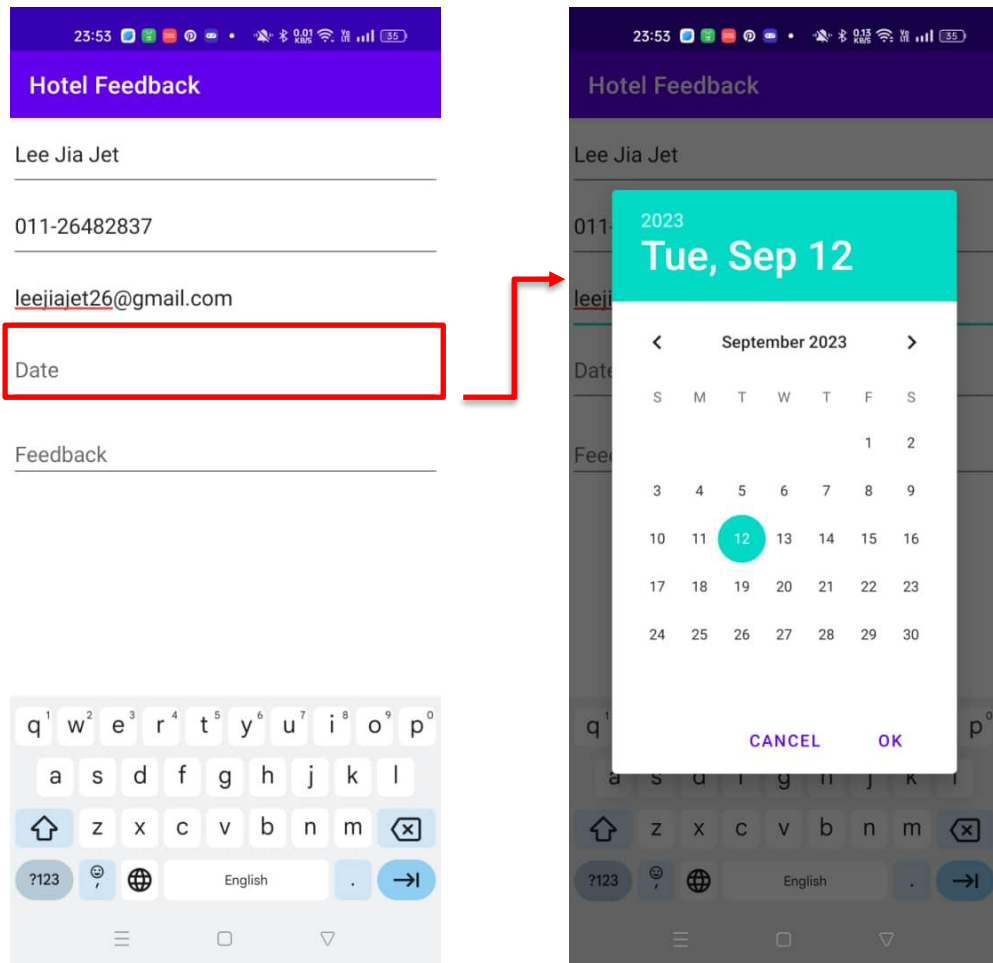
Figure 5.4.1.3 Date information

When a user clicks on the date text box, a calendar will be displayed as a pop-up, allowing the user to easily select the date when they provided their feedback. This feature enhances user convenience by simplifying the date entry process and ensures that the dates stored in Firebase maintain a consistent format.
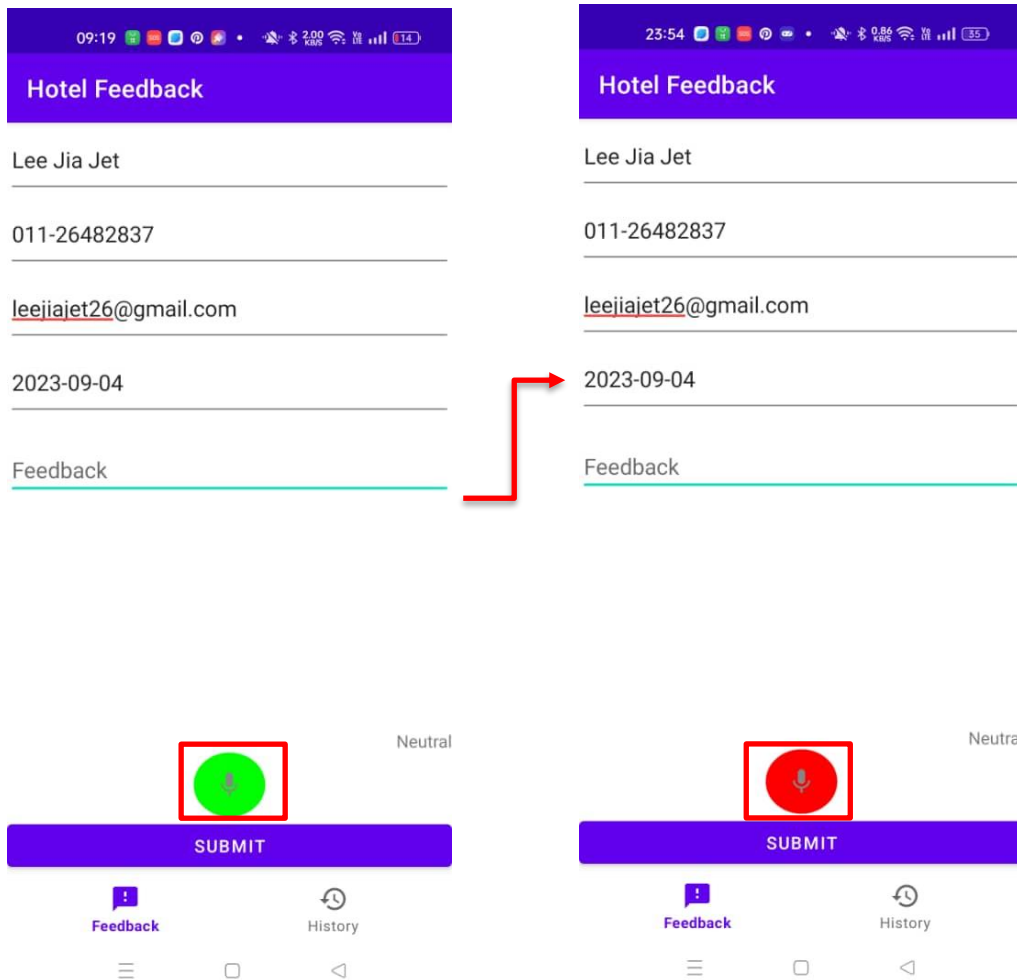
Figure 5.4.1.4 Voice recognition

During the process of providing feedback for the hotel, customers are presented with the choice to utilize voice recognition for their input. When a customer activates the voice recognition button, it transitions from green to red, signifying that the system is prepared to record the customer's spoken feedback. This feature enables customers to articulate their feedback verbally, as the system seamlessly converts their spoken words into text within the feedback column. Additionally, users also retain the flexibility to manually type their feedback should they wish to include additional comments about their hotel experience.
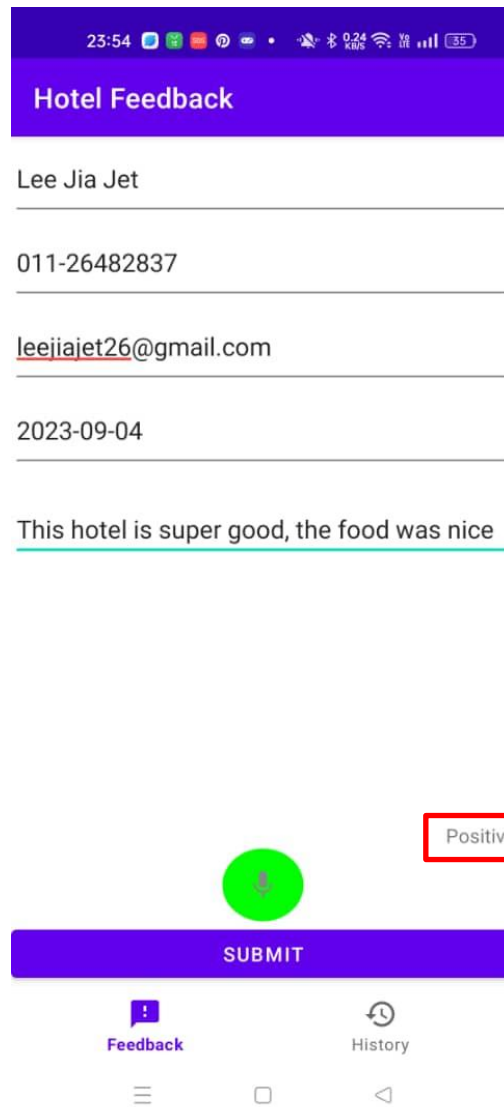
Figure 5.4.1.5 Sentiment analysis

Once users have completed their feedback, the system automatically performs an analysis to determine the rating of the feedback. This rating can fall into categories such as slightly positive, positive, neutral, slightly negative, or negative. This automated process informs customers about the rating assigned to their feedback, providing them with valuable insights into the overall sentiment of their input.
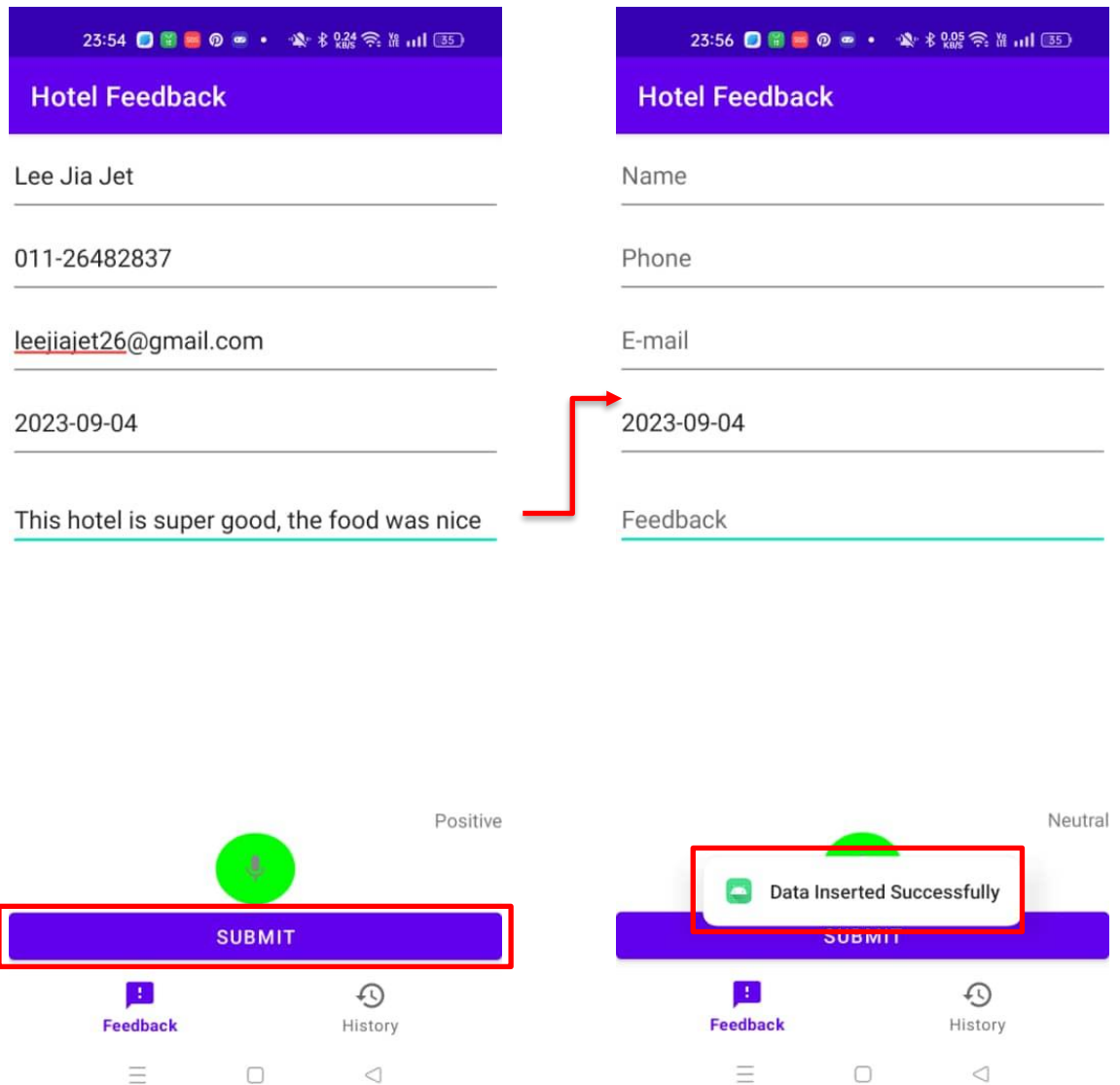
Figure 5.4.1.6 Submit information

Once customers have thoroughly reviewed their provided information and feedback for the hotel, they must click the "Submit" button to transmit all their data to Firebase for storage. Upon clicking this button, a pop-up notification will appear, displaying the message "Data Inserted Successfully." This notification serves to inform the user that their information has been successfully recorded and stored in the database.
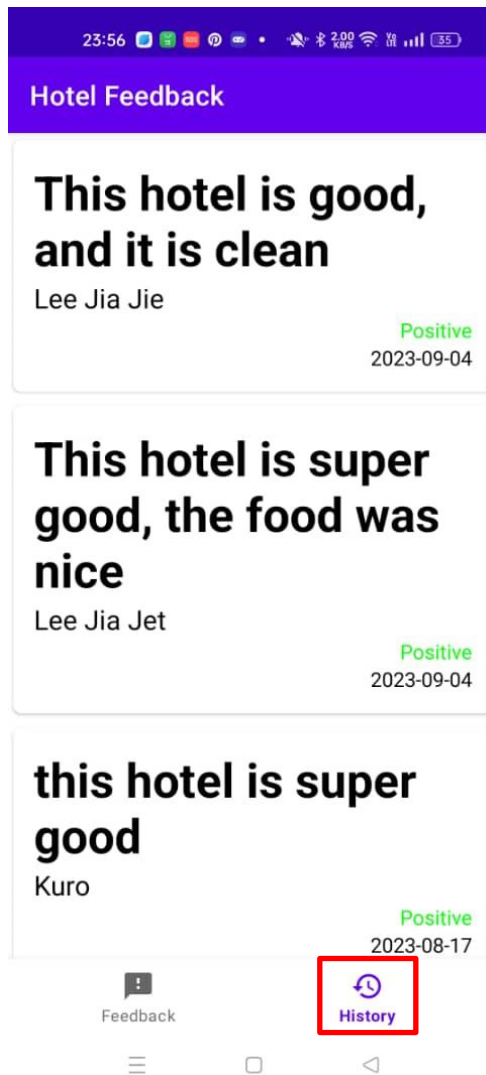
Figure 5.4.1.7 View feedback in user applications.

If a customer wishes to access previous feedback submitted by other customers, they can simply click on the "History" button located in the bottom navigation bar. By doing so, they gain access to a comprehensive list of all feedback provided by other customers, thereby allowing them to browse through the feedback records.

5.4.2 Admin application

There is an application that are use by hotel manager. The purpose of the application is to let manager leave a remark to the feedback and view the report of the information that they need.
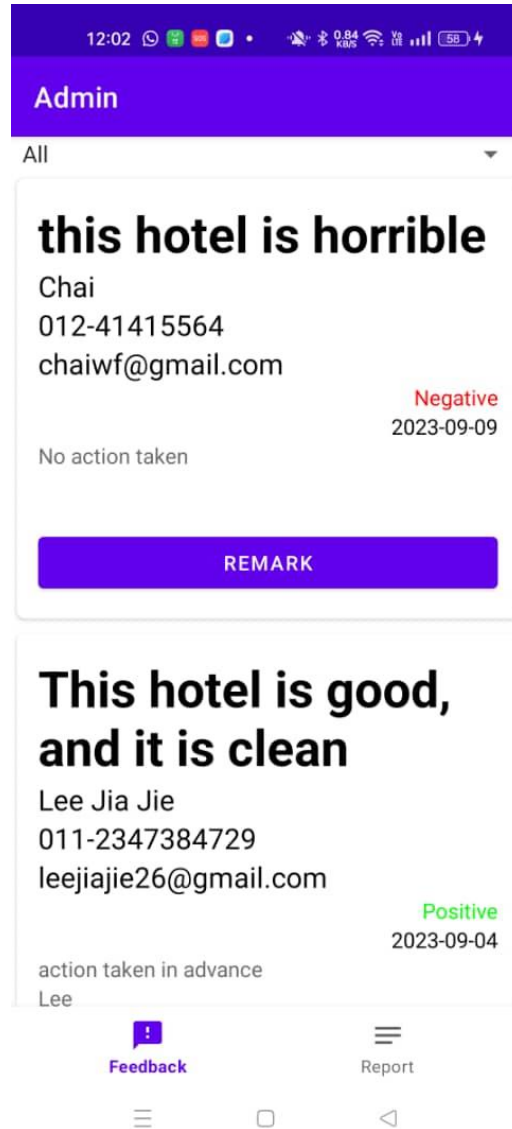
Figure 5.4.2.1 View feedback page

When the manager opens the application, they will be presented with a "View Feedback" page. On this page, the manager will have access to comprehensive feedback information, including customer-provided feedback, customer details such as name, phone number, email address, rating, and the date the feedback was submitted. Additionally, a "Remark" button will be available for the manager to document whether any actions have been taken in response to the feedback.
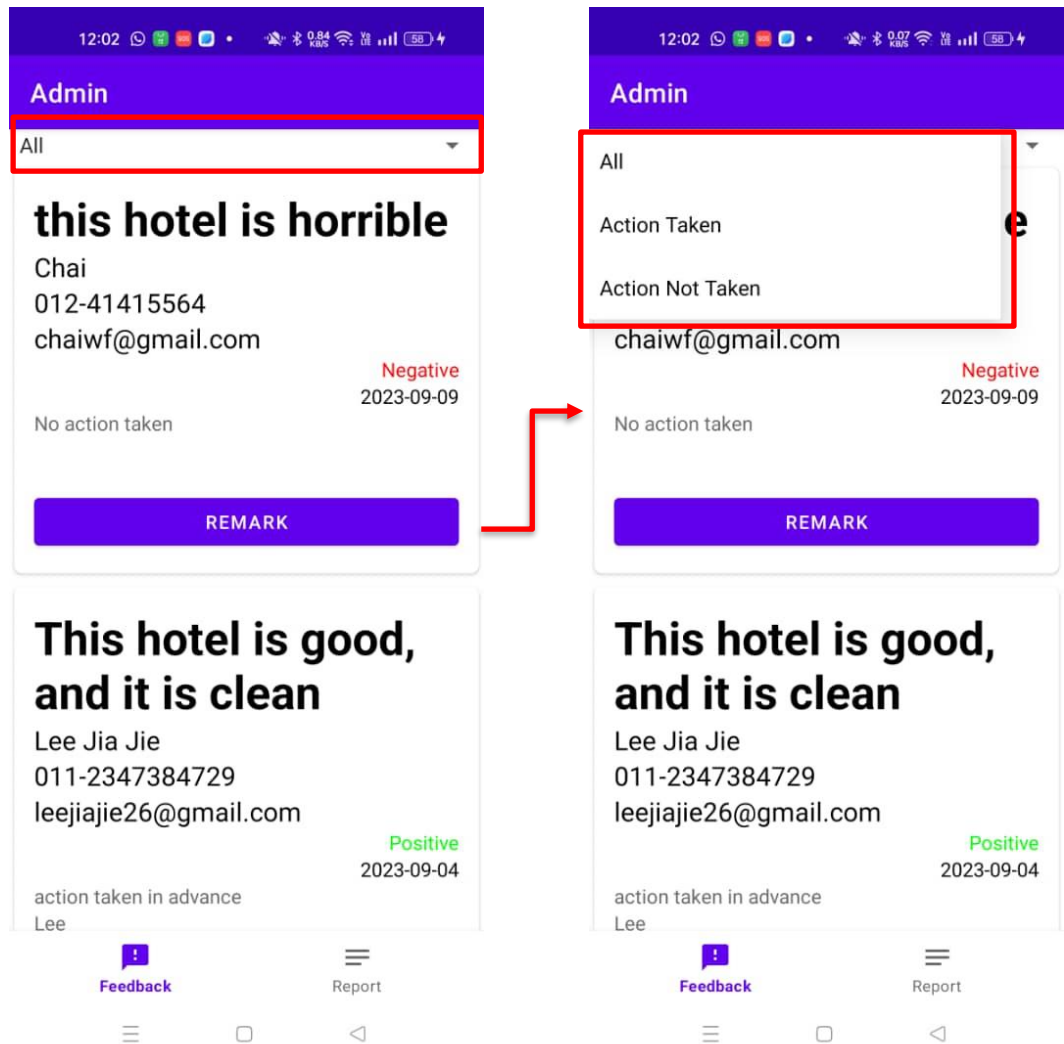
Figure 5.4.2.2 Action taken drop down box

At the top of the feedback page, there will be a dropdown menu that allows the manager to filter feedback based on whether actions have been taken or not. This feature enhances convenience by enabling the manager to easily separate feedback into two categories: those that require action and those that have already been addressed. This separation helps the manager quickly identify feedback that hasn't been remarked upon and take prompt action.
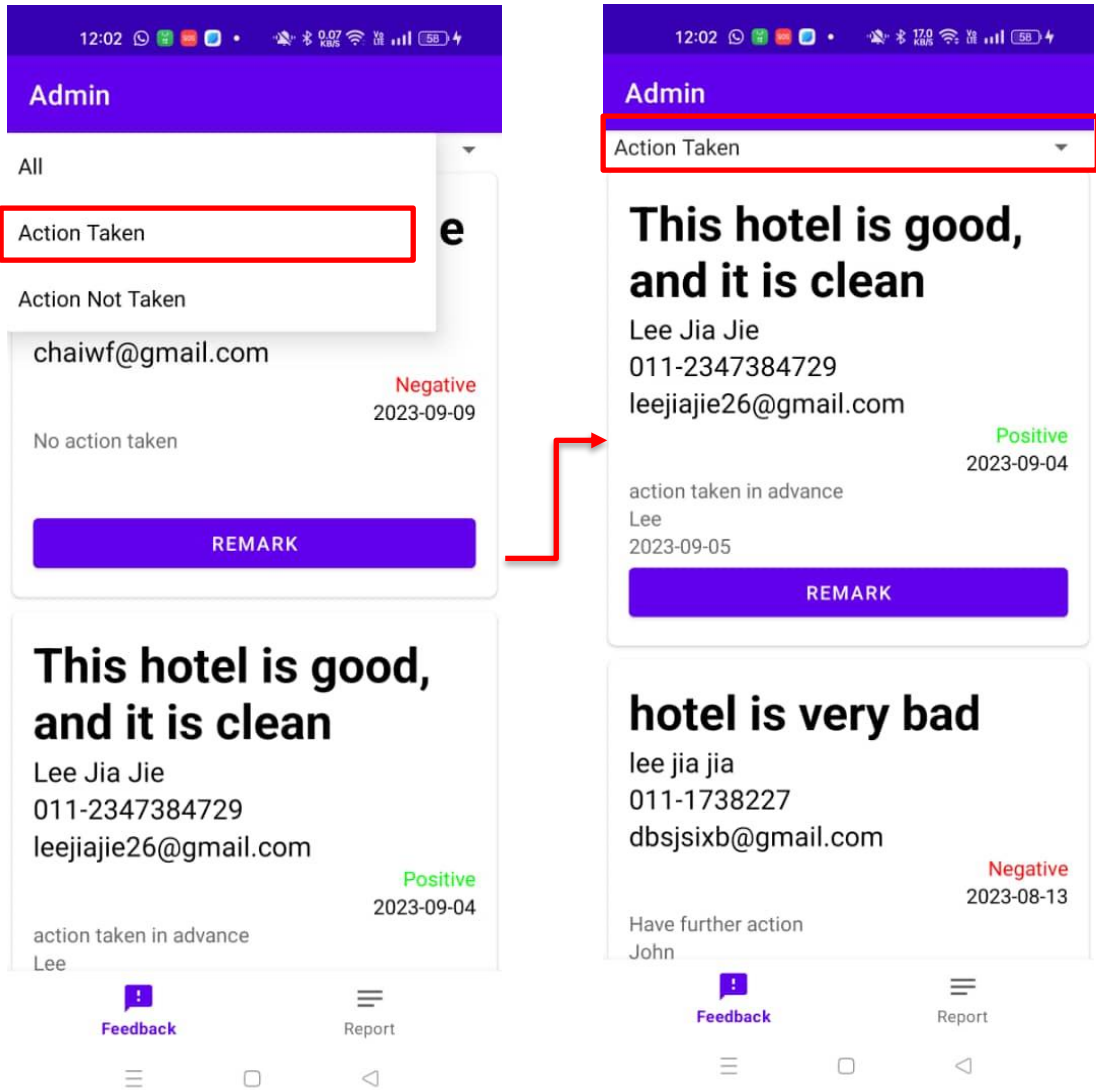
Figure 5.4.2.3 View Action Taken Feedback

When a user selects "Action Taken," the system will display a list containing all the feedback for which actions have been recorded.
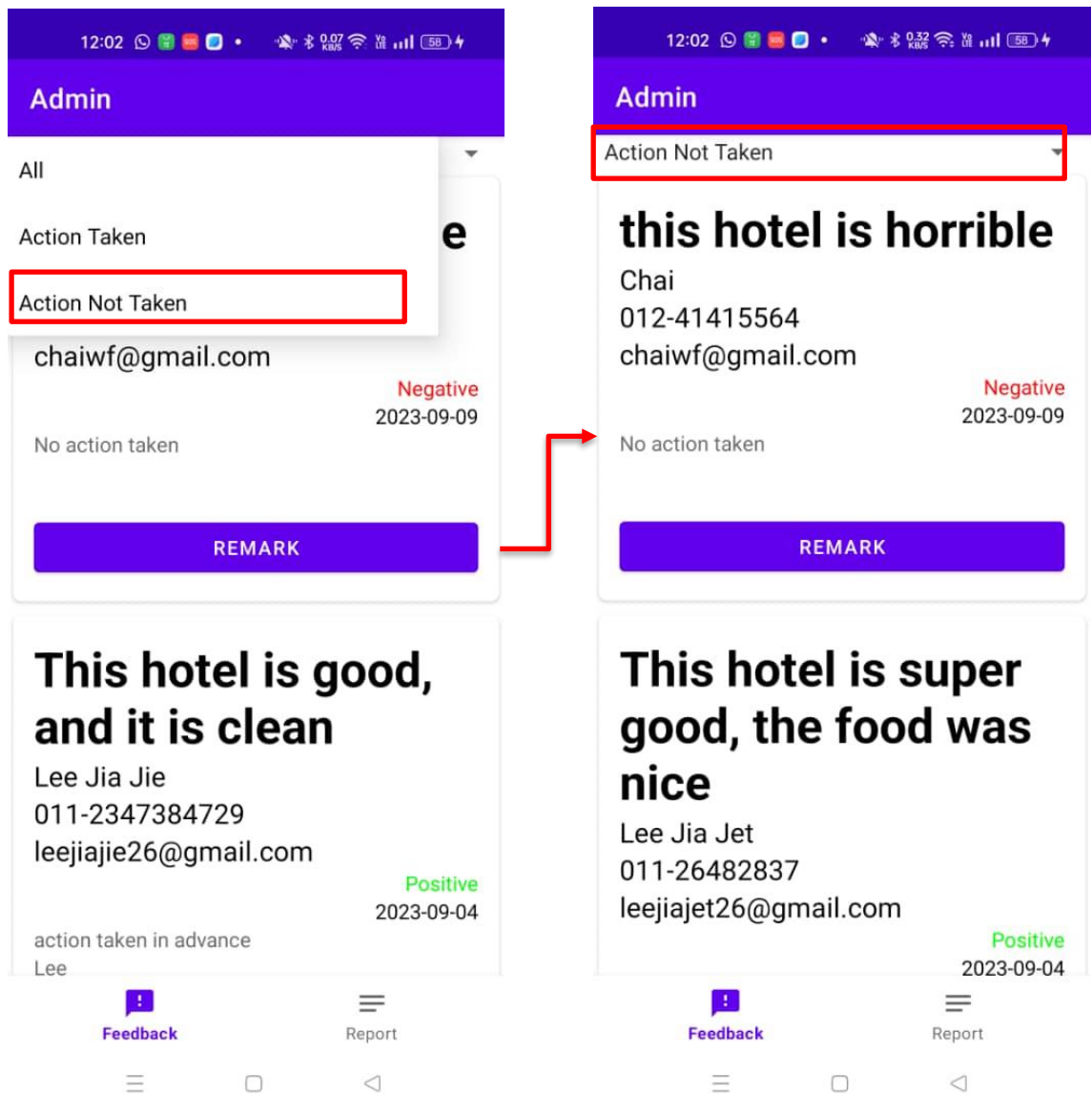
Figure 5.4.2.4 View Action Not Taken Feedback

Upon selecting "Action Not Taken," the system will present a list comprising all the feedback for which actions have not yet been implemented.
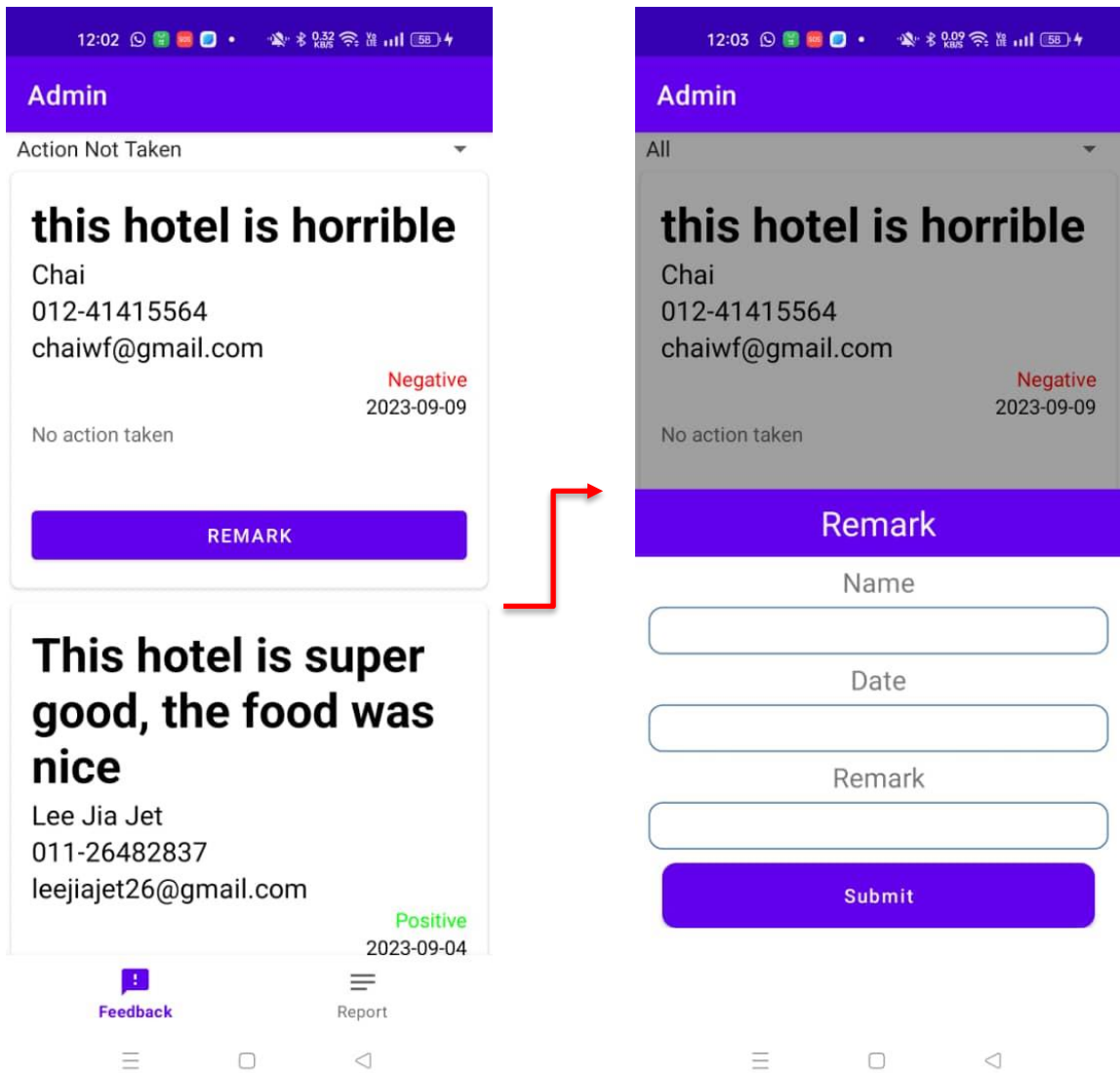
Figure 5.4.2.5 Create Remark for Action Taken

When a user intends to add a remark to a feedback entry, they can click on the "Remark" button. This action will open a pop-up window titled "Remark," where the user is required to input three pieces of information which is their name, the date of the remark, and the comment within the remark text box.
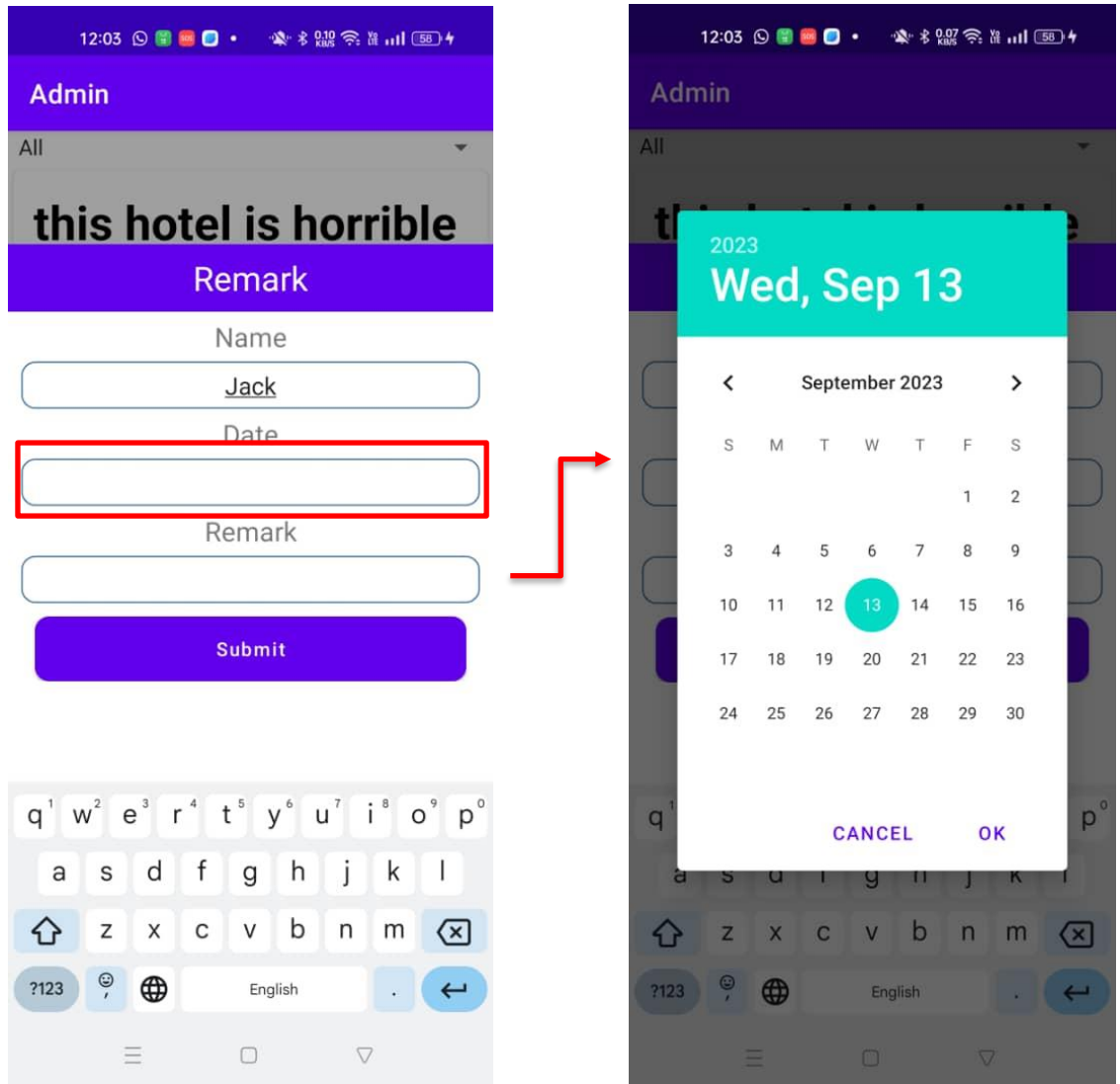
Figure 5.4.2.6 Insert remark date

To facilitate date entry for the user, clicking on the date text box will trigger a calendar pop-up, allowing the user to select the date. This approach enhances user convenience and ensures uniformity in the date format for the remark date.
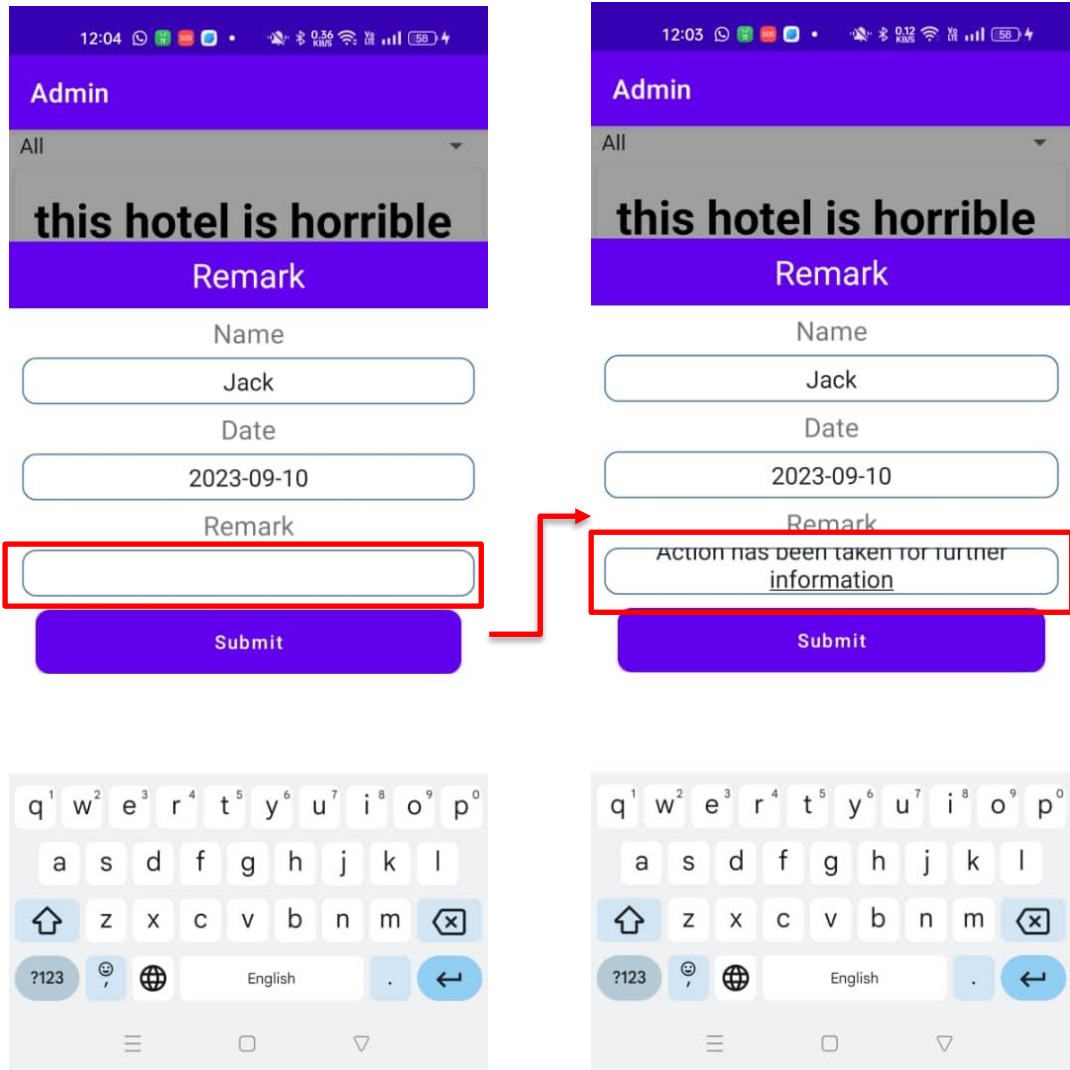
Figure 5.4.2.7 Insert Remark

Once the user has selected a date from the calendar pop-up, the chosen date will appear in the text box. The user can then proceed to input their remark comment into the remark text box.
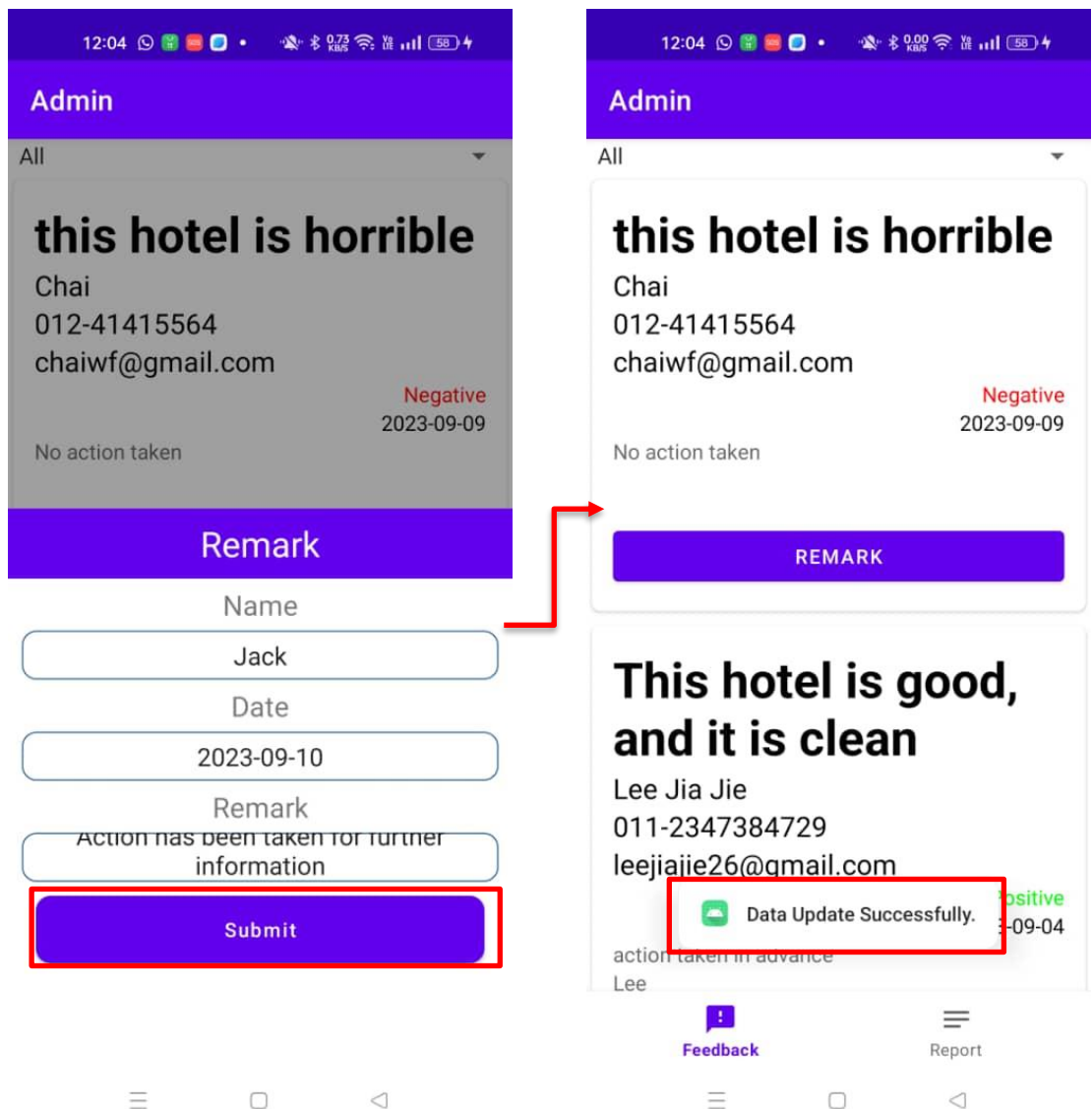
Figure 5.4.2.8 Submit remark

Once all the remark information has been entered, the user is required to review it for accuracy. Upon completing the double-check, the user can proceed to press the "Submit" button. This action will send the data to Firebase for storage. If the data is successfully stored, a pop-up message box will appear with the message "Data Update Successfully."
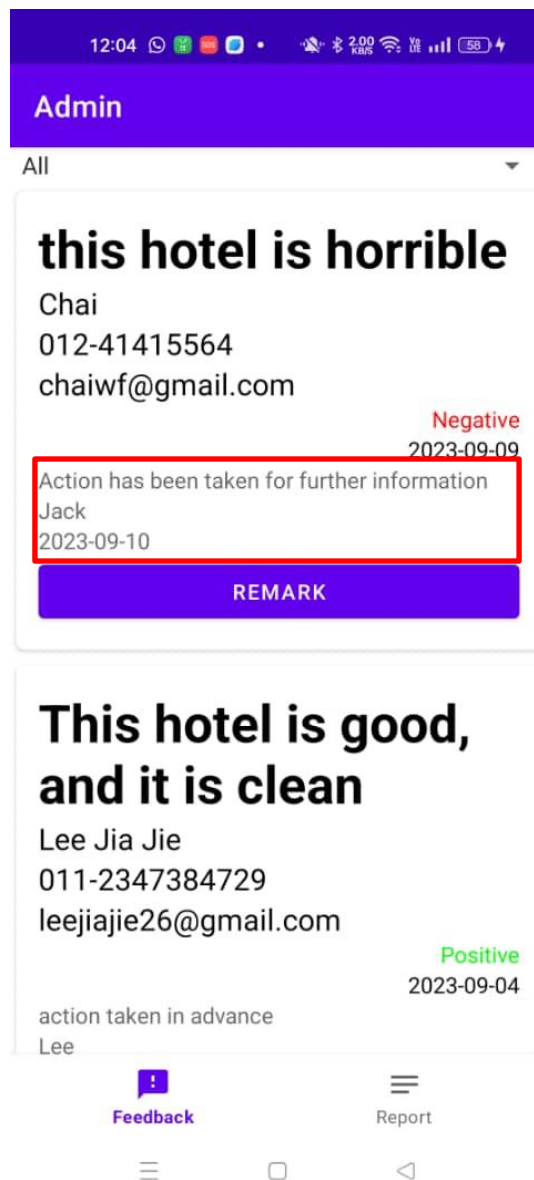
Figure 5.4.2.9 Shown remark information

Once a remark has been completed and successfully updated in Firebase, the information will be displayed below the original feedback entry. The order of presentation will be as follows as remark, name, and date. This arrangement allows users to view comprehensive information, combining both the customer's feedback and any associated remarks.
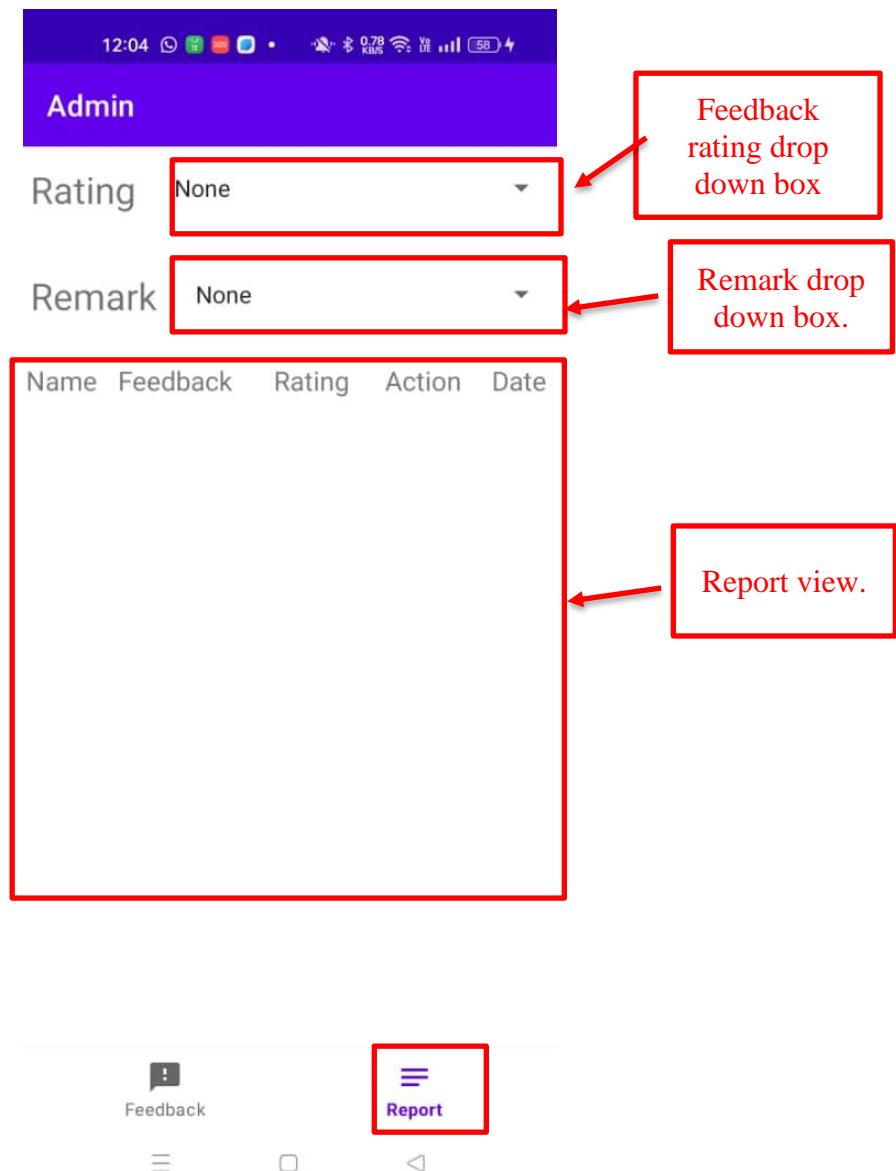
Figure 5.4.2.10 Report page

When users wish to access reports, they can do so by clicking the "Report" button located in the bottom navigation bar. On the report page, users will find filtering options for both ratings and remark text. These options are accompanied by dropdown buttons that enable users to select the specific information they want to view. Additionally, there is a dedicated section where users can access a report table for a comprehensive overview of the data.
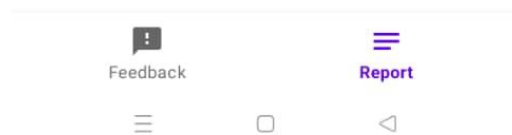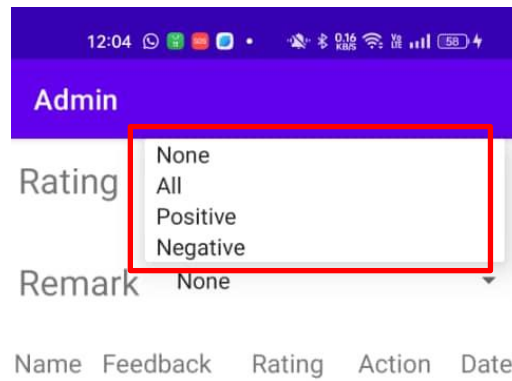
Figure 5.4.2.11 Feeback rating drop down box

When a user clicks on the feedback rating dropdown box, several options will be presented for selection, including "None," "All," "Positive," and "Negative." It's important for the user to choose one of these options; otherwise, the default setting will remain as "None."

Figure 5.4.2.12 Remark drop down box

Once users have selected their desired feedback rating, they are also required to choose the type of remarks they wish to view. Various options are available, including "None," "All," "Action Taken," and "Action Not Taken." If users do not make a selection, the default setting will remain as "None."

Figure 5.4.2.13 Report table

Once both the rating and remark preferences have been selected, the report table will display all the information chosen by the user. For instance, in the illustrated scenario, if the user selects "All Ratings" and "All Remarks," the report table will present all the desired information. This report includes the customer's name, the customer's feedback, the feedback rating, whether the manager- has taken action or not, and the date on which the manager took action.

Chapter 6 System Evaluation and Discussion

6.1 System Evaluation Survey Results

The evaluation survey comprised 15 participants who provided their feedback. The survey was structured into three sections: the first section gathered personal information and details about the participants' hotel feedback experiences, the second section focused on the hotel customer feedback application, and the third section focused on the hotel admin application.

6.1.1 First section- Personal Information and Hotel Feedback Experience
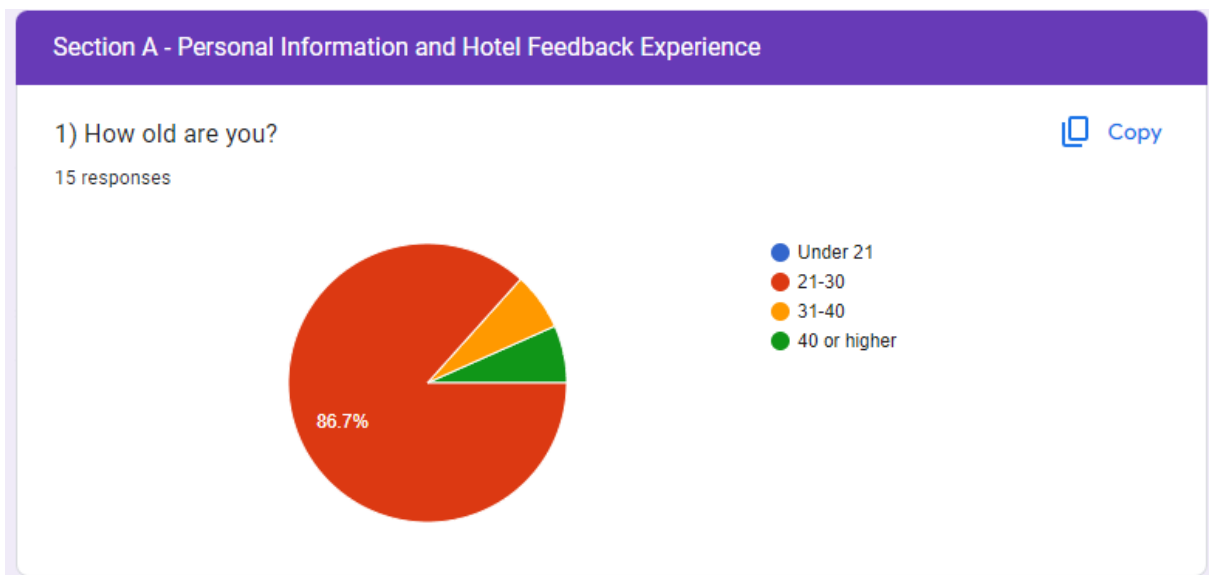
Figure 6.1.1.1 Age of respondents
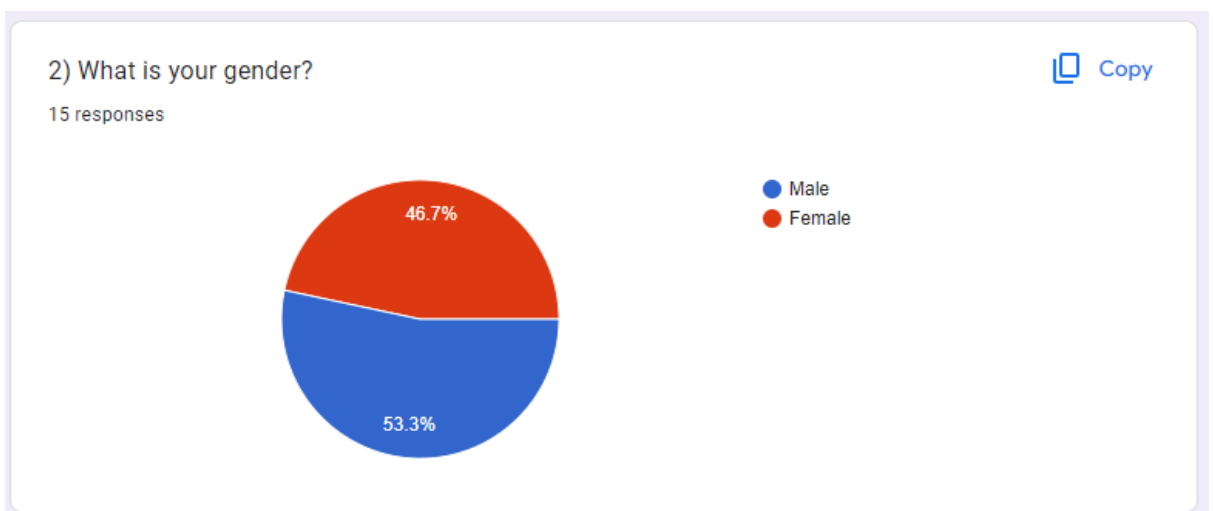
Figure 6.1.1.2 Gender of respondents
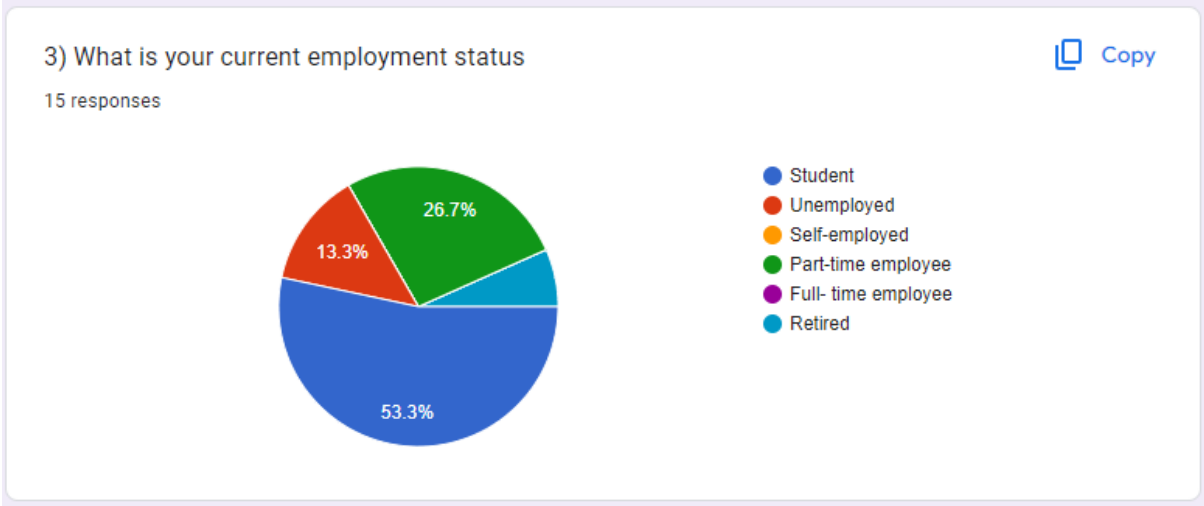
Figure 6.1.1.3 Employment Status
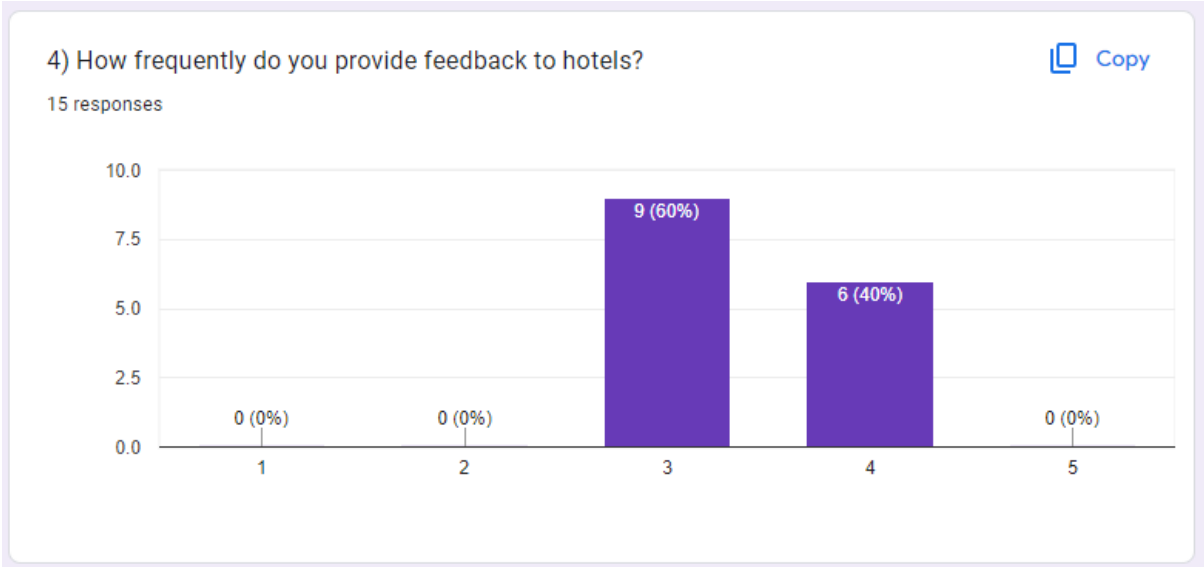
Figure 6.1.1.4 Frequency of respondent provide hotel feedback
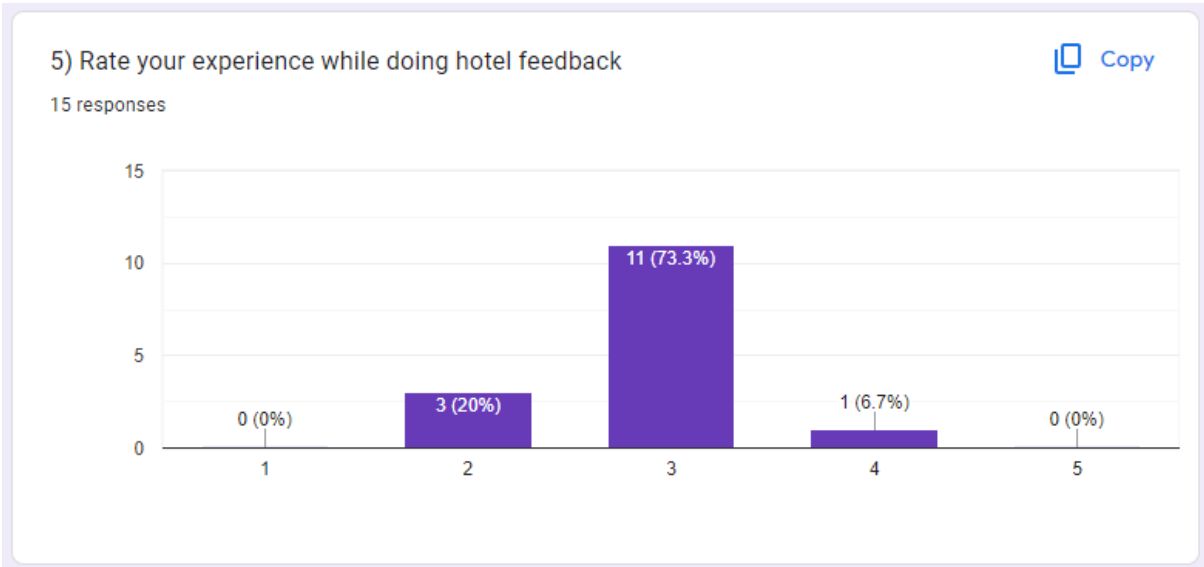
Figure 6.1.1.5 Experience on doing hotel feedback

According to the initial section of the survey, a significant majority of respondents fall within the age range of 21 to 30 years, accounting for 86.7% of the total. The gender distribution is relatively balanced, with 53.3% identifying as male and 46.7% as female. The largest occupation group among the respondents is students, making up 53.3% of the total. Regarding the frequency of providing hotel feedback, 60% of respondents fall into the 3 and 4 rating categories, indicating a moderate to high frequency. As for the rating of the hotel feedback experience, most respondents rated it at 3.

6.1.2 Second section- Hotel Customer Feedback Application
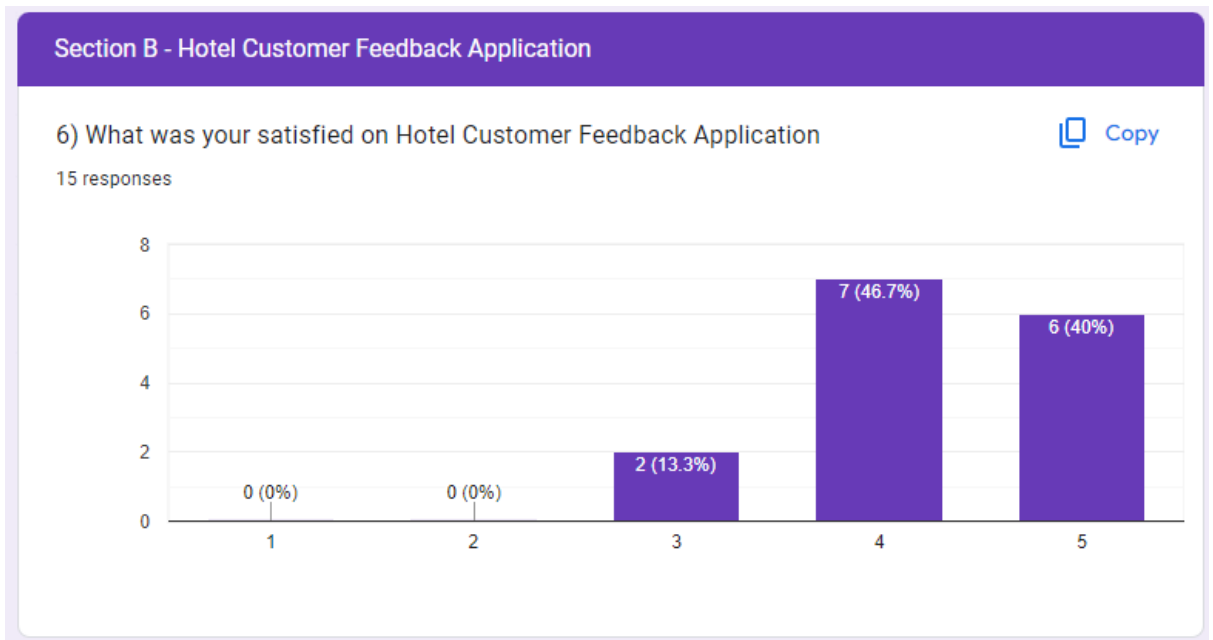
Figure 6.1.2.1 Satisfaction of hotel feedback application
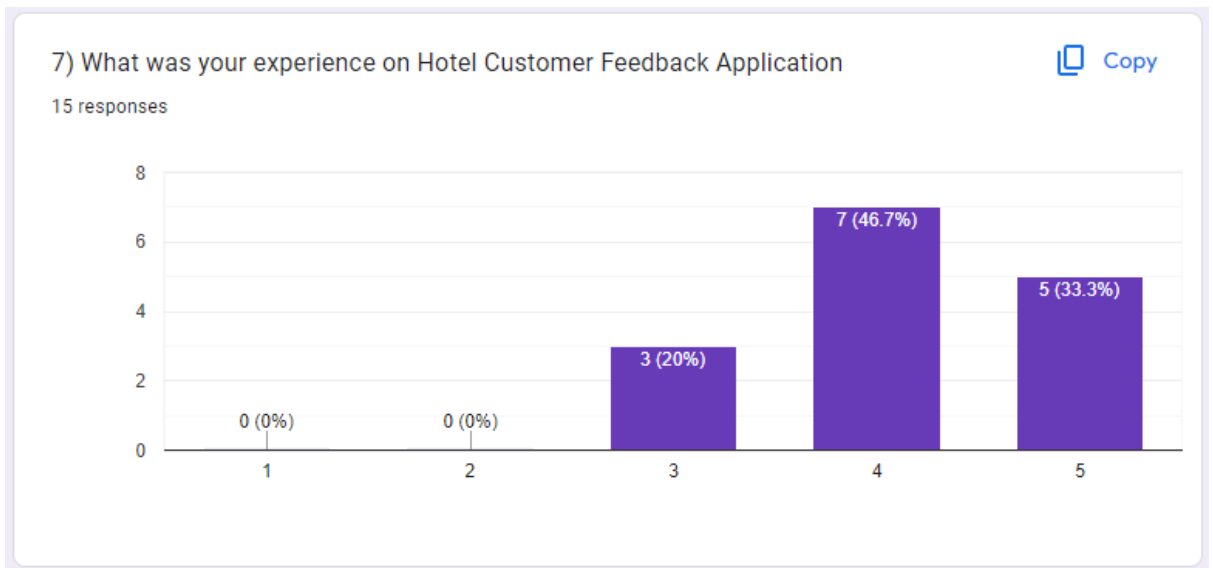
Figure 6.1.2.2 Rate of experience on hotel customer feedback application

Figure 6.1.2.3 User friendly of the application
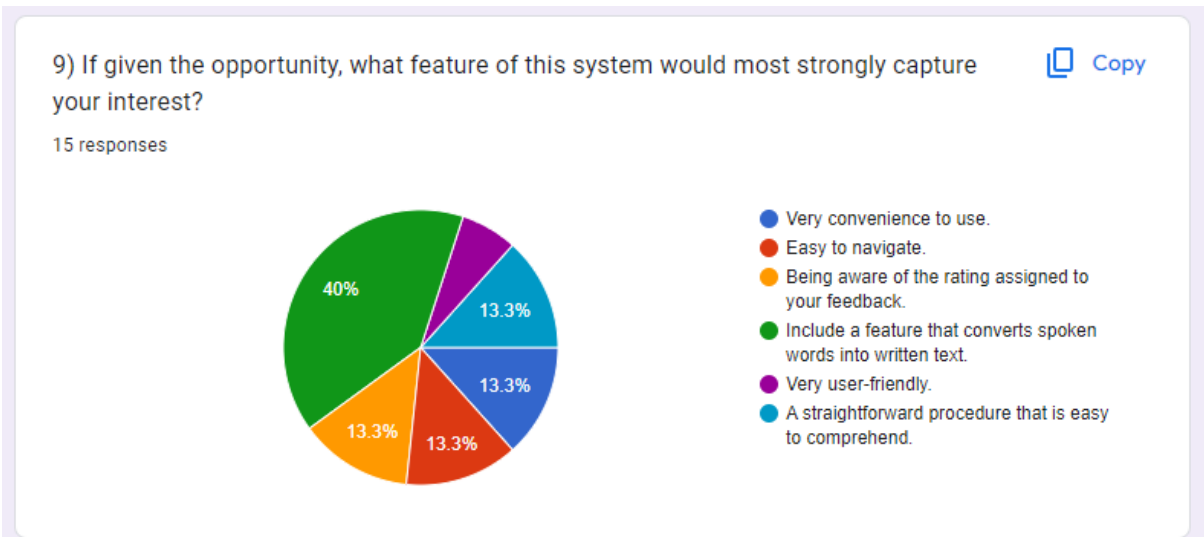
Figure 6.1.2.4 Feature that capture respondent
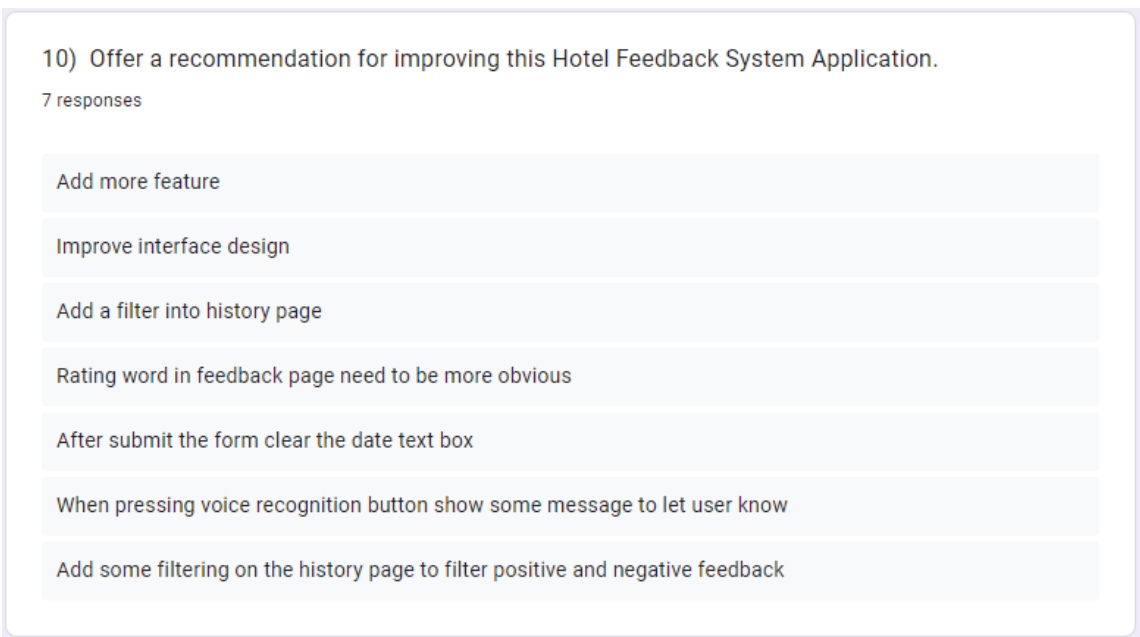
Figure 6.1.2.5 Recommendation from respondents

The survey's second section was designed to collect input from participants about hotel feedback system applications. A significant number of respondents expressed their satisfaction with the application, and the highest rating of 4 was chosen by 46.7% of them. Additionally, 46.7% of the participants reported having an outstanding experience with the application. It's important to highlight that every respondent agreed that the application is easy for users to navigate, and the standout feature of this application was the speech-to-text functionality.

Respondents also provided some suggestions for improving the application. These include adding filters to the history page so that users can choose to view either positive or negative feedback, using colors like green for positive and red for negative feedback ratings on the feedback page, incorporating more features into the application, providing a message to inform users when voice recognition is active, and enhancing the overall design of the application's interface.

6.1.3 Third section- Hotel Admin Application
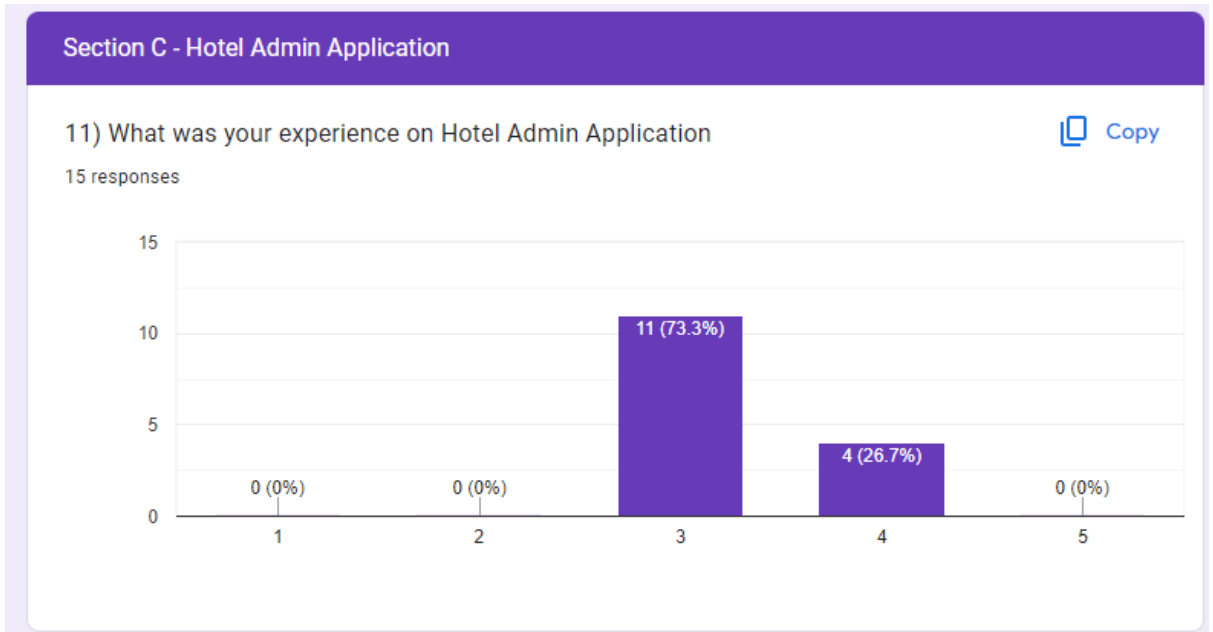
Figure 6.1.3.1 Experience on Hotel Admin Application
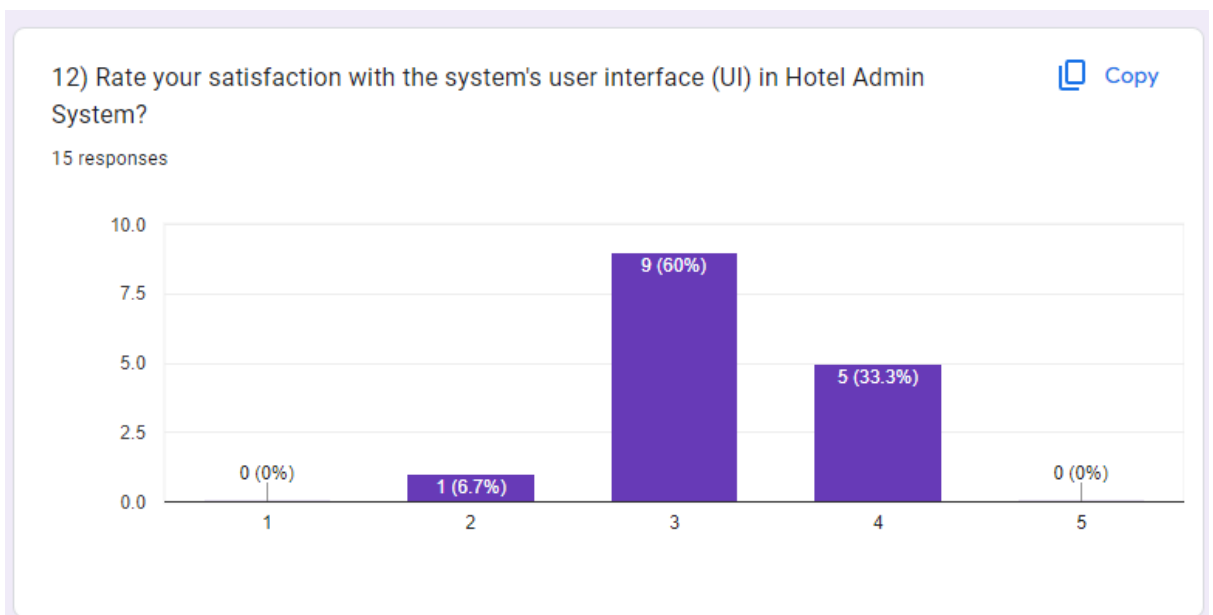
Figure 6.1.3.2 Satisfaction of the user interface

13) Is the feature of Hotel Admin Application helps manager?

15 responses

● Yes
● No

93.3%
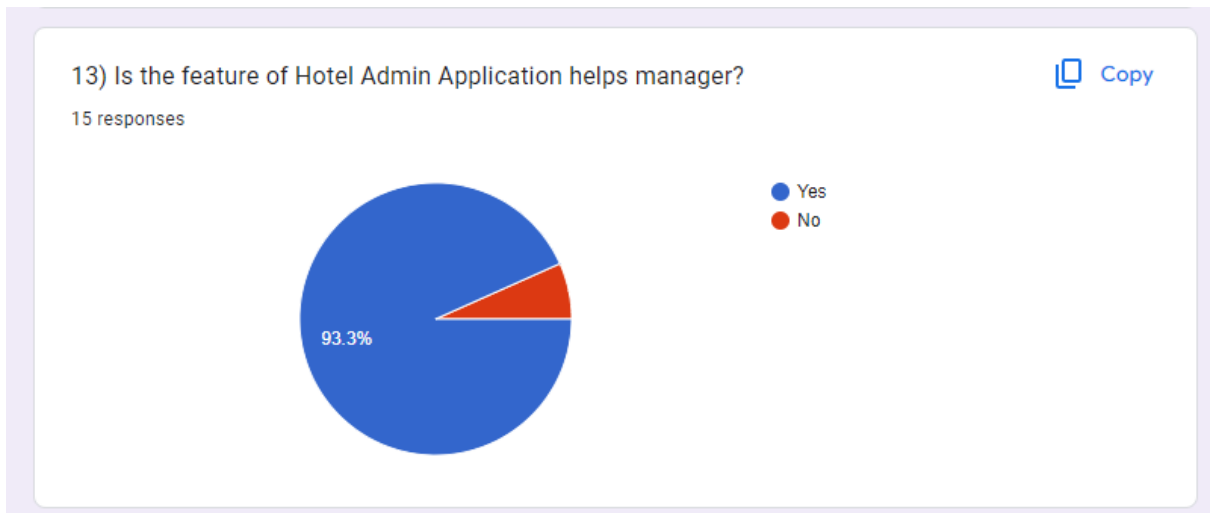
Figure 6.1.3.3 Opinion of respondents

14) Is the application user-friendly for manager?

15 responses
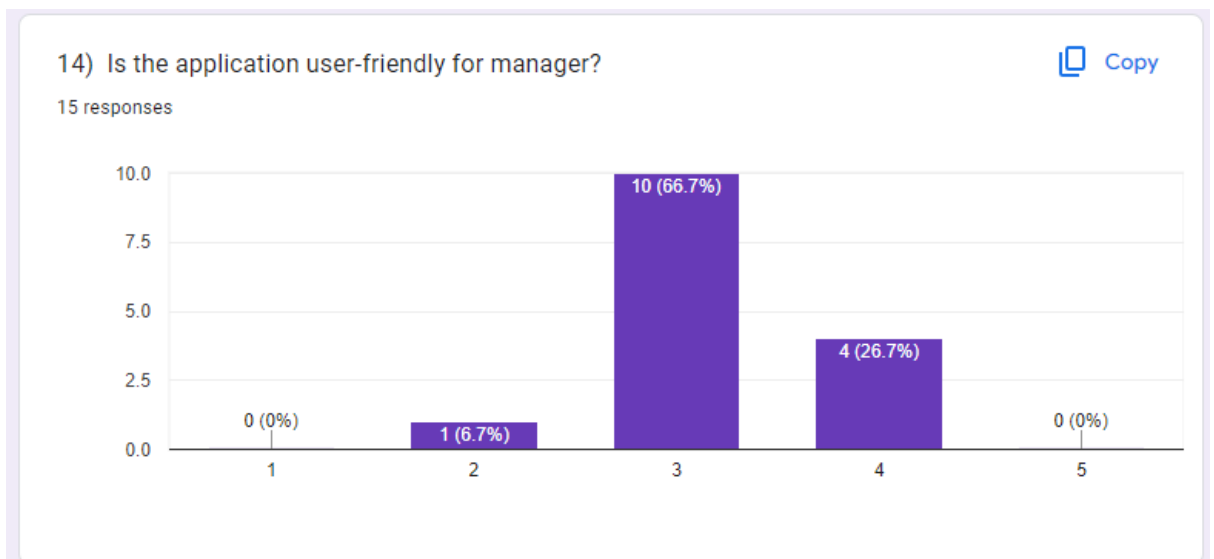
Figure 6.1.3.4 Rate of user-friendly of the application
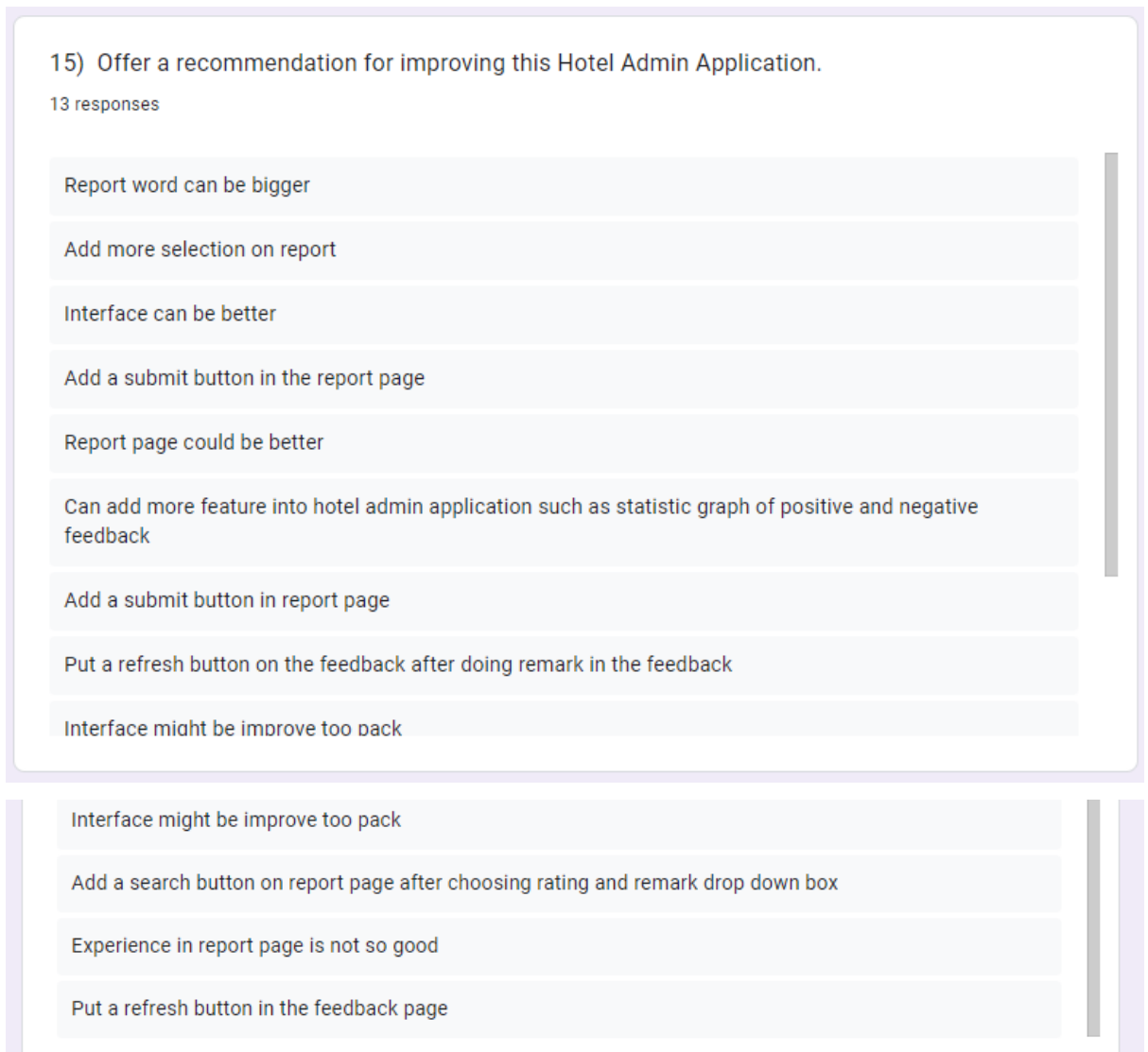
Figure 6.1.3.5 Recommendation of Hotel Admin Application

The majority of respondents reported having a positive experience with the hotel admin application, with 73.3% rating it as a 3, and 26.7% rating it as a 4. When it comes to the user interface of the application, 60% of respondents had a neutral opinion, but one respondent expressed dissatisfaction with it. Most respondents agreed that this application is beneficial for managers, although there were a few who disagreed. Many respondents found the application moderately user-friendly for managers, but one respondent found it slightly user-friendly.

Respondents also provided feedback and suggestions for the application. The most common feedback related to the report page, with suggestions such as adding a submit button and providing more options like date selection. Some respondents mentioned

concerns about the feedback page, noting that it appeared crowded, and they recommended adding a refresh button. Additionally, there was a suggestion to include statistical graphs within the application.

6.2 Testing Setup and Result

6.2.1 User Application

6.2.1.1 Unit Testing 1 – Main Application

Input	Expected Output	Actual Output
Click Feedback Page	Direct to feedback page	User able go to feedback page
Click History Page	Direct to History page	User able go to history page

Table 6.2.1.1 Unit Testing 1 – Main Application

6.2.1.2 Unit Testing 2 – Feedback page

Input	Expected Output	Actual Output
Fill all edit text	Able to fill all edit text	User successfully fill all edit text
Click date edit text	Have pop up calendar and able to choose the date	User successfully choose date and fill into date edit text
Click voice recognition	Able to capture user voice and fill into feedback edit text	Successfully capture user voice and convert into text fill into feedback edit text
Able to show rating to user with sentiment analysis	Able to collect user feedback in edit text and show the rating of the text in text box	Successfully collect user feedback and show rating in the text box
Click submit button with all edit text are fill	Submit all the information into firebase	Successfully send all the information into the firebase
Click submit button without filling all edit text	Can't submit the information and will have a pop up message	Unsuccessfully send the information into firebase and have a pop up message that shown "Please fill all the information"

Table 6.2.1.2 Unit Testing 2 – Feedback page

6.2.1.2 Unit Testing 3 – History page

Input	Expected Output	Actual Output
Retrieve data from firebase	Able to view all feedback in a list	User able to view all feedback in a list

Table 6.2.1.3 Unit Testing 3 History page

6.2.2 Admin Application

6.2.2.1 Unit Testing 4 – Main Application

Input	Expected Output	Actual Output
Click Feedback Page	Direct to feedback page	User able go to feedback page
Click Report Page	Direct to report page	User able go to report page

Table 6.2.2.1 Unit Testing 4 – Main Application

6.2.2.2 Unit Testing 5 – Feedback page

Input	Expected Output	Actual Output
Able to view all data from firebase	Able to view all feedback in a list	User able to view all feedback in a list
Click sorting drop down box	Able to view drop down box with selection	User able to view drop down box with selection and choose
Click "All" button from drop down box	Able to view all feedback in a list	User able to view all feedback in a list
Click "Action Taken" button from drop down box	Able to view feedback that action has taken in a list	User able to view all feedback that action has taken in a list
Click "Action Not Taken" button from drop down box	Able to view feedback that action has not taken in a list	User able to view all feedback that action has not taken in a list
Click remark button on feedback card	Able to pop up remark view	User able pop up remark view
Fill remark pop up edit text	Able to fill all edit text	User able to fill all edit text
Click remark view date	Able to pop up a calendar	User able to pop up calendar and choose the date of remark that will record in remark date edit text
Click submit button	Able to submit all the information in remark pop up	User successfully submit all remark information into firebase

Table 6.2.2.2 Unit Testing 5 – Feedback page

6.2.2.3 Unit Testing 6 – Report page

Input	Expected Output	Actual Output
Click drop down box of remark	Able to view drop down box with selection	User able to view drop down box selection and choose one
Click "None" button from rating drop down box	Able to view "None" text inside drop down box	User able to choose "None" and it has a "None" text inside the drop down box
Click "All" button from rating drop down box	Able to view "All" text inside drop down box	User able to choose "All" and it has a "All" text inside the drop down box
Click "Positive" button from rating drop down box	Able to view "Positive" text inside drop down box	User able to choose "Positive" and it has a "Positive" text inside the drop down box
Click "Negative" button from rating drop down box	Able to view "Negative" text inside drop down box	User able to choose "Negative" and it has a "Negative" text inside the drop down box
Click "None" button from remark drop down box	Able to view "None" text inside drop down box	User able to choose "None" and it has a "None" text inside the drop down box
Click "All" button from remark drop down box	Able to view "All" text inside drop down box	User able to choose "All" and it has a "All" text inside the drop down box
Click "Action Taken" button from remark drop down box	Able to view "Action Taken" text inside drop down box	User able to choose "Action Taken" and it has a "Action Taken" text inside the drop down box
Click "Action Not Taken" button from remark drop down box	Able to view "Action Not Taken" text inside drop down box	User able to choose "Action Not Taken" and it has a "Action Not Taken" text inside the drop down box
Click "None" from rating drop down box and click "None" or "All" or "Action Taken" or "Action Not Taken" from remark drop down box	Unable to show table of the report	User unable to view the table of the report
Click "None" or "All" or "Positive" or "Negative" from rating drop down box and click "None" from remark drop down box	Unable to show table of the report	User unable to view the table of the report

Click "All" from rating drop down box and click "All" from remark drop down box	Able to show every feedback information in every rating and remark	User able view all rating and all remark data in a table form
Click "All" from rating drop down box and click "Action Taken" from remark drop down box	Able to show every rating with action taken data	User able view all rating with action taken data in a table form
Click "All" from rating drop down box and click "Action Not Taken" from remark drop down box	Able to show every rating with action not taken data	User able view all rating with action not taken data in a table form
Click "Positive" from rating drop down box and click "All" from remark drop down box	Able to show positive feedback information in every rating and remark	User able view positive rating and all remark data in a table form
Click "Positive" from rating drop down box and click "Action Taken" from remark drop down box	Able to show positive rating with action taken data	User able view positive rating with action taken data in a table form
Click "Positive" from rating drop down box and click "Action Not Taken" from remark drop down box	Able to show positive rating with action not taken data	User able view positive rating with action not taken data in a table form
Click "Negative" from rating drop down box and click "All" from remark drop down box	Able to show negative feedback information in every rating and remark	User able view negative rating and all remark data in a table form
Click "Negative" from rating drop down box and click "Action Taken" from remark drop down box	Able to show negative rating with action taken data	User able view negative rating with action taken data in a table form
Click "Negative" from rating drop down box and click "Action Not Taken" from remark drop down box	Able to show negative rating with action not taken data	User able view negative rating with action not taken data in a table form

Table 6.2.2.3 Unit Testing 6 – Report page

6.2.3 Accuracy of Voice Recognition

6.2.3.1 Unit Testing 7 – Accuracy of Voice Recognition

Input	Expected Output	Actual Output	Pass/ Fail
Analyze "the room was dirty and it is smokey"	Negative	Negative	Pass
Analyze ""The room was clean, comfortable, and have a good decoration.""	Positive	Positive	Pass
Analyze ""The hotel staff is super friendly but the room cleanliness are terrible.""	Slightly Negative	Slightly Negative	Pass
Analyze "The breakfast buffet was fantastic, but the noise from nearby construction was a little bit annoying"	Slightly Negative	Slightly Negative	Pass
Analyze "the food is marvelous and the environment could be better"	Slightly Positive	Positive	Fail
Analyze "The location was perfect, right in the city center, although the Wi-Fi was frustratingly slow"	Slightly Positive	Slightly Positive	Pass
Analyze "the hotel room had a stunning balcony and have a marvelous view"	Positive	Positive	Pass
Analyze "I have an enjoyable experience in this hotel"	Positive	Positive	Pass
Analyze "The hotel have limited food option and the quality was poor"	Negative	Negative	Pass
Analyze "the stuff was unfriendly and unhelpful"	Negative	Negative	Pass

Table 6.2.3.1 Unit Testing 7 – Accuracy of Voice Recognition

6.2.4 Accuracy of Sentiment Analysis
6.2.4 1 Unit Testing 8 – Accuracy of Sentiment Analysis

Input	Expected Output	Actual Output	Pass/ Fail
Speak "the room was dirty and it is smokey"	"the room was dirty and it is smokey"	"the room was dirty and it is smokey"	Pass
Speak "The room was clean, comfortable, and have a good decoration"	"The room was clean comfortable and have a good decoration. "	"the room was clean comfortable and have a good decoration. "	Pass
Speak "The hotel staff is super friendly but the room cleanliness are terrible"	"The hotel staff is super friendly but the room cleanliness are terrible"	"the hotel staff is super friendly but the room cleanliness are terrible	Pass
Speak "The breakfast buffet was fantastic, but the noise from nearby construction was a little bit annoying"	"The breakfast buffet was fantastic, but the noise from nearby construction was a little bit annoying"	"the breakfast buffet was fantastic, but the noise from nearby construction was a little bit annoying"	Pass
Speak "the food is marvelous and the environment could be better"	"the food is marvelous and the environment could be better"	"the food is marvelous and the environment could be better"	Pass
Speak "The location was perfect, right in the city center, although the Wi-Fi was frustratingly slow"	"The location was perfect, right in the city center, although the Wi-Fi was frustratingly slow"	"the location was perfect, right in the city center, although the Wi-Fi was frustratingly slow"	Pass
Speak "the hotel room had a stunning balcony and have a marvelous view"	"the hotel room had a stunning balcony and have a marvelous view"	"the hotel room had a stunning balcony and have a marvelous view"	Pass
Speak "I have an enjoyable experience in this hotel"	"I have an enjoyable experience in this hotel"	"I have an enjoyable experience in this hotel"	Pass
Speak "The hotel have limited food option and the quality was poor"	"The hotel have limited food option and the quality was poor"	"The hotel have limited food option and the quality was poor"	Pass
Speak "the stuff was unfriendly and unhelpful"	"the stuff was unfriendly and unhelpful"	"the stuff was unfriendly and unhelpful"	Pass

Table 6.2.4.1 Unit Testing 8 – Accuracy of Sentiment Analysis

6.3 Implementation Issues and Challenges

This project has presented numerous issues and challenges due to its integration of two distinct technologies: Python for sentiment analysis and Android Studio for application development. These technologies operate in different programming languages, with Python using Python itself and Android Studio utilizing Java. Bridging this gap and establishing a seamless connection between the two languages posed a significant hurdle. The task required extensive research and configuration to effectively unite them within a mobile application environment, further complicated by the limited availability of resources for guidance.

After extensive research efforts, I came across ChaquO, a framework designed to enable Android Studio to execute Python code. However, this discovery brought about another obstacle. The latest version of Python introduced changes that affected some essential features, notably the Natural Language Toolkit (NLTK) used for sentiment analysis, which was not compatible with ChaquO. To resolve this compatibility issue, I had to make the difficult decision to downgrade the Python version. This adjustment allowed the Python code and Android Studio components to work harmoniously, despite the sacrifices made in terms of Python's latest capabilities.

Another significant challenge emerged when dealing with the retrieval of data from Firebase into Android Studio. This particular issue arose within an adapter located inside a fragment in my Android Studio project. Navigating the intricacies of coding within an adapter proved to be a complex task. Consequently, I needed to devise a strategy to effectively code within the confines of the adapter, as my initial attempts to manipulate data from the main fragment proved insufficient.

In summary, this project has demanded a deep dive into various technologies and their integration, from aligning different programming languages to managing compatibility issues and optimizing data retrieval mechanisms. These challenges, though formidable, have provided valuable learning experiences and problem-solving opportunities throughout the project's development.

6.4 Timeline

Task ID	Task	Task Duration	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
	1: INTRODUCTION														
1	Problem Statement and Motivation	1	■												
2	Objective	1	■												
3	Project Scope and Direction	1	■												
4	Contributions	1	■												
	2: LITERATURE REVIEW														
5	Find Hotel Feedback System	1	■												
6	Summary of limitation	1	■												
7	Comparison table	1	■												
	3: SYSTEM METHODOLOGY														
8	Methodology	1		■											
9	System Equation	1		■											
10	Use Case Diagram	2		■	■										
	4: SYSTEM DESIGN														
11	System flow of Sentiment Analysis	1				■									
12	System flow of User Mobile Application	1					■								
13	System flow of Admin Mobile Application	1						■							
	5: IMPLEMENT AND TESTING														
14	Hardware Setup	1							■						
15	Software Setup	1							■						
16	Setting and configuration	1							■						
17	System Operation	4							■	■	■	■			
	6:SYSTEM EVALUATION AND DISCUSSION														
18	System Evaluation Survey Results	1										■			
19	Testing Setup and Result	1											■		
20	Implementation Issues and Challenges	1											■		
	7: CONCLUSION AND RECOMMENDATION														
21	Conclusion	1												■	
22	Recommendation	1												■	
23	Finalize FYP2 Report	1													■
24	FYP2 Report Submission	1													■

Figure 6.4 Timeline

6.5 Objective Evaluation

This project has successfully achieved its objective by incorporating sentiment analysis into the application, automating the process of rating customer feedback. This solution is designed to alleviate the workload of administrators who would otherwise need to manually categorize feedback as positive or negative. It offers a clearer way to visualize and segregate feedback, facilitating prompt action.

Additionally, it enables managers to monitor whether actions are being taken based on the feedback received. A noteworthy aspect of this project is the introduction of an alternative feedback method for customers, utilizing voice recognition technology. This innovation enhances the convenience of providing feedback and allows customers to express themselves more effectively.

The inclusion of voice recognition has left a lasting impression on most testers, who found it to be a standout feature in the hotel feedback system. Furthermore, it simplifies the process for managers when generating reports, as it provides a categorized breakdown of positive and negative feedback.

Chapter 7 Conclusion and Recommendation

7.1 Conclusion

Hotels are essential in the tourism industry because they provide a place for tourists to stay. It's crucial for hotels to ensure that customers have a positive experience. To figure out how to improve, hotels often use feedback forms that customers fill out. This helps hotel management get important information on how to make their services better and enhance the customer experience.

However, there are some problems with these hotel feedback systems. One issue is that customers sometimes find it hard to express themselves well in written feedback. Words alone can't fully capture a person's feelings and thoughts, so when customers need to use words to give feedback, it can be challenging. Written text can't always convey everything a person wants to say.

Another problem is that hotel feedback systems struggle to tell the difference between positive and negative feedback. If a system can't figure out whether the feedback is good or bad, it's difficult for managers to decide what actions to take. This means managers might have to manually go through each piece of feedback to determine if it's positive or negative, which can be time-consuming and frustrating.

Lastly, managing feedback data can be a time-consuming task that requires a lot of manpower. Some hotel feedback systems need people to go through the feedback and decide if it's positive or negative. This manual process can also lead to mistakes in rating the feedback.

To address these problems, I've researched other hotel feedback systems like Corus Hotel Kuala Lumpur, Swiss-Garden International, Ramada Suites by Wyndham KLCC, and Hotel De' La Ferns. I've looked at their features, strengths, and weaknesses and compared them. My research has shown that these systems face similar issues as the ones I've mentioned.

Based on this research, I have a clear idea of how to solve these problems. My proposal is to add sentiment analysis to automatically analyze feedback and

incorporate voice recognition to allow customers to express themselves more effectively when giving feedback. In summary, this project aims to address the problems identified in the hotel feedback system and improve its functionality.

7.2 Recommendations

A survey was conducted to identify areas where the hotel feedback system could be improved. This proposed system aims to encompass the entire process of the hotel feedback system, spanning from customer users to administrative users, which are typically the management team. In this comprehensive approach, the system seeks to address issues commonly found in other hotel feedback systems.

It's important to note that different users have distinct perspectives, and these viewpoints can be valuable in pinpointing weaknesses in the system. Developers can then utilize this feedback to make necessary enhancements. The results of an evaluation survey conducted among users of the application yielded some useful recommendations.

For instance, some respondents suggested making improvements to the feedback page by enhancing the visibility of the rating words. Currently, the words "positive," "neutral," and "negative" all appear in the same color. To enhance user experience, the proposal is to differentiate them by color—using green for "positive" and red for "negative." This adjustment will make it easier for users to discern and select their preferred rating.

Another recommendation was to implement a pop-up message when users activate the voice recognition feature. Occasionally, users inadvertently press the voice recognition button without realizing it. A pop-up message would serve as a notification, letting users know that they have activated the voice recognition feature.

In the evaluation survey results pertaining to the admin applications, the majority of recommendations provided by respondents centered on improving the report page. Users found the current selection of report options to be limited, and the absence of a submit button caused confusion. Additionally, feedback indicated a desire for enhancements to the overall interface of the admin application.

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Appendix

Survey Question Forms

Survey for User Experience for Final Year Project - Speech-to-Text and Sentiment Analysis in a Hotel Feedback System

Greetings, I am Lee Jia Jet, a final-year undergraduate student pursuing a degree in Information Systems with a focus on Business Information Systems. I am engaged in a research study titled "Speech-to-Text and Sentiment Analysis in a Hotel Feedback System." As part of my project, I am seeking feedback from users to gather insights about their experience. I kindly request a few minutes of your time to provide your valuable input by answering the following questions. Your feedback will greatly contribute to my research.

Here is the information that needs to be conveyed:

1. Purpose of the Questionnaire:
   - Enhancing the customer experience when providing feedback.
   - Enhancing the managerial experience in feedback management.
   - Continuous improvement of the application.
2. This questionnaire is divided into two sections:
   -Section A - Personal Information and Hotel Feedback Experience
   -Section B - Hotel Customer Feedback Application
   -Section C - Hotel Admin Application

jiajetlee15@gmail.com Switch accounts

Not shared

* Indicates required question

Acknowledgement *
By taking part in this questionnaire, I acknowledge that my participation is entirely voluntary. I am aware that the information I provide will be utilized solely for research and development purposes, handled with strict confidentiality, and anonymized for collective analysis. I grant permission for the gathered data to be used in analysis and reporting, with the assurance that my personal information will not be disclosed in any subsequent publications or reports.

○ Yes

○ No

Next   Clear form

Section A - Personal Information and Hotel Feedback Experience

1) How old are you? *

- ○ Under 21
- ○ 21-30
- ○ 31-40
- ○ 40 or higher

2) What is your gender? *

- ○ Male
- ○ Female

3) What is your current employment status *

- ○ Student
- ○ Unemployed
- ○ Self-employed
- ○ Part-time employee
- ○ Full- time employee
- ○ Retired

4) How frequently do you provide feedback to hotels? *

	1	2	3	4	5	
Very Rarely	○	○	○	○	○	Very Often

5) Rate your experience while doing hotel feedback *

	1	2	3	4	5	
Very Dissatisfied	○	○	○	○	○	Very Satisfied

Section B - Hotel Customer Feedback Application

6) What was your satisfied on Hotel Customer Feedback Application *

	1	2	3	4	5	
Very Dissatisfied	○	○	○	○	○	Very Satisfied

7) What was your experience on Hotel Customer Feedback Application *

	1	2	3	4	5	
Terrible	○	○	○	○	○	Excellent

8) Is the application user-friendly for customers? *

○ Yes

○ No

9) If given the opportunity, what feature of this system would most strongly *
capture your interest?

○ Very convenience to use.

○ Easy to navigate.

○ Being aware of the rating assigned to your feedback.

○ Include a feature that converts spoken words into written text.

○ Very user-friendly.

○ A straightforward procedure that is easy to comprehend.

10) Offer a recommendation for improving this Hotel Feedback System
Application.

Your answer

Section C - Hotel Admin Application

11) What was your experience on Hotel Admin Application *

	1	2	3	4	5	
Terrible	○	○	○	○	○	Excellent

12) Rate your satisfaction with the system's user interface (UI) in Hotel Admin System? *

	1	2	3	4	5	
Very Dissatisfied	○	○	○	○	○	Very Satisfied

13) Is the feature of Hotel Admin Application helps manager? *

○ Yes

○ No

14) Is the application user-friendly for manager? *

	1	2	3	4	5	
Not User-Friendly	○	○	○	○	○	Extremely User-Friendly

15) Offer a recommendation for improving this Hotel Admin Application.

Your answer

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	Study week no.:3
Student Name & ID: Lee Jia Jet, 20ACB06198	
Supervisor: Mr. Su Lee Seng	
Project Title: Speech-to-text and Sentiment Analysis for a Hotel Feedback System	

1. WORK DONE

1) Do further research on development mobile application on android studio
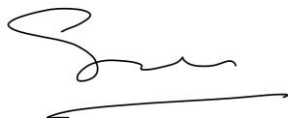
2. WORK TO BE DONE

Start doing user application by insert fragment and bottom navigation bar

3. PROBLEMS ENCOUNTERED

Study to android studio from the beginning.

4. SELF EVALUATION OF THE PROGRESS

Study more android studio coding and further study on firebase

_____ _____

Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	Study week no.:5
Student Name & ID: Lee Jia Jet, 20ACB06198	
Supervisor: Mr. Su Lee Seng	
Project Title: Speech-to-text and Sentiment Analysis for a Hotel Feedback System	

1. WORK DONE
1) Do feedback page and setup firebase. Connect firebase to android studio and push the data into firebase.
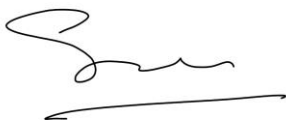
2. WORK TO BE DONE
Done feedback page, and setup firebase

3. PROBLEMS ENCOUNTERED
Struggle to push data into firebase and it have bug with the application

4. SELF EVALUATION OF THE PROGRESS
Study putting python into android studio

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Supervisor's signature

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Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	Study week no.:7
Student Name & ID: Lee Jia Jet, 20ACB06198	
Supervisor: Mr. Su Lee Seng	
Project Title: Speech-to-text and Sentiment Analysis for a Hotel Feedback System	

1. WORK DONE

1) Insert Chaquopy into android studio. Do VaderSentiment into python file. Retrieve feedback information to let sentimental analysis to do rating for the feedback. Show into feedback page.
2) Can retrieve data from the firebase and show into history page
3) Finish up user application
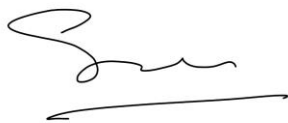
2. WORK TO BE DONE

Finish up user application

3. PROBLEMS ENCOUNTERED

Setup Chaquopy into android studio and download python version.

4. SELF EVALUATION OF THE PROGRESS

Fine a way to do admin application for this project

_____
Supervisor's signature

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Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: T3, Y3	Study week no.:9
Student Name & ID: Lee Jia Jet, 20ACB06198	
Supervisor: Mr. Su Lee Seng	
Project Title: Speech-to-text and Sentiment Analysis for a Hotel Feedback System	

1. WORK DONE
1) Do some fine tune for VaderSentiment
2) Start doing admin application. Can fetch and push data into firebase. Able to view all feedback in feedback page. Press remark are able pop up remark form and fill it. Able to filter action taken or not taken.
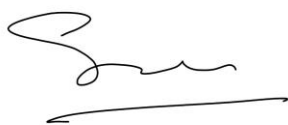
2. WORK TO BE DONE
Finish admin feedback page

3. PROBLEMS ENCOUNTERED
Remark form can pop up and find a way to store remark information into firebase

4. SELF EVALUATION OF THE PROGRESS
Thinking about how to do system report

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Supervisor's signature

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Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	Study week no.:10
Student Name & ID: Lee Jia Jet, 20ACB06198	
Supervisor: Mr. Su Lee Seng	
Project Title: Speech-to-text and Sentiment Analysis for a Hotel Feedback System	

1. WORK DONE
1) Do system report. User can choose the information that they need in the drop down box. And fetch the data that user use into a table form.
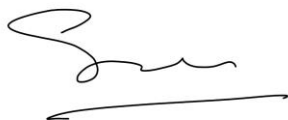
2. WORK TO BE DONE
Done admin application

3. PROBLEMS ENCOUNTERED
Fetching selected data into system and make it into table

4. SELF EVALUATION OF THE PROGRESS
Study more android studio coding and further study on firebase

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Supervisor's signature

_____
Student's signature

SPEECH-TO-TEXT AND SENTIMENT ANALYSIS FOR A HOTEL FEEDBACK SYSTEM

INTRODUCTION

This paper presents an application that allows hotel customers to provide feedback to the hotel using voice recognition technology. The proposed application is capable of using sentiment analysis to detect whether the feedback is positive, neutral, or negative.

PROBLEM STATEMENT

- Customers struggle to express themselves effectively in written feedback
- Difficult to detect and differentiate positive feedback and negative feedback for further actions to be taken
- Consume lot of time and workforce to manage feedback data

PROJECT OBJECTIVE

- To develop a hotel feedback system to let customers use voice/ speech to provide feedback more effectively.
- Develop a hotel feedback system in mobile application that will analyze and differentiate customer feedbacks using sentiment analysis.
- • Hotel feedback system that will automate the classification of feedback data.

METHODOLOGY

- Developing using sentiment analysis methodology and prototype methodology
- React Native for mobile application development
- Python for sentiment analysis coding

CONCLUSION

The report proposes that voice recognition and sentiment analysis can address the challenges encountered by the conventional hotel feedback system.

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Bachelor of Business Information System (Honours)
By: Lee Jia Jet   Supervisor: Su Lee Seng

PLAGIARISM CHECK RESULT

Speech-to-text and Sentiment Analysis for a Hotel Feedback System

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3%	3%	0%	%
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6	admin.ijbarr.com Internet Source	<1%
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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

Full Name(s) of Candidate(s)	Lee Jia Jet
ID Number(s)	2006198
Programme / Course	IB
Title of Final Year Project	Voice Feedback System with Sentiment Analysis at a University

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  Signature of Supervisor   Signature of Co-Supervisor

  Name: Su Lee Seng   Name:
                                                       _____

  Date: 20/4/2023   Date:
                                                       _____

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FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY
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Student Name	Lee Jia Jet
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√	Table of Contents
√	List of Figures (if applicable)
√	List of Tables (if applicable)
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√	List of Abbreviations (if applicable)
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√	Bibliography (or References)
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