



## Artificial Intelligence (AI) – Cover Sheet

### ASSIGNMENT

#### Instruction:

- Marks will be awarded for good presentation and thoroughness in your approach.
- Referencing Code: If you use some code, or ideas for code, which are taken or adapted from another source (book, magazine, internet, discussion forum, etc), then this **must** be cited and referenced using the Harvard Name convention within your source code. Failure to reference code properly is considered as plagiarism.
- Complete this cover sheet and attach it to your project.
  - This project is to be attempted by a group of 3 students.

#### Student declaration:

*I declare that:*

1. *We understand what is meant by plagiarism*
2. *The implication of plagiarism have been explained to us by our lecturer*
3. *This project is all our work and we have acknowledged any use of the published or unpublished works of other people.*

Group Leader's Signature:

*Lim*

Date: 11/28/2023

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# **1. Problem Specification**

## **1.1 Abstract**

The goal of this project is to use the Botpress framework to create a customized chatbot that will primarily function as a knowledge base for the traditional Indonesian drum known as the kendang. The aim is to develop an interactive and intuitive platform that facilitates users in obtaining thorough knowledge about Kendang, encompassing its background, methods of play, geographical variances, and cultural importance.

The chatbot's goal is to converse with users in natural language while imitating human interaction by responding and offering information. Our goal is to develop an intelligent and contextually aware chatbot that can guide users through Kendang techniques and promote a deeper understanding of this culturally rich percussion instrument. We plan to achieve this by utilizing the Botpress framework.

The chatbot's dynamic conversational flow that adjusts to user inputs, multimedia integration to enhance auditory and visual learning, and a knowledge base that is updated frequently with precise and pertinent information are some of its key features. The project also places a strong emphasis on user feedback and iterative testing to improve the chatbot's responses and provide a smooth and enjoyable user experience.

Our goal in creating this Kendang knowledge bot is to help spread awareness of traditional music and cultural heritage while also preserving it. The project intends to close the gap between technology and cultural education by promoting a deeper understanding of Kendang and its significance in Indonesian heritage, in addition to exploring the technical aspects of chatbot development.

## **1.2 Problem Statement**

### 1.2.1 Limited of Knowledge of Kendang Drum (Angelina Leanore TP072929)

The Kendang drum, despite its popularity in Indonesia, is not as well-known in other areas of the world. To introduce, Kendang is a double headed barrel drum from the Indonesian archipelago. It is regarded as the assembly's leader for Javanese, Sundanese, and Balinese. This drum is typically used by Kendang players to manoeuvre through tempo changes, starts and stops, and collaborative art performance such as Tari (dance) and Wayang Kulit (shadow puppet). Due to its limited knowledge of Kendang Drum, there are various reasons for the necessity for concentrated efforts to conserve, promote, and educate people about this traditional, distinctive art. (Wilson, 2022)

One of the primary reasons for the shortage of information about Kendang Drum is lack of access to and awareness of written sources such as recorded resources. In contrast to current drum instruments such as the bass drum and snare drum, which have been extensively investigated and recorded due to the enormous number of enthusiasts. The lack of written and documented documentation makes it difficult for academics and students to comprehend the history and evolution of the Kendang Drum. As a result, this percussion instrument is concealed. (Lesadmin, 2023)

Furthermore, Indonesia has also undergone modernity, causing many young generations to be unaware of their ancestors' traditions. It is a vital step in preserving Indonesian culture, particularly Kendang, for other nations of the world and most importantly, for Indonesians. Given the scarcity information, efforts must be undertaken to promote the Kendang to a global audience. This knowledge may be made more accessible via the use of digital technologies such as educational websites, apps, and chatbots. Many lessons, historical knowledge, background, and

language barriers no longer need to be worried because the media generally offers a wide range of languages. (Lesadmin, 2023)

However, it cannot be denied that there are further challenges behind this restricted Kendang Drum understanding. First and foremost, it is a difficult instrument to master or learn. It takes a lot of talent. Second, it is not as common in popular music nowadays as other types of drums. Third, there is a lack of awareness among Indonesians to spread or introduce it to the world. To summarize, it is guarantee that the cultural significance and beauty of Kendang are appreciated, well-known, and passed down to future generations by recording its history, sharing playing skills, and embracing digital tools.

#### 1.2.2 Procasination (Terence Lim Dao Liang TP073243)

One of the biggest reasons that people fail to reach their target or goal is due to procrastination. People frequently associate procrastination with being "lazy" or having poor time-management skills. It is a widespread problem. According to Philips (2019) research, up to 20% of adults globally engage in genuine procrastination, which is defined as persistently putting off tasks to the point where it significantly impacts their everyday life and makes them feel ashamed or guilty. Procrastination occurs for a variety of reasons, such as a dislike of the task at hand, a fear of failing, irritation, self-doubt, and anxiety. With the creation of a chat bot, comes a new solution for this problem.

In modern age, most people have already experience first-hand the convenience and benefits that AI brought. Chat bot especially, can assist people for education purpose or advising. Kendang as a traditional musical instrument require quite a lot of time and effort to learn. This is where chatbot comes in useful, one of the properties of chat bot is it can advise a suitable time table for the user and generally set a goal setting for anyone who is interested to learn Kendang.

One of the best way for people to overcome procrastination is to materialize or set their goals, this will increase their focus and motivate them to work toward their goal. A sense of clarity and less uncertainty are provided by having clear goals. Without clear goals, people can feel paralyzed by the uncertainty of their route, which could result in a lack of confidence and indecision.

In a research conducted in 2022, some interaction between goal setting chat bot and students in school are observed. These interactions include: How engaged students were with their behaviour, how effective and simple the chat bots were seen to be, how learning with chat bots was perceived by students, and students ideas for designing educational chat bots. The results showed that students had positive learning experiences with the learning buddy and goal-setting chat bots, suggesting the value of using theoretical frameworks for creating chat bots for teaching and learning (Hew et al., 2022). Since chat bot is a highly capable goal setter, anyone learning to play Kendang can utilize a chat bot to reach their goal more quickly and efficiently.

### 1.2.3 High proficiency (Eraliev Suimonkul TP068888)

One of the main reasons people will want to use this chatbot is it will motivate people to play Kendang. Although achieving a high level of proficiency in Kendang playing requires long and diligent practice with instructors, this bot can provide an overview of Kendang playing and offer some theoretical knowledge and a foundation. However, users should initially become familiar with drum notation as the knowledge provided by the chatbot may be difficult for people who are unfamiliar to understand. There are many different techniques of playing Kendang like basic hand positions and strokes, different types of beats and rhythms, playing in different gamelan ensembles, improvisation and solo playing. Not only that, there is different Rhythmic Patterns that any high level Kendang player must learn.

For example, Ketuk-Ketuk Patterns is a key rhythm in Indonesian drumming is the ketuk-ketuk pattern. It is characterized by a beat that is syncopated and energetic and is made up of both open and muted strokes. Ladrang Patterns is a classic Javanese rhythmic pattern that is frequently incorporated into gamelan music. It uses numerous drummers in an ensemble to perform complex interlocking rhythms, creating a mesmerizing and layered auditory environment. Other than that, Kendhang patterns is the two-headed drum known as the kendhang is essential to Indonesian music. Many traditional and modern compositions have a rhythmic foundation built on kendhang patterns, which are frequently cyclical. Next, Bedug drum patterns plays in most Religious and ceremonial music featuring the usage of bedug drums. The patterns are frequently slow and resonant, giving the music a sad and introspective character.

Most Gamelan ensembles are led by the Kendang, which also helps to set the tempo and energy of a performance. There are typically two different rhythmic pieces created to fit together to achieve a pace and complexity that would be challenging for one player alone. The drummers express changes in volume, speed, and cues to ANGSEL breaks by adjusting their repeated grooves. (Dullard, 2020)

Good drummers should train from a young age. Improvisation is a highly sophisticated, technically demanding behavior and should be taught only after a student has developed their musicianship and performance skills to an advanced level. This idea is possibly inapplicable for some other types of music because students are sometimes taught to develop their skills of improvisation from the beginning of the process of learning. However, this idea relates to Balinese music. Students are taught basic composed patterns at the beginning and learn to improvise only after they have mastered those. (SUDIRANA, 2003)

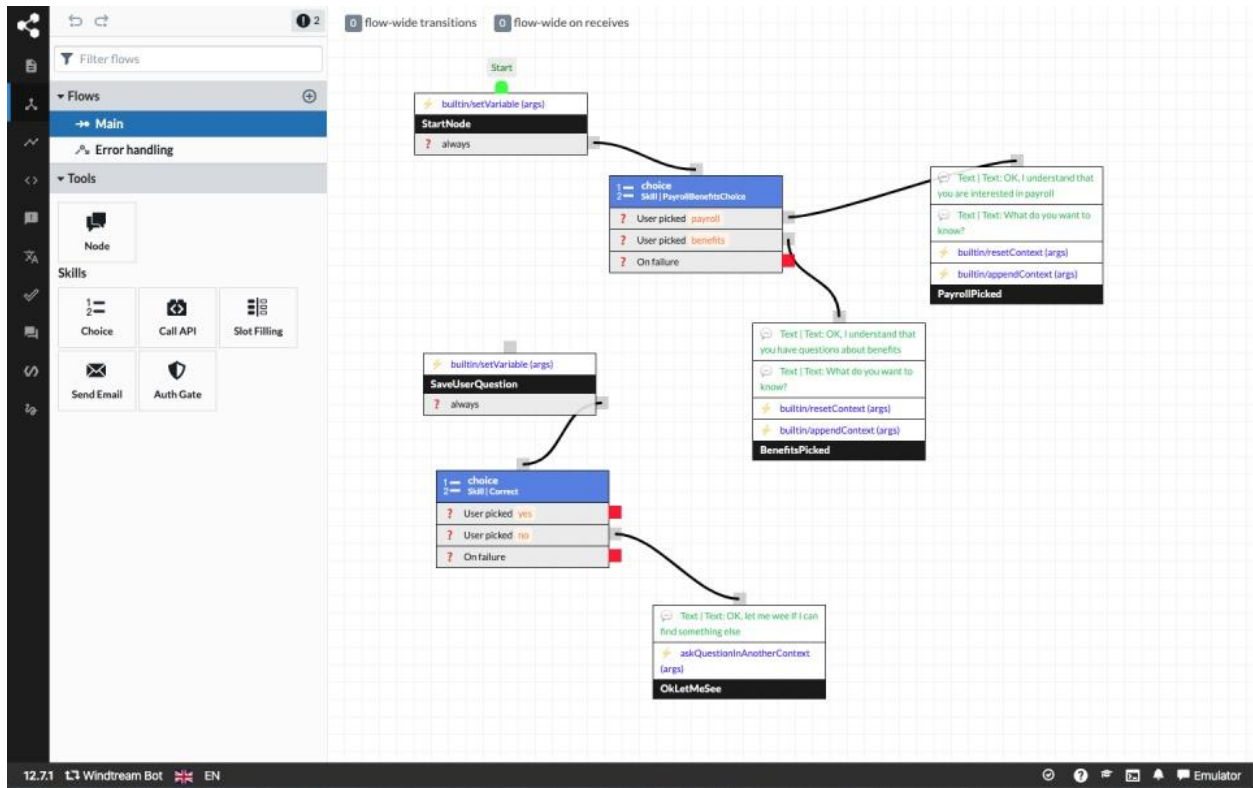
The ability to create improvised patterns that are perfectly synchronized with the melody and gong cycle according to accepted Balinese aesthetics is the most important aspect of solo drumming. Even if a drummer plays very well and produces complicated patterns by himself, he would be considered a good player only if these patterns are unified with the melody accompaniment.

To summary, our chatbot will provide basic information about playing techniques and patterns and also offer the option to watch instructional videos on specific topics



## 2. Knowledge Acquisition

### 2.1 Chatbot Framework



*Figure 2.1: Botpress workflow*

Botpress is an open-source chatbot platform that simplifies the development of Intelligent conversational AI. It's designed to be a simple tool to use because it offers a set of features out-of-the-box, making it an easy-to-use tool for developers. One of its key features is the Visual Flow Editor, which enables developers to design flexible conversational flows, which makes managing a complicated chatbot easier. Leveraging Natural Language Processing (NLP) engines and AI automation, Botpress can effectively understand and respond to every message. Through the implementation of AI tasks of automation, this tool empowers the chatbot to go beyond basic functions, facilitating the automation of workflows and access to external data sources. This capability allows the chatbot to offer a comprehensive and valuable service,

moreover, Botpress is compatible with various channels, including Messenger, Skype, SMS, Webchat, and more. Its ability to swiftly deploy your bot across major messaging channels ensures widespread user reach, facilitating seamless scalability and alignment with evolving business requirements.

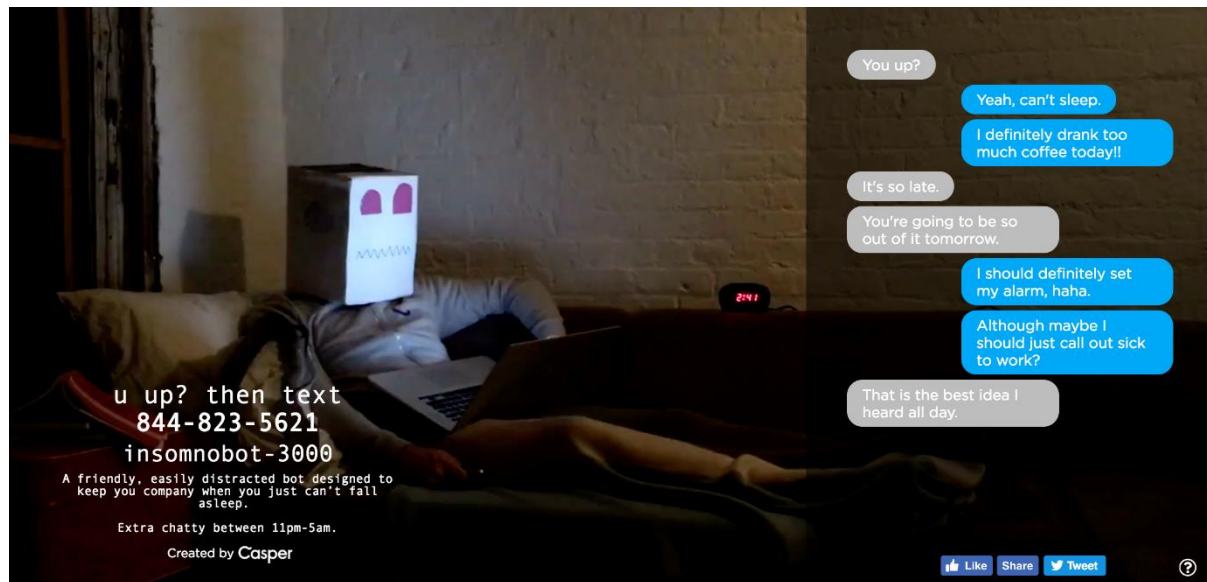
In addition, Botpress incorporates brand consistency management by employing the capabilities of GPT to introduce features like dynamic knowledge, analysis, automatic self-improvement, and AI-driven recommendations. One cannot be denied is the expense associated with chatbot development costs. Its cost-effective nature renders Botpress an attractive choice for businesses or developers of various scales, particularly those with budgetary constraints when venturing into AI-powered conversations.

Furthermore, Botpress's analytics dashboard grants developers valuable insights into chatbot performance and usage. This includes tracking key metrics like active user counts to gauge overall chatbot adoption, analysing conversation paths to identify common interactions and enhance user satisfaction, and monitoring bot response times and error rates to maintain a positive user experience. Additionally, Botpress provides a beginner-friendly authoring UI that simplifies chatbot development. The drag-and-drop interface streamlines the creation of chatbot conversation, allowing users to define features that improve chatbot comprehension, design dialogue flows, and incorporate text, images, and interactive elements into chatbot responses.

Last but not least, Botpress offers infinitely extendable and customizable Software Development Kits (SDKs) and Application Programming Interfaces (APIs). These tools empower developers to expand chatbot functionalities, seamlessly integrate with third-party applications, and leverage real-time updates via APIs, ensuring the chatbot remains adaptable to evolving needs.

## 2.2 Literature review on chatbot

**Insomnobot 3000: A bot designed for insomniac** (Terence Lim Dao Liang TP073243)



*Figure 2.1 Website page for Insomnobot 3000 (Casper, 2023)*

One forerunner that utilizes chat bot in their business is Casper, an internet retailer that offers sleep products both online and offline. Casper has marketed itself as a brand built around the full culture of sleep, not just as a shop. The startup's main offering is mattresses, but it also produces pillows, dog beds, runs an annual sleep symposium, and blogs about sleep. This company realized the potential of an intelligence chat bot and invested into it, the company created an innovative chat bot call Insomnobot 3000 designed for people who have problems falling asleep will converse with them by text message, in a manner similar to that of a human.

The way to access the chat bot is easy and accessible to anyone, just text the number 844-823-5621 between 11 p.m. and 5 a.m. The simplified design is a product of a 10-person team from Casper's tech, design, data, and creative departments worked on covertly for months to produce. According to Ryan (2016), head of communication Lindsay Kaplan commented that the initial aim was simple, the bot is created to make 3 a.m. a little less lonely. At the start the bot is just available to Casper employees and their friends. Insomnobot3000 was put to the test by having its test subjects hold conversations and provide feedback while keeping the identity of the bot a secret until later. Additionally, they allow users to talk at different times throughout the day. What they discovered was that those late-night conversations were very different: insomniacs repeatedly brought up issues that were keeping them up, such as work stress, coffee, or something they had just watched on TV, or they welcomed distractions, such as weekend plans. With that discovery the vision of the team became clearer.

Unfortunately, Insomnobot 3000 does not designed to utilize machine learning, which means it would not gain any new knowledge unless Casper teams collect data from its user and implement all kind of fresh response. Since Insomnobot bot 3000 is free to use, there is likely to none possibility that Casper would pour money and resource into its development. The bot is by

no means flawless in its design just as the name suggested, the bot is only useful between 11 p.m. to 5 a.m.. According to Lazzaro (2016), when exchanging conversation, the bot is unresponsive during morning and afternoon. Even when tested at 10:30pm but to no avail, not until 11.30pm the bot shows sign of intelligence. The bot only shows willingness to chat intelligently at a certain time yet its response is sassy and doesn't make much sense (Lazzaro, 2016). Compared to its competitor, Insomnobot 3000 is indeed one of the very first innovative chat bot but without any further support it won't find its place in the current technologies landscape.

However, Insomnobot 3000's purpose lies somewhere else. It is a fantastic illustration of a marketing bot which is a component of the changing interaction between customers and companies taking place in chat windows. A great example is Facebook's enthusiasm for bots and the addition of marketing and promotional language to the Messenger platform when it left testing conversations between businesses and customers (Johnson, 2016).

In conclusion, the bot is intended to operate at its peak between the hours of 11 p.m. and 5 a.m. The Insomnobot-3000 is a wholly customer engagement bot without any direct sales directives, in contrast to some of the other bots made by competitors. But even without direct sales directives, the Insomnobot-3000 has been very successful because with its distinctive approach, it was able to enhance brand perception and reach hundreds of thousands of new clients. Nevertheless, this chat bot did help the Casper acquire thousands of worthwhile warm leads for remarketing.

## SlimMe – Obesity advisor chatbot (Terence Lim Dao Liang TP073243)

Obesity has become a significant worldwide health issue in recent years, crossing geographic boundaries and impacting people from all socioeconomic levels. According to a study done by Fruh (2017), more than 30 percent of US citizens are obese. Obesity is linked to a number of comorbid conditions, including diabetes, heart disease, obstructive sleep apnea, and cancer; nevertheless, even a small weight loss of 5% to 10% or more can have a major positive impact on health-related outcomes. Although techniques like realistic goal-setting and more frequent consultations can significantly increase the success of weight-management programs, many people struggle to maintain weight loss. To counter this problem, a chatbot called SlimMe is designed to help others to lose weight. According to Rahmanti et al. (2022), the conversational agent SlimMe is designed to help people who want to reduce weight or keep it off. It communicates with people via text messages through the messaging app on their smartphone. The messaging platform, webhook services, and conversation management make up the SlimMe chatbot architecture.

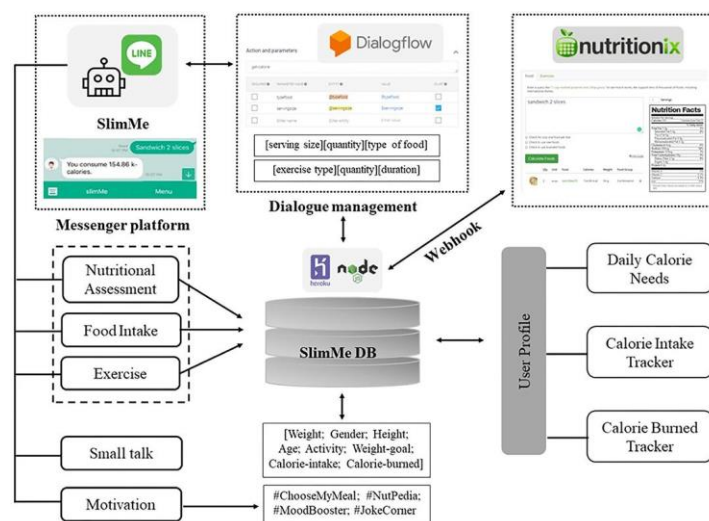
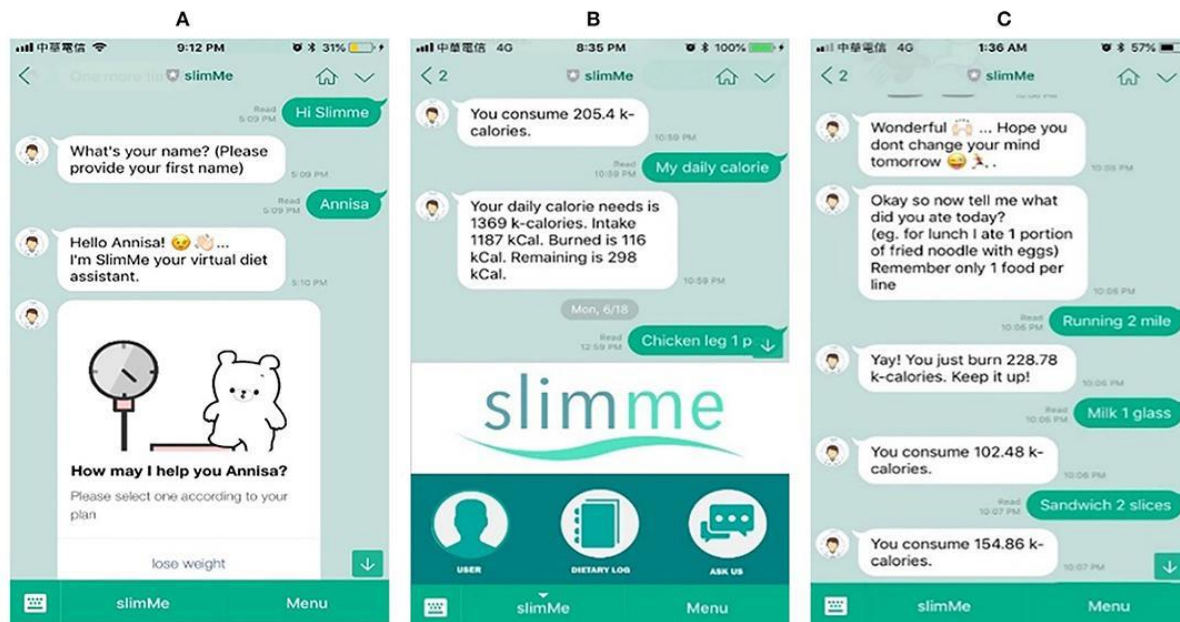


Figure 2.2 SlimMe's knowledge-driven model and framework.

Figure 2.2 shows how SlimMe's knowledge base was built on user expression responses. According to Rahmanti et al.(2022), the bot will extract any messages related to nutrition facts, food intake, and exercise info to store them in the SlimMe database. The bot is also designed to show empathy by addition of social interaction such as small talk, motivational features, humor, and media that can mimic human-like dialogues.

By using the Nutritionix Food and Exercise Database API, the developers increased the bot's understanding and were able to add more nutrition consultation services. Thus, it could assess calorie intake, count users' daily caloric needs, and track calories burned during and after exercise. Nutritionix has more than 800,000 unique food items and exercise data, making it the largest verified public food database (Rahmanti et al., 2022). The self-monitoring behavior, which logs user activity and permanent food tracking as well as self-weigh-ins, was adopted in the construction of the chatbot knowledge models. According to Painter et al. (2017), weight loss was known to be significantly predicted by self-monitoring practices. Users can simulate self-monitoring behavior characteristics like nutrition assessment, food consumption, and activity history with the help of SlimMe.



*Figure 2.3 Interface of SlimMe*

Figure 2.3 shows an example of SlimMe conversation with its user. First of all the user's age, gender, weight, height, and level of physical activity will all be elicited by the SlimMe bot. Based on the user's information profile and intended weight goal, the bot will then estimate the user's daily calorie requirements. Based on the self-reported input, the bot will also estimate the user's daily calorie intake. According to Rahmanti et al.(2020), testers reported they thought the chatbot is easy and fun to use. SlimMe chatbot is helpful due to it simplifies user caloric intake and caloric expenditure without the need for new apps. The use of emoticons, stickers and GIFs also bring characters to the bot and leave a good impression on the testers.

On the other hand, the chatbot also has some limitations. Most of the drawbacks of SlimMe stem from its calorie tracker and time limit features. While the bot does remind the user two times a day to report their calorie consumption, it is not possible to change it to three times a day which would make it more empathy toward users. Many users anticipated receiving weekly

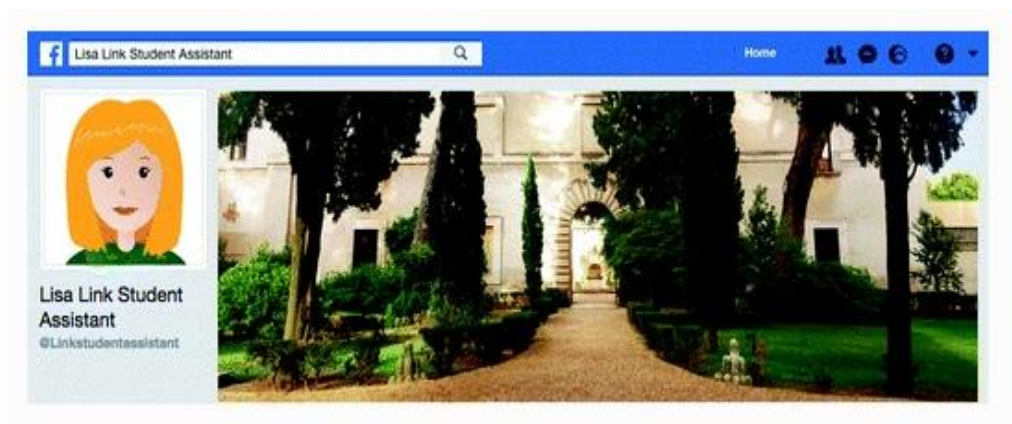


or monthly updates from the bot regarding calories and macronutrients information, however the bot is only capable of providing that information on a daily basis. Some users also find the time limited response during exercise simulation to be annoying. For example, when the user responded late the chatbot would fail to recognize the user input.

In summary, SlimMe has been specialized to people facing obesity but its impressive persuasive and empathic chatting system made it user friendly to anyone concerned with their caloric intake. Its enormous database collects nutrition facts to provide accurate data for its user, and its framework can be used to create a new virtual agent that supports a different type of dietary therapy. The framework design can prove beneficial to any future creation of specialized chatbot or expert system related to dietary.

## **LiSA - a Virtual Assistant to Help Students in Their University Life (Terence Lim Dao Liang TP073243)**

These days, a lot of universities use websites and mailboxes to welcome and assist students and visitors, or they use a physical help desk to answer frequently asked questions and provide information. Therefore, students would need to visit the institute in order to request and receive real-time and updated information, and staff members tasked with managing the volume of daily requests would need to be hired specifically for that purpose. The increasing cost of management have leads to a trend of examining academic literature to gain an understanding of the current state of affairs regarding chatbots in higher education, with a focus on works specifically pertaining to chatbots for universities. According to Dibitonto et al. (2018) research, a chatbot has the potential to modernize campus technology, which is frequently out of date. It could also have a positive impact on the entire academic environment, benefiting both staff and students.



*Figure 2.4 Facebook page of chatbot LiSA*

LiSA is a chatbot built to help students by providing information and services and responding to their inquiries around-the-clock. Figure 1 above show the homepage of LiSA

chatbot fully implemented into Facebook, student and visitor can visit the page to inquiry about any information like university's resources, admissions, and course offerings. Other than that, it can be used in a variety of contexts depending on the needs of students and particular times of the school year. The chatbot could also assist potential students with enrollment during the application process; the idea is to enable students to access information without having to search through multiple websites for answers to commonly asked queries.

The survey conducted in the campus shows that while 26,9% of students say they are not very satisfied and 3,8% say they are not satisfied at all, the majority of students—69,2%—state that they are very satisfied with the communication service (Dibitonto et al. (2018). One of the favor factors of LiSA is student seems to like to receive personalised information regarding the school, email sent by LiSA have been useful for student to be updated on academic news. The majority of students who gotten their answer, frequently expressed gratitude to LiSA, and used other polite expressions enhanced by smiling emoticons. Using the information provided by the students, it was found that having a chatbot provide information and notifications about lessons—particularly regarding schedule changes—would be helpful to students. Push delivery of this kind of information is necessary to provide students with prompt advice. Students also want to be informed about events and activities at the university. Additionally, this information may be personalized based on the interests and academic trajectory of the student and may be sent in push mode. The enrollment process and general information will also be included, but they may only be accessible upon request. Important messages and deadlines will also be sent by email and push notifications will be enabled.

## Chatbot Rebo (Angelina Leanore TP072929)

The Rebo Chatbot was created with the aim of helping apprentices reflect on their work to learn more deeply and critically, as well as to help them develop self-regulated learning abilities, or the ability to manage their own learning. The chatbot was primarily used to guide apprentices in reflecting on a single task and how they could approach a similar task in the future. Rebo was developed to address the issue of declining user engagement over time. As its purpose of development objective is to help employees with their work experience, this chatbot will ask apprentices about their previous week's activity, such as how it went and how these activities align with their educational goals. This encourages apprentices to establish a connection with their daily work and take charge of their own personal development.

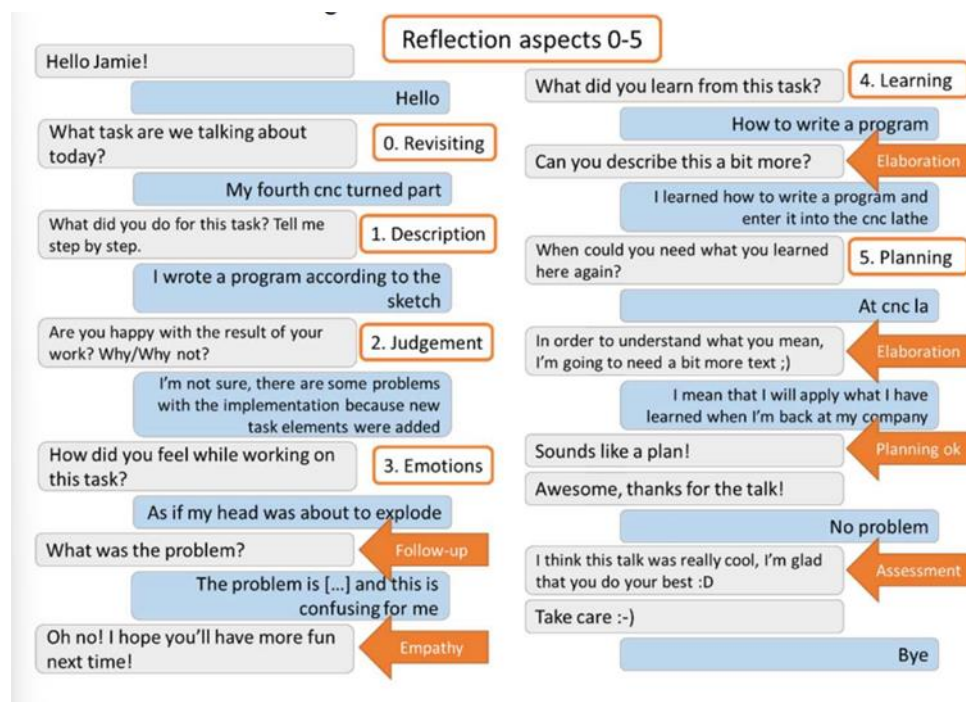


Figure 2.5: Example Usage of Rebo bot

Figure 2.5 illustrates an apprentice's interaction with the chatbot. The conversation structure is purposefully designed to lead learners through various reflection stages, such as

description, judgment, emotions, learning, and planning. The developers have identified at least one question that exists: “How can we make Rebo even better for you?”. Besides welcomes, goodbyes, and other types of reflection, it has now been updated to include some jokes to fulfill the requests from apprentices who asked for a joke at the end of the talk. After some tough conversations, they believe that the apprentices deserve something joyful. Rebo’s follow-up statement is also empathetic, praising, and offers feedback. Apprentices will evaluate the results by describing their emotions during the experience. Rebo then asks what they learned. Finally, Rebo appreciates the conversations by providing feedback based on the reflection analysis and ends with a goodbye. (Wolfbauer & Pammer-Schindler, 2023)

Figure 2 below shows another chat with Rebo that has been translated from German to English. Following 9 months of testing in the apprentices’ daily work life with the group Andritz AG apprentices and SSI SCHFER apprentices.



*Figure 2.6: An apprentice reflects with Rebo*

## **Chatbot CiSA (Angelina Leanore TP072929)**

CiSA, a chatbot for international students and academics, was developed to provide essential information regarding campus life to international students. This has made the infrastructure and public services better for users. In the past, there have been many issues between domestic and international students, some of which are because of the adaptation and language barrier, which results in discomfort while navigating and obtaining suitable information. Therefore, CiSA will play a crucial role in creating an effective information system for students to gather information easily. This service was built and launched at Kookim University to provide students with one-on-one access and to answer questions without regard to time limits, place, or language requirements. (Heo & Lee, 2019)

CiSA uses natural language to interact with users through a conversational interface and it is presented through speech, text, and images. Cisa is designed to answer questions about topics such as campus dining menu options, how to utilize the library, student timetables, and available activities. Visual clues are important for CiSA to achieve its goals because text-only answers can be time-consuming. It can engage in two types of dialogues: open domain, which is unlimited and integrated using NLP and closed domain, which provides users with options to select. This helps to keep the conversation on track. (Heo & Lee, 2019)

Take an example of the logical task flow that depicts the process of ordering food at campus dining. First, CiSA will greet or welcome the user. The user then chooses a meal from the list, and the bot will offer directions to the dining area that they request. Following that, if there are any dietary or other sorts of preferences to choose from, there is also a list of menus being provided. Following the choice of the meal, CiSA will provide the user with a navigation guide.

If there are no more questions to be asked, then CiSA will end the conversation by saying Goodbye.(Heo & Lee, 2019)

Using the platform from Google Dialogflow this chatbot was finally built. It was then integrated with Facebook Messenger to provide a more familiar and convenient way for users to interact with it. The conversation component is divided into three parts: intents, entities, and context. Intents are used to match user input into specific responses. Entities are used to keep data from the user input. Context is used to track the current conversation. Many international students believe that the chatbot was effective, successful, and satisfying and that its service was beneficial due to knowledge acquisition.(Heo & Lee, 2019)

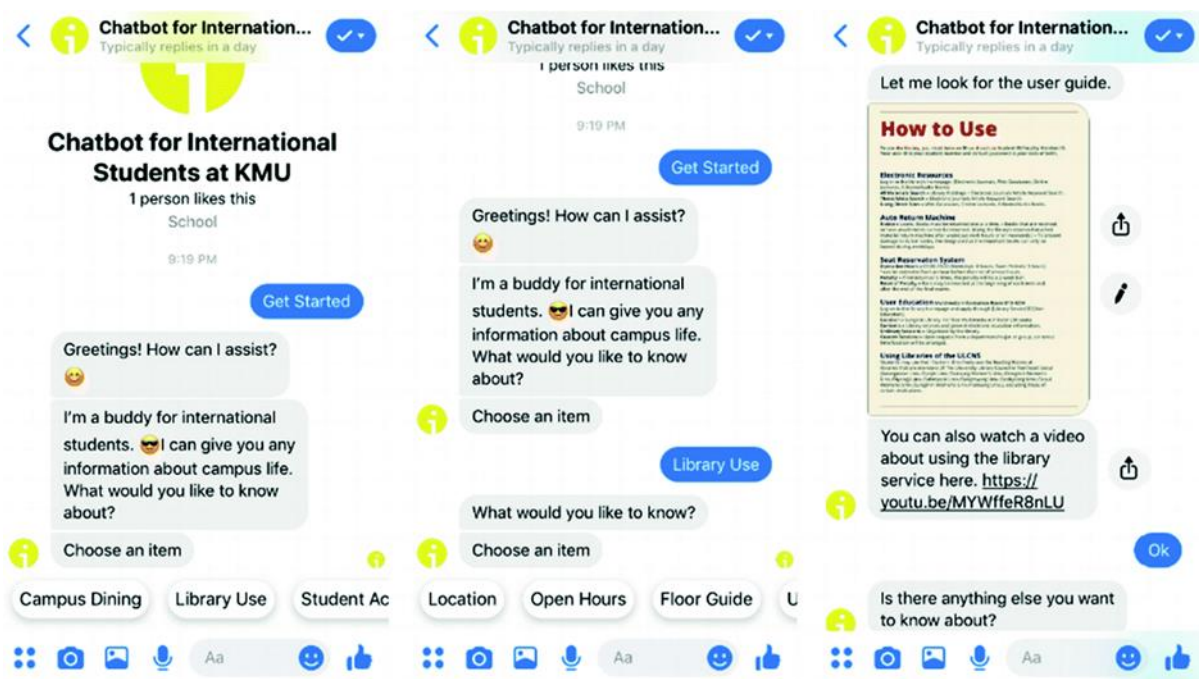


Figure 2.7: The example usage of CiSA running on Facebook Messenger

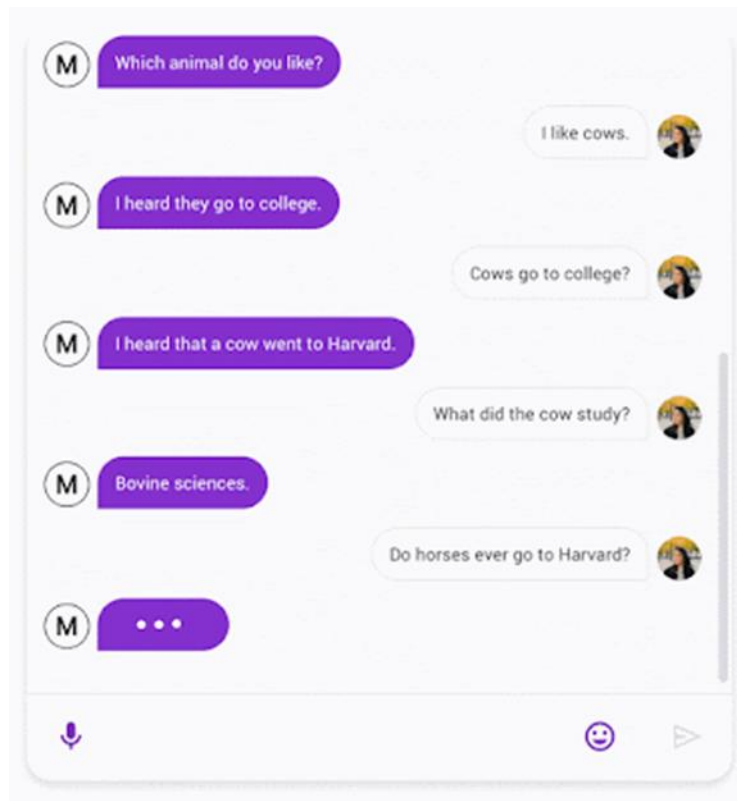
### Chatbot Meena – Google trained bot (Angelina Leanore TP072929)

Meena is a Google-developed trained neural conversational model. Google claims that Meena can carry a conversation to the next level, implying that it is more likely to converse with

another human than a chatbot. It has already been demonstrated that it is one of the most human-like chatbots ever constructed. She has been trained on a vast dataset of text and code and can produce text, translate language, compose various types of creative content, and provide useful answers to your inquiries. Meena will be a one-of-a-kind chatbot since it has been educated to be rational and detailed in its replies. According to Google Developer, this chatbot was trained with 40 billion parameters using 341 GB of text data, including social media discussions, and is based on Google's Seq2seq model. (Super, 2019)

Meena was built using Google's evolved transformer program, using around 40 billion words and nearly 2.6 billion parameters, and a dataset of 341GB. Its exceptional ability to predict the next word in a sequence is evaluated using the metric of perplexity. A remarkable correlation exists between perplexity and SSA (Sensibleness and Specificity Average), a human evaluation metric for chatbot quality. Meena's performance, surpassing 79%, stands remarkably close to the human benchmark of 86%, outperforming other AI chatbots in the market. A high level of correlation indicates that the chatbot has a deeper understanding of the conversation's semantic meaning, making it more probable to offer responses that are both precise and appropriate for the context. (Adiwardana et al., 2020)





*Figure 2.8: Example of a usage of Meena*

### **ChefBot - Specialized cooking chatbot (Eraliev Suimonkul TP068888)**

The objective of chat systems is to deliver precise and interesting answers. End-to-end neural networks or filling in the blanks are frequently used in current models. But having productive interactions also entails remembering and bringing up pertinent details from earlier in the conversation in addition to reacting to the most recent comment. For example, in a culinary situation, an artificial agent tries to achieve better answer generation by providing not just detailed directions but also usage explanations and suggested alternatives for ingredients. This improves the user's entire culinary experience by giving the conversation a more tailored and supportive touch.

Chefbot was designed using RASA X, a conversational AI creation tool. It uses annotated example conversations between a user (IG) and a bot (IF) in two modes: open domain and domain specific mode. The discussion used shapes for each recipe to ensure a clear order. It helps to categorize both domain specific and general queries. Chefbot is equipped with two shared databases to solve questions not covered by the demo. The first database suggests alternative ingredients for a given recipe, while the second provides information about kitchen tools, including their use, handling, alternative names and storage locations. Chefbot uses rules, checkpoints and custom actions to allow users to ask questions at every stage of cooking. After answering the question, Chefbot guides the user to the next logical step in the recipe. The result is a flexible and adaptive chat model that can effectively handle real cooking tasks. (Strathearn & Gkatzia, 2021)

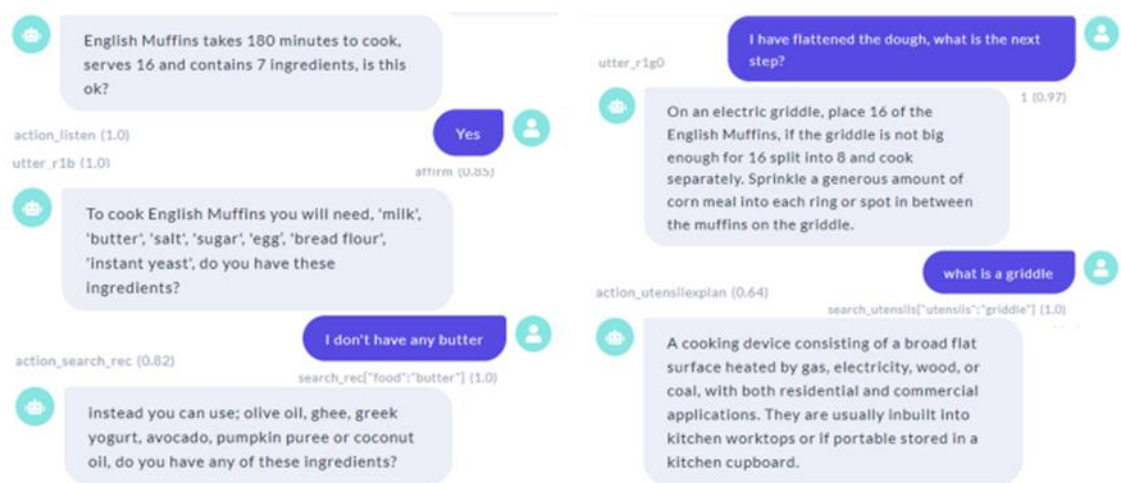


Figure 2.9. Example of how chatbot can assist with cooking.

Task-oriented discourse is centered on helping users accomplish certain objectives by comprehending intents, monitoring states, and producing replies predicated on subsequent

actions. Open-domain dialogue systems converse about a variety of topics inside a single dialogue, in contrast. This task sits in between these two goals: offering instructions to assist users in creating a recipe and facilitating open-domain discussions about relevant ideas, such ingredients, and the purpose of objects.

### **SuperAgent – E-commerce specialized chatbot (Eraliev Suimonkul TP068888)**

Conventional chatbots for customer care frequently rely on conversations created by humans, which presents issues with data volume and privacy. This article presents SuperAgent, a unique customer care chatbot that leverages large amounts of publicly accessible e-commerce data. SuperAgent uses user-generated material and in-page product descriptions from e-commerce websites, in contrast to its competitors. When it comes to answering routine inquiries, this method works well and is reasonably priced, freeing up human support employees to concentrate on more important inquiries. SuperAgent's value in improving users' online purchasing experiences is demonstrated by its demonstration as a browser plugin. (Cui, 2017)

**Microsoft Surface Pro 4 (128 GB, 4 GB RAM, Intel Core i5)**  
 by Microsoft  
 ★★★★★ 1,623 customer reviews | 820 answered questions

Price: **\$775.00** & FREE Shipping  
**In Stock**  
 Get it as soon as Wednesday, March 1 when you choose Two-Day Shipping at checkout.  
 Ships from and sold by PcBase USA.

Style: **Device Only**  
 Size: **Intel Core i5, 4GB RAM, 4GB**  
 Used & new (78) from \$629.99 & FREE shipping.

**Product Information**  
 Style: Device Only | Size: Intel Core i5, 4GB RAM, 4GB

**Technical Details**  
 • Summary

Screen Size	12.3 inches	▲
Screen Resolution	2736 x 1824	29 votes ▼
Max Screen Resolution	2736x1824 pixels	
Processor	3 GHz Intel Core i5	
RAM	4 GB SDRAM DDR	
Hard Drive	128 GB SSD	
Wireless Type	802.11abg	
Number of USB 3.0 Ports	1	18 votes ▼
Average Battery Life (in hours)	9 hours	

• Other Technical Details

**Customer Questions & Answers**  
 Have a question? Search for answers

**Question:** should i buy one with 8gb  
**Answer:** I think if you're a regular 128gb card in for \$60. I g getting a newer model ne  
 By Devon on November 1  
 See more answers (9)

**Question:** So if I want more storage  
**Answer:** Yes. I am using SP4 with point, for now, unless you this feature in the future,  
 By WX on October 30, 20

**Customer Reviews**  
 ★★★★★ 1,623

**Top Customer Reviews**  
 ★★★★★ I love it, but you might not.  
 By Joshua Oh on October 28, 2015  
 Style Name: Device Only | Size: Intel Core i5, 8GB RAM, 256GB  
 It seems like the big question right now is, "Do I get the Surface Pro 4 or the Surface Book?"  
 I'll explain why I chose the Surface Pro 4, but first, a quick about having a light backpack is important to me.

The S Book is almost two times heavier than the SP4. It packs extra power that the S Book has. I don't plan to play any intense games, but the SP4's keyboard feels great to type on. The S Book's keyboard, but the SP4's keyboard feels great to type on. Other PDF's feels much more natural with the SP4's table.

**Super Agent**  
 2/27/2017 3:52:26 PM

Hello, I'm super agent. The current product is Microsoft-Surface-Pro-Intel-Core. Feel free to ask your question and I'll look for the best answer for you.

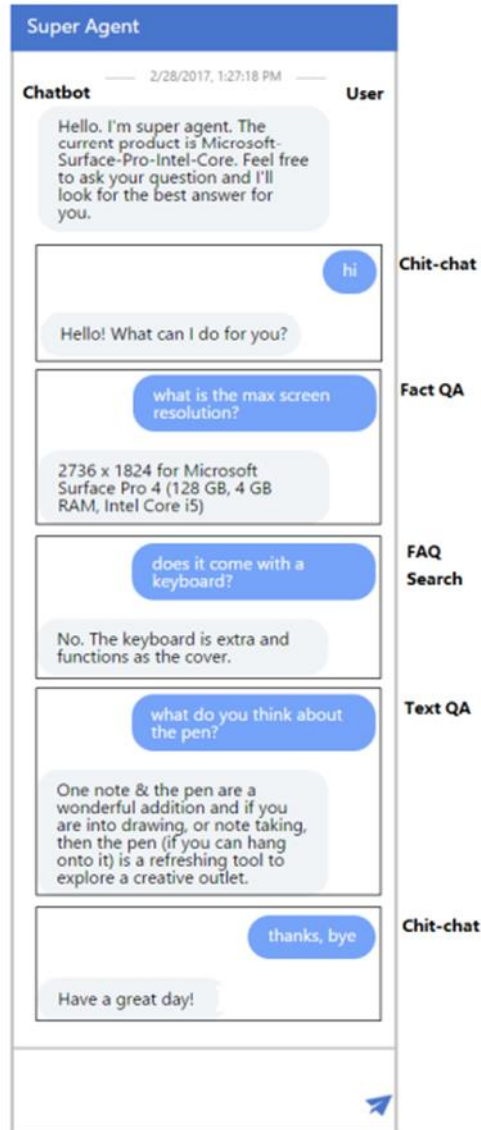
what is the max screen resolution?

The screen resolution is 2736 x 1824 for Microsoft Surface Pro 4 (128 GB, 4 GB RAM, Intel Core i5)

Does it have a hdmi port?

It has a mini display port, but through the use of an adapter this will allow an HDMI connection.

Figure 2.10: An example of a product page from Amazon.com, including product information, customer Q&A, and reviews. SuperAgent is an add-on extension located at the bottom right corner.



*Figure 2.11: A case study of SuperAgent*

SuperAgent, a customer service chatbot designed for e-commerce websites, utilizes large-scale, publicly available, and crowd-sourced customer data. Employing state-of-the-art NLP and machine learning techniques, including fact QA, FAQ search, opinion-oriented text QA, and chit-chat conversation modeling, SuperAgent enhances the end-to-end user experience for online shopping. Its usability analysis demonstrates improved information acquisition, particularly on product pages with extensive user-generated content. Future developments will concentrate on

integrating a customer query intent detection module to optimize individual engines.

Additionally, a deeper exploration of multi-turn queries is planned, with a focus on refining context modeling.

### **PaLM – Language specialized chatbot (Eraliev Suimonkul TP068888)**

Google Research unveiled the concept for Pathways in 2022; it was a novel paradigm that could function extremely well in a variety of jobs and domains. Stated otherwise, a model that is more "general." A significant step in achieving this goal was the creation of the new Pathways System, a distributed computing optimization tool.

Google presents PaLM: Pathways Language Model, a transformer-based model with 540 billion parameters that was trained using the Pathways System, enabling a level of parallelization and efficiency never before possible, in the paper titled "PaLM: Scaling Language Modeling with Pathways." (Pomaro, 2022)

On multiple BIG-bench activities, PaLM shows remarkable natural language creation and understanding capabilities. On reasoning problems requiring multi-step arithmetic or common sense reasoning, PaLM also demonstrates breakthrough skills.

Standard Prompting	Chain of thought prompting
<p><b>Example Input</b></p> <p>Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?</p> <p><b>Example Output</b></p> <p>A: The answer is 11.</p> <p><b>Prompt</b></p> <p>The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?</p> <p><b>Model Response</b> ❌</p> <p>The answer is 50.</p>	<p><b>Example Input</b></p> <p>Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?</p> <p><b>Example Output</b></p> <p>Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. <math>5 + 6 = 11</math>. The answer is 11.</p> <p><b>Prompt</b></p> <p>The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?</p> <p><b>Model Response</b> ✅</p> <p>The cafeteria had 23 apples originally. They used 20 to make lunch. So they had <math>23 - 20 = 3</math>. They bought 6 more apples, so they have <math>3 + 6 = 9</math>. The answer is 9.</p>

Figure 2.12. Explaining the result of the prompt.

Surprisingly, PaLM can even produce clear explanations for situations requiring a sophisticated blend of domain expertise, multi-step logical reasoning, and profound linguistic comprehension. For instance, it can offer superior justifications for brand-new jokes that aren't available online.

## Explaining a joke

### Prompt

Explain this joke:

Joke: Did you see that Google just hired an eloquent whale for their TPU team? It showed them how to communicate between two different pods!

### Model Response

Prediction: TPUs are a type of computer chip that Google uses for deep learning. A "pod" is a group of TPUs. A "pod" is also a group of whales. The joke is that the whale is able to communicate between two groups of whales, but the speaker is pretending that the whale is able to communicate between two groups of TPUs.

Figure 2.13: Joke explanation

Numerous instances exist where AI models generate code based on natural language briefs. With only 5% of the code in the pre-training dataset, PaLM does well in this challenge.

### Prompt

```
// Translate from C to Python
int add_one ( int x ){
  int m = 1;
  while ( x & m ) {
    x = x ^ m;
    m <<= 1;
  }
  x = x ^ m;
  return x; }
```

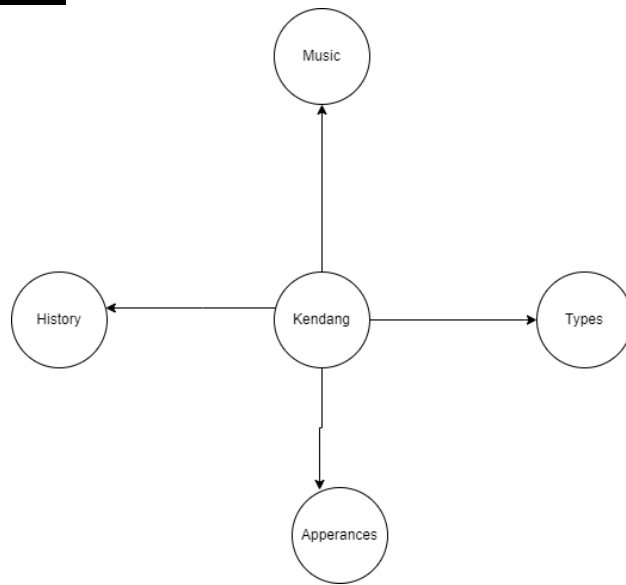
### Model Response

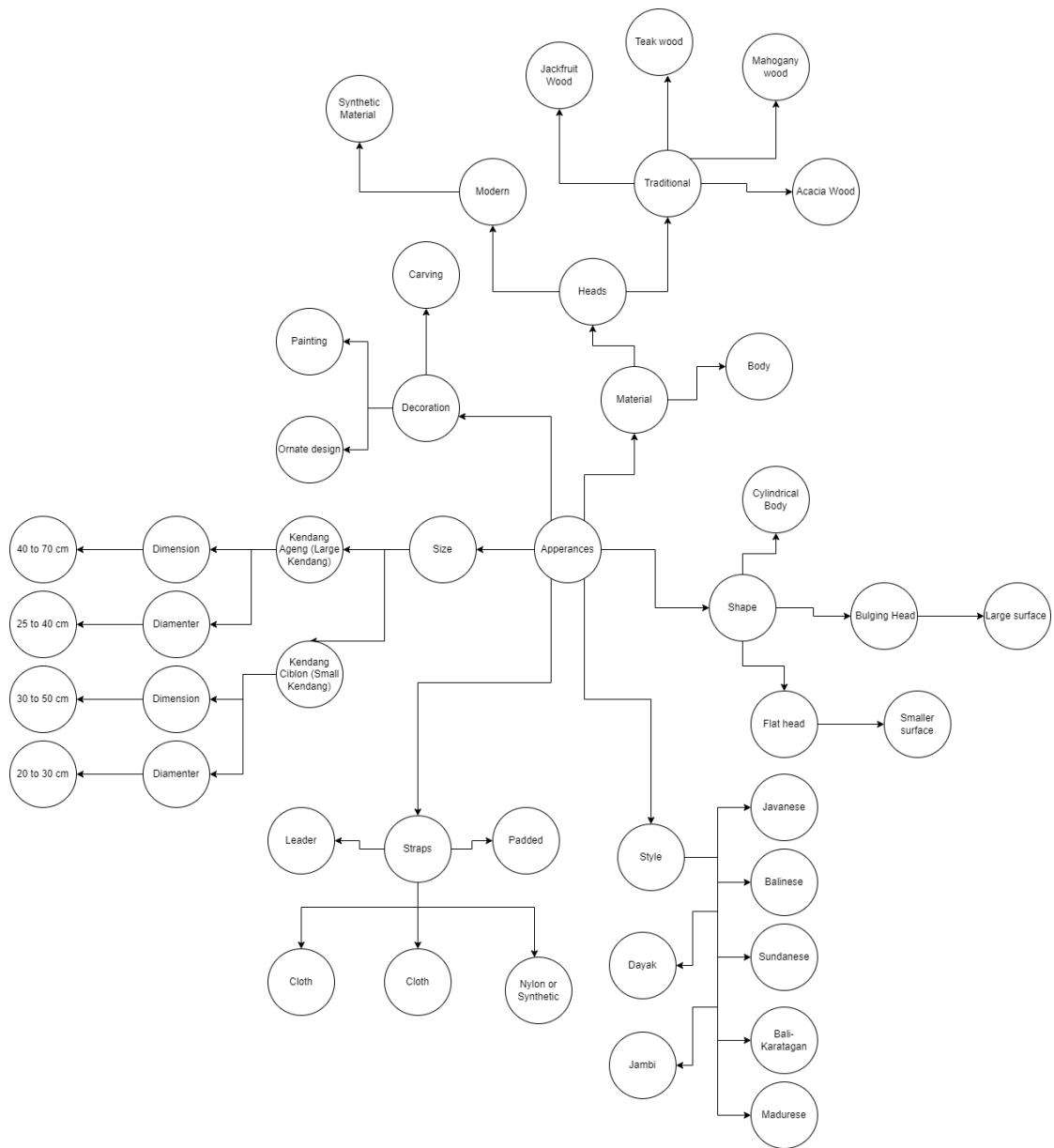
```
def add_one(x: int):
    m = 1
    while (x & m):
        x = (x ^ m)
        m <<= 1
    x = (x ^ m)
    return x
```

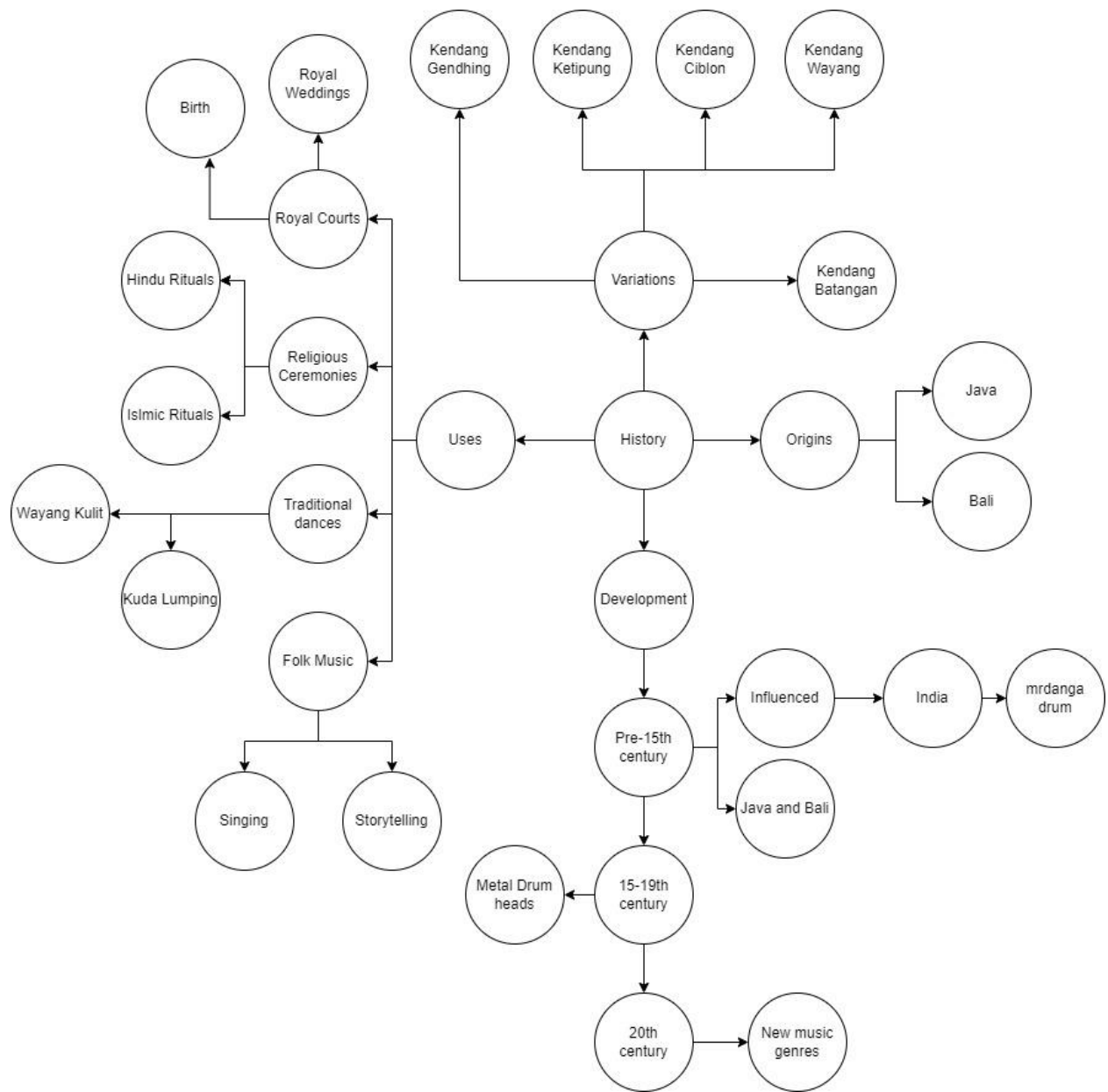
Figure 2.14: Generating Code

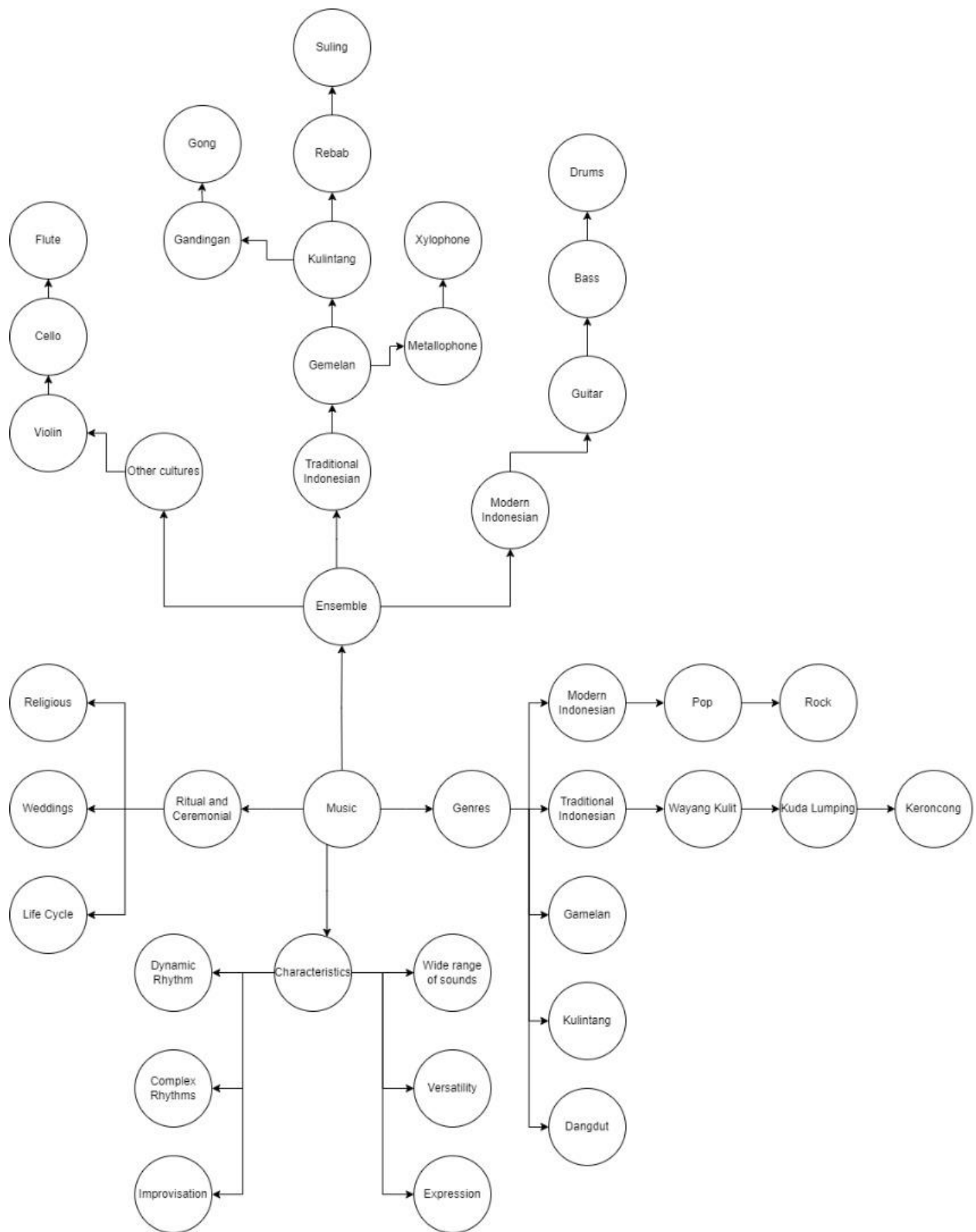


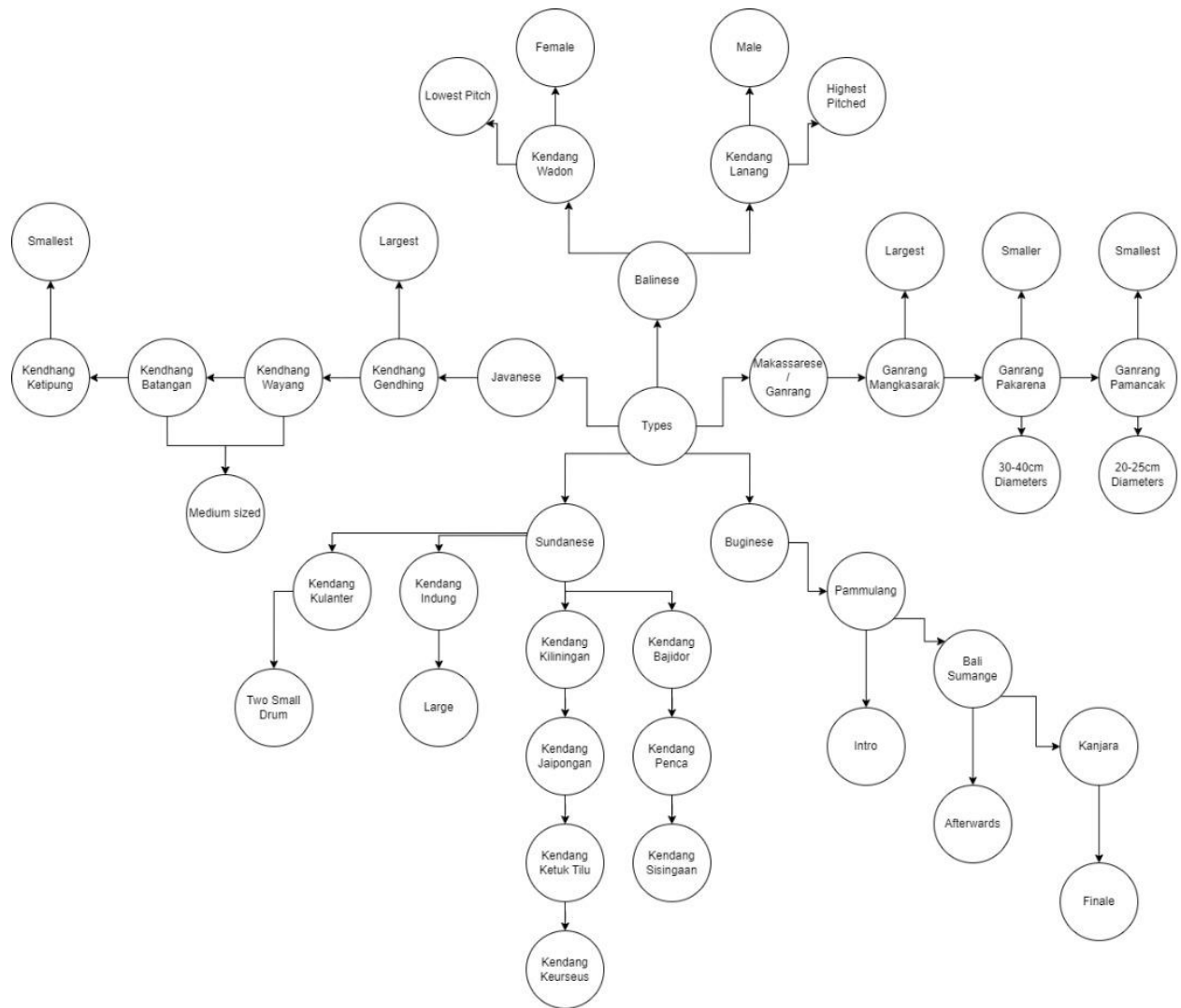
### **3. Sematic Network**







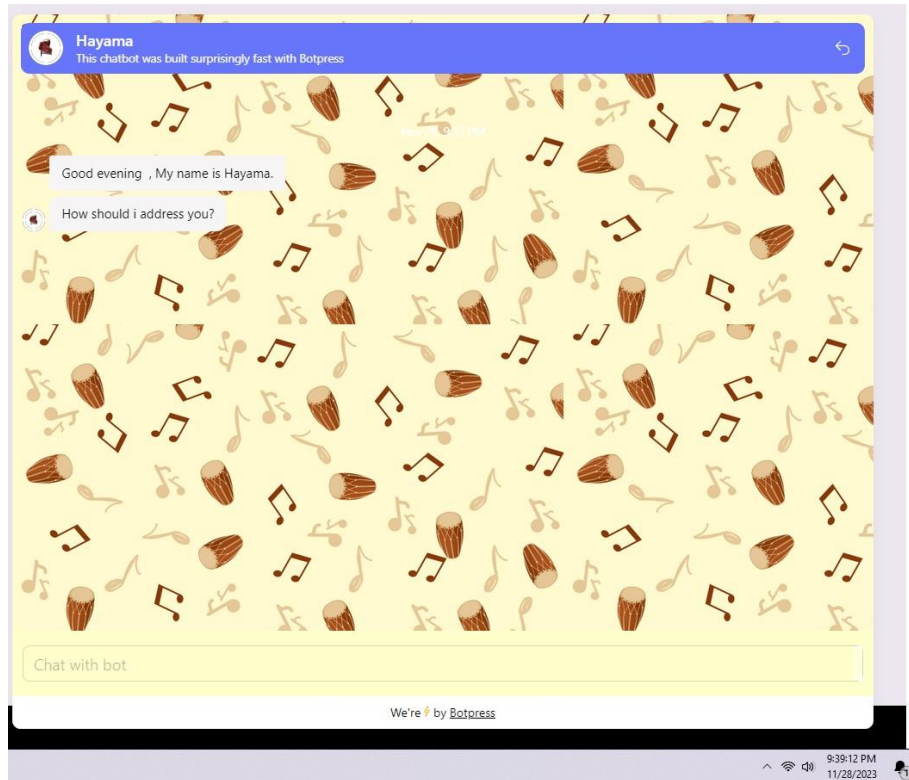




## **4. Implementation**

### **4.1 Screenshot of special feature**

#### **Timely Greeting**



*Figure 4.1.1 Greeting according to time.*

First of all, the Chatbot will introduce itself. The chatbot have the function to greet user according to the time, if the user try to use the chatbot during the day the bot will greet the user with Good afternoon. After the bot gets the user name, it will save it in the system.

#### **Quiz minigame**

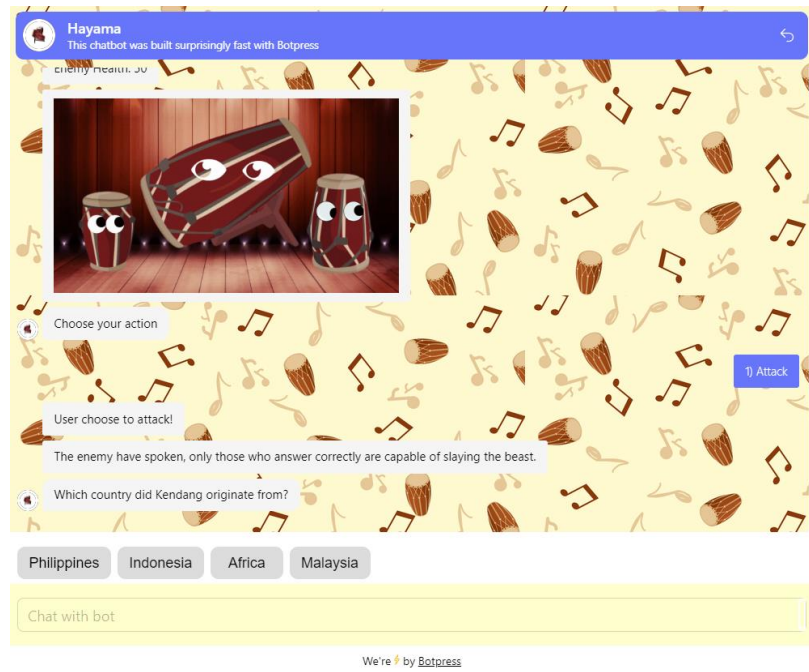
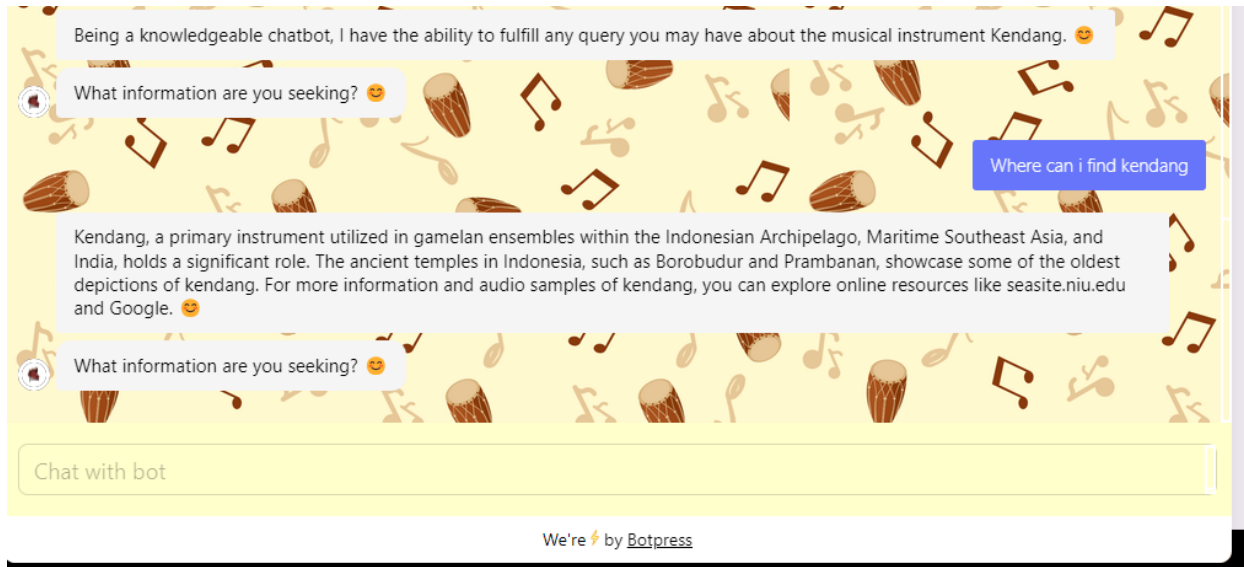


Figure 4.1.2. Quiz Minigame

After the user have agree to participate in the minigame, the system will explain the rules to them. To summarize, user and his opponent both have their individual health bar, if any side health have been reduced to 0, the game will end. User have three choice of action they can take which is attack, recover and surrender. All quizzes tested to the user will be randomized and enemy AI will also take randomized action which can heal themselves or harm user.

## Intelligent knowledge system



*Figure 4.1.3. Chatbot answering user question.*

The chatbot is designed to be semi-intelligent. Instead of provide the user with long and confusing explanation, it will summarize the information into short and easily understandable sentences.



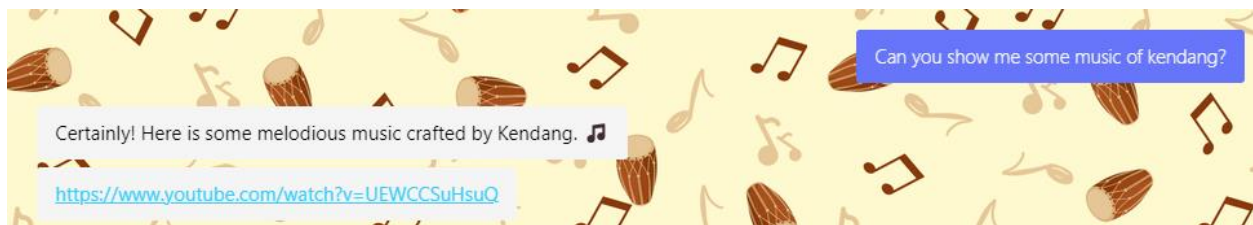
*Figure 4.1.4. user ask unrelated question.*

If user ask anything other than Kendang, the chatbot will first look for any answer in its knowledge base. The chatbot only setup with a Kendang knowledge base, so it would not be able to answer any question unrelated to Kendang.





*Figure 4.1.5 Pictures providing when asked.*



*Figure 4.1.6. Music links providing when asked.*

Another unique features implemented into the system is, the chatbot will provide necessary pictures or link when user ask it to. Natural language processing is used to archived this, so that the chatbot will be able to understand human language structured. Figure 4.1.5 and 4.1.6 shows the chatbot showing pictures of kendang and Youtube link of Kendang.



*Figure 4.1.7 Chatbot understood user intent of concluding conversation*

If the user wanted to end the conversation, they just need to say goodbye or word with similar intent. The Chatbot is capable of understanding them.

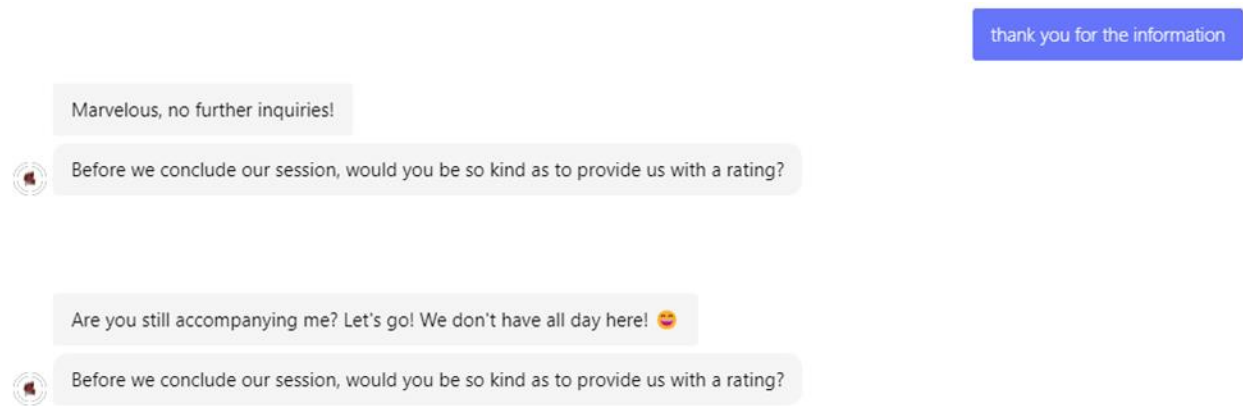
### **Rating and review**



*Figure 4.1.7. rating and reviews system*

Before ending the conversation, the system will ask the user to provide ratings and review which will be save into the records to provide analyses to improve the system

## Timeout message



*Figure 4.1.8 Kind reminder if user is still in chat but not interacting.*

If the user stayed unresponsive for over a period of time the system will send out some message to remind user.

## 3D model presented in together with chatbot




*Figure 4.1.10 3D model of kendang*


Additionally, we also implemented a 3D model viewer in the website for easier visualisation of the instrument. User can interact and change point of view to see every corner of the instrument.

## 4.2 User Acceptance testing in questionnaire

# Hayama Chatbot

Hayama chatbot is a computer program that simulates conversations with human end users. This chatbot is designed to provide knowledge or information about Kendang drums originating from Indonesia. Apart from that, this chatbot has several interesting features, one of which is a mini game.

terencelim14@yahoo.com [Switch account](#) 

 Not shared

Did the chatbot Hayama use expressive language and speak humanlike?

	1	2	3	4	5	
Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree

Did you learn how to play the Kendang drum after speaking with Hayama?

	1	2	3	4	5	
Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree

Is the quiz minigame implemented in the chatbot challenging?

	1	2	3	4	5	
Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree

Figure 4.2.1 Questions in questionnaire

The image shows a digital questionnaire form with a light blue background. It contains two white rectangular boxes, each with a question and a five-point Likert scale. The first question asks about the relevance of chatbot-provided media. The second question asks about personalization by the chatbot 'Hayama'. At the bottom, there is a blue 'Submit' button and a blue 'Clear form' link.

Is the picture and video provided by the chatbot relevant to the question context?

1 2 3 4 5

Disagree ☐ ☐ ☐ ☐ ☐ Agree

Did the chatbot Hayama address you by name or adapt its responses to your specific needs?

1 2 3 4 5

Disagree ☐ ☐ ☐ ☐ ☐ Agree

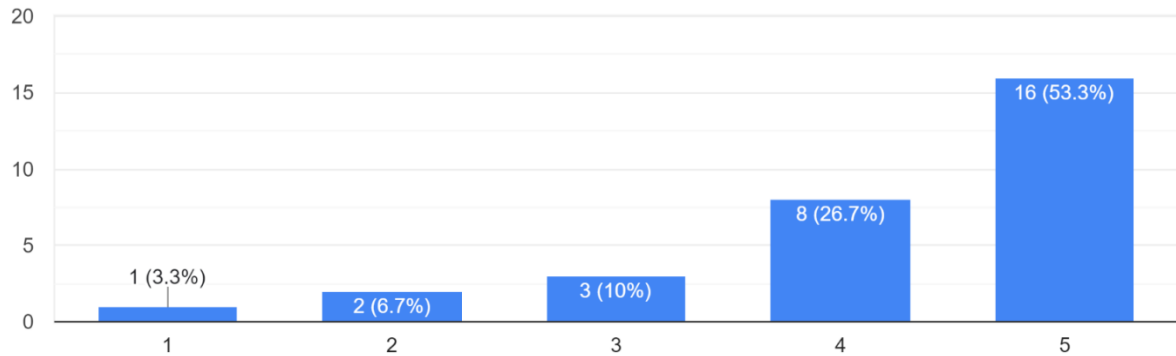
[Submit](#) [Clear form](#)

*Figure 4.2.2 Questions in questionnaire*

### 4.3 Results of user acceptance testing in graphs format

Did the chatbot Hayama use expressive language and speak humanlike?

30 responses

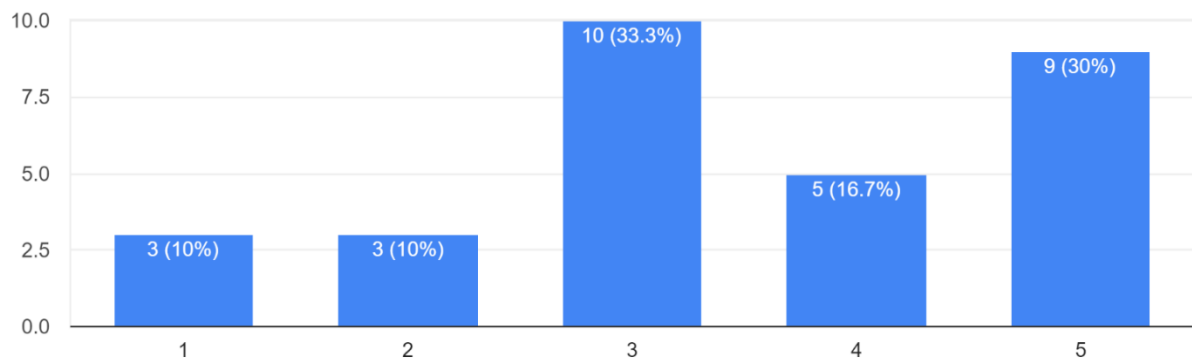


*Figure 4.3.1: results of question 1*

The bar chart illustrates that 16 individual agree that the chatbot Hayam using expressive language and speak humanlike, whereas 8 respondents did not share this view. 3 of people believed that Hayama spoke in a humanlike but did not use expressive language. Only 2 and 1 individual, disagreed that Hayama spoke in a humanlike, possibly due to the absence of Jokes in the conversation. Introducing jokes into the conversation could enhance the perception that users are interacting with a human rather than a bot.

Did you learn how to play the Kendang drum after speaking with Hayama?

30 responses

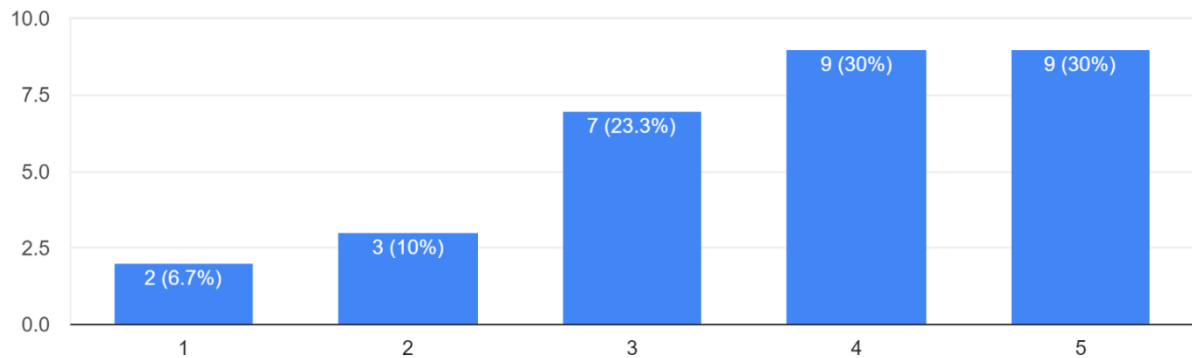


*Figure 4.3.2: results of question 2*

The chart indicates that 10 people gave a neutral opinion regarding their learning experience on playing Kendang through the chatbot. One of the reasons that can support this is the possibility that the chatbot provided tutorial of Kendang are difficult to understand. 5 people agreed that they had learnt how to play Kendang, in contrast, only 3 people disagreed. It could be because they already have the knowledge to play Kendang, while this tutorial is more aimed at beginners.

Is the quiz minigame implemented in the chatbot challenging?

30 responses



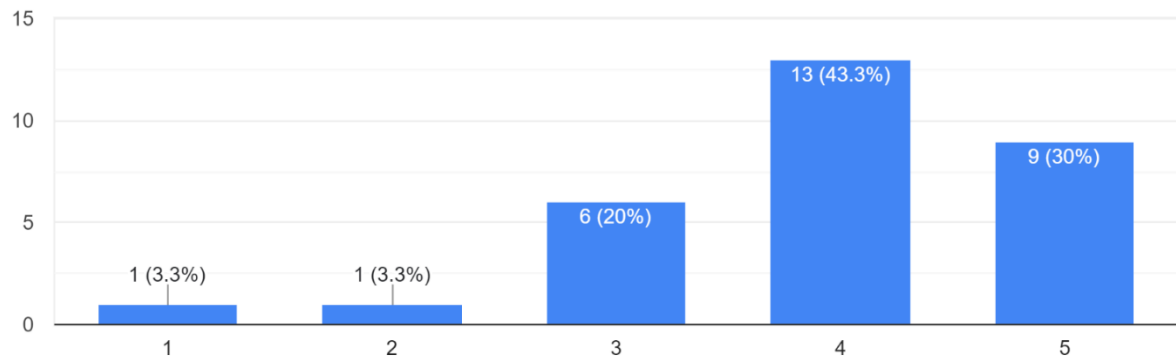
*Figure 4.3.3: results of question 3*

According to the chart, 9 people thought the chatbot's quiz minigame was challenging, while 7 found it to be neutral, and 3 thought it was simple. The difference could result from the minigame's inherent complexity, even if some experienced Kendang players claim it's easy. The varied answers imply that users' evaluations of the quiz minigame's complexity vary due to personal abilities or expectations. Additional investigation is necessary to understand the elements causing these different points of view.



Is the picture and video provided by the chatbot relevant to the question context?

30 responses

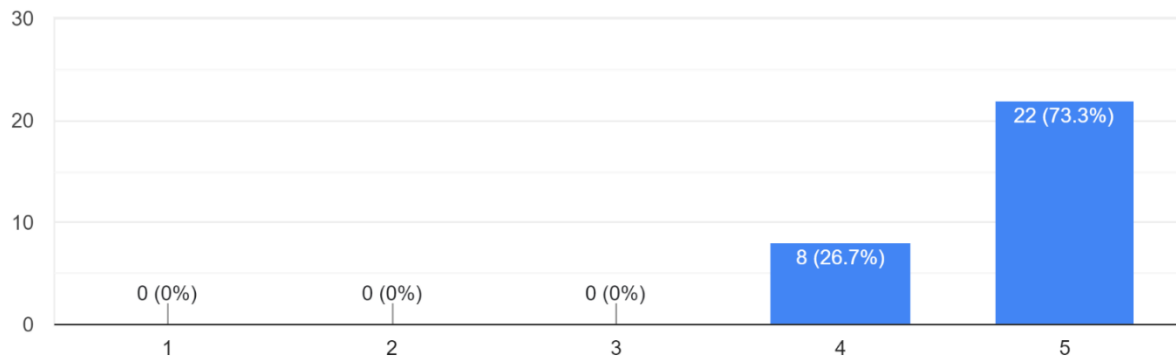


*Figure 4.3.4: results of question 4*

The bar graph displays how relevant the chatbot's images and videos are to the context of the inquiry. A single responder gave a score of 1 for significant disagreement, describing situations in which the visual information appeared to be completely unrelated. One additional person selected a score of 2, expressing dissatisfaction. Six respondents chose number three, indicating an average understanding of relevance. Nine respondents received the highest rating of 5, highlighting consistently acceptable media in regard to the asked issues, while thirteen respondents offered a rating of four for usually relevant visual content. This range highlights the different user experiences and expectations with regard to the suitability of the offered illustrations in the situations they are used.

Did the chatbot Hayama address you by name or adapt its responses to your specific needs?

30 responses



*Figure 4.3.5: results of question 5*

The rating indicates preferences in users' opinion about how personalised the chatbot Hayama is, as can be seen from the bar chart above. Notably, 8 people chose to agree with a rating of 4, which suggests that they are satisfied but that there is still space for development. However, the vast majority of 22 respondents gave the highest grade of 5 for strongly agreeing that replies should constantly be tailored to the demands of the individual and should always address them by name, creating a personalised and interesting exchange.

## **5. Coding Implementation**

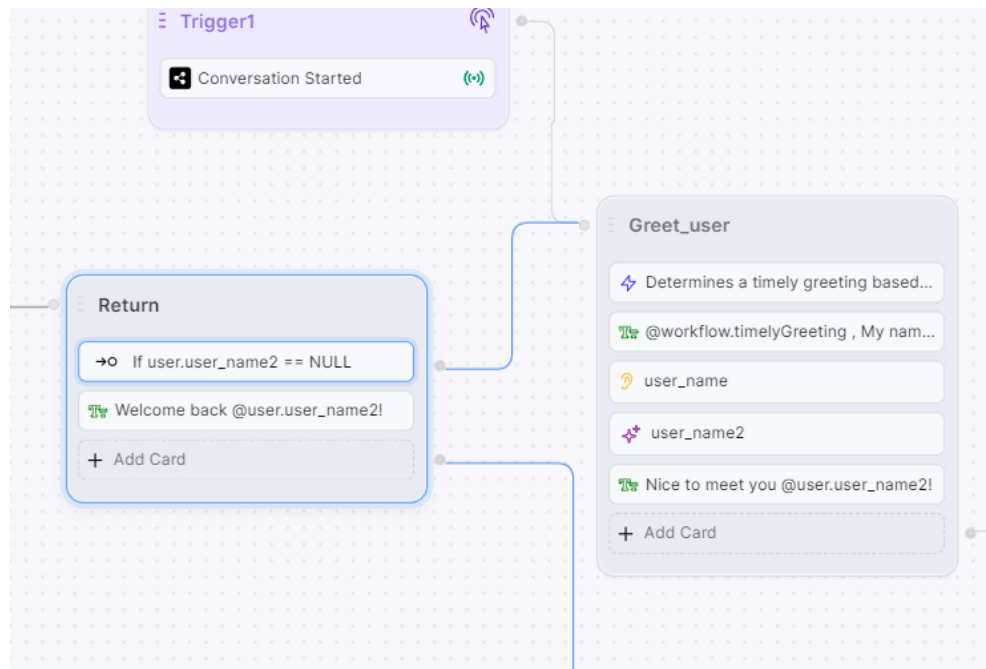
### **5.1 Timely Greeting**

```
01 const date = new Date();
02 const currentHour = date.getHours();
03 var hournow = currentHour + 8
04
05 let timelyGreeting = ''
06 if (hournow >= 0 && hournow < 12) {
07   timelyGreeting = 'Good morning'
08 } else if (hournow >= 12 && hournow < 18) {
09   timelyGreeting = 'Good afternoon'
10 } else {
11   timelyGreeting = 'Good evening'
12 }
13
14 workflow.timelyGreeting = timelyGreeting
15
```

*Figure 5.1: Greet user with the system time*

When the User first open the webpage, the chatbot will get the current time from the system and assign it to a variable named “currentHour”. Using the variable the system compare the value to greet user with different greeting according to the time. If the current time is after 00:00 and before 12:00, the system will greet the user good morning. If the current time is after or equal to 12:00 and before 18:00, the system will greet the user good afternoon. Lastly if the current time is anything else, it could only be evening so the system will greet the user with good evening.

## 5.2 Returning user



*Figure 5.2: Recognize returning user*

After user have use the chatbot for the first time, the bot will record his/her username in the system. When user return to the chatbot, the system will check if the username variable is empty or not, if yes it will greet the user normally and get a new username, if the username have already been recorded the system will welcome user back to the chatbot while still remembering his/her name.

## 5.3 Quiz minigame

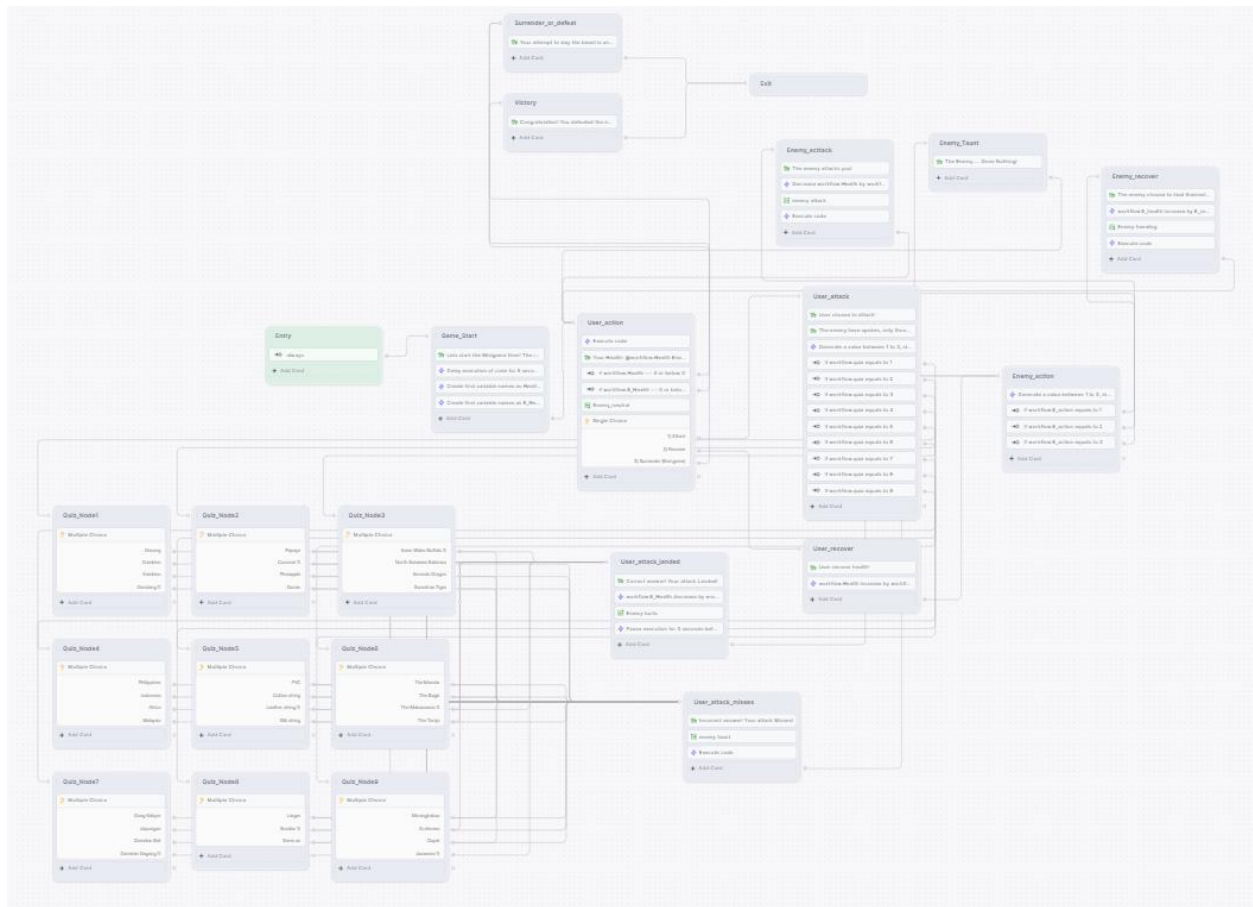
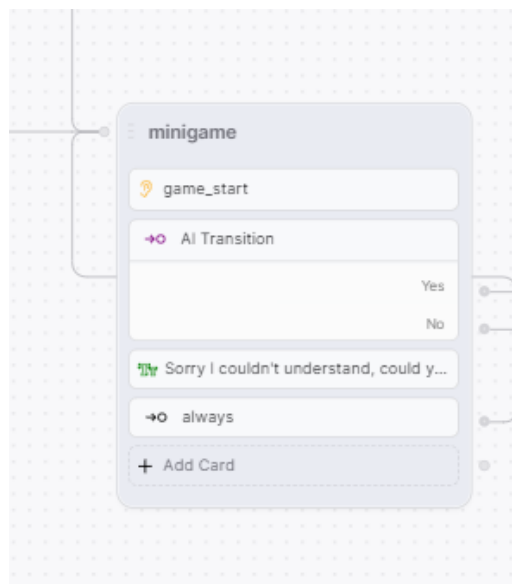
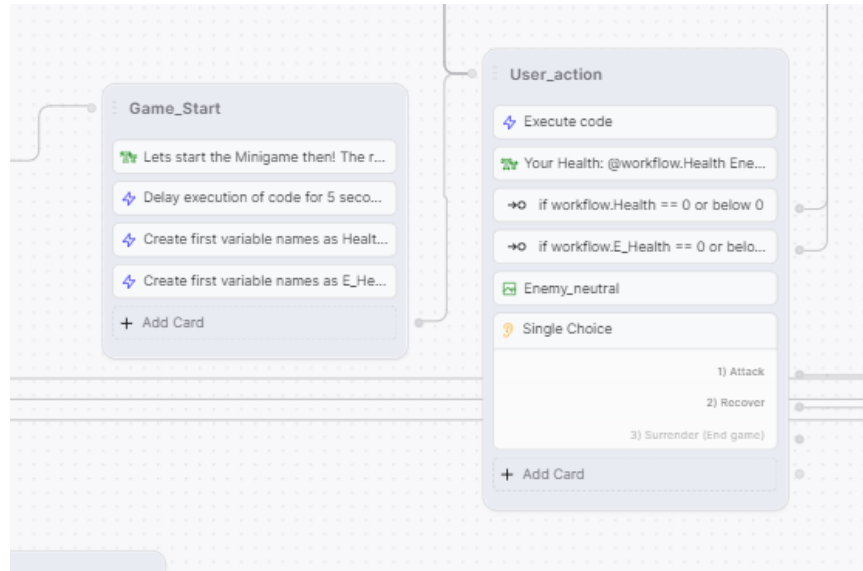


Figure 5.3: Quiz workflow



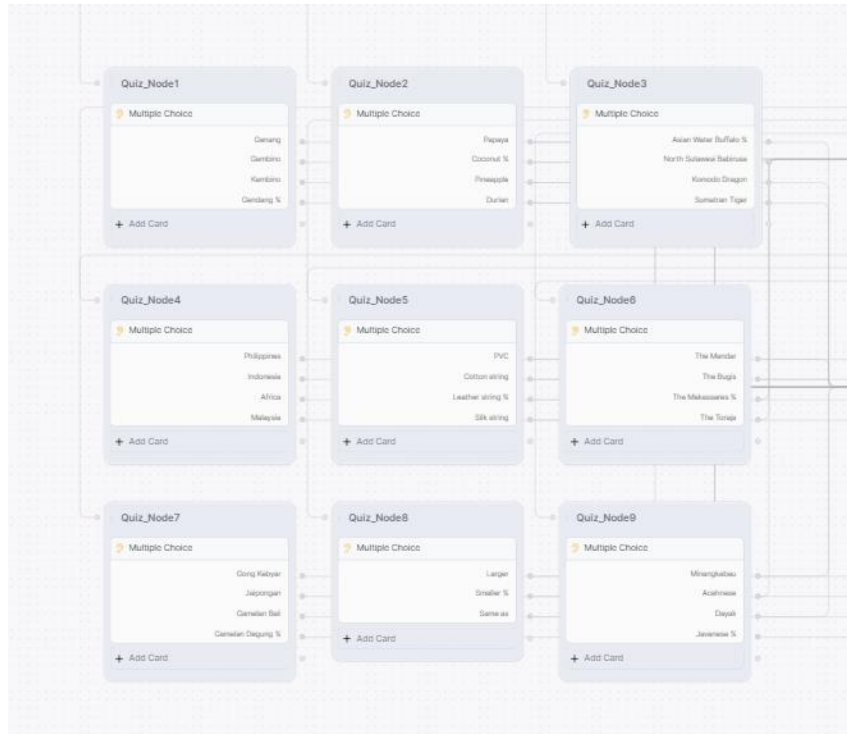
*Figure 5.4: confirming the game*

Before going into the main knowledge chatbot, the bot will ask if the user would like to play a minigame, the user could type in yes and the game will start and no for vice versa.



*Figure 5.5: Explanation of rules and declaration of variable*

Going into the game, the chatbot will firstly explain the rules of the game to the user. Then it will declare variable to store value such as user health point and opponent health point. The bot will confirm if any of the health point is reduced to 0, the game will end immediately. User is provided with three actions, attack, recover and surrender.



*Figure 5.6: Quiz question*

If user choose to attack to reduce opponent health point, he/she have to answer a randomly chosen question from a total of 9 question. Each of the question nodes will have only one correct choice, and only if the user chosen correctly the system will reduce the opponent health point.



*Figure 5.7 Enemy action*

Not only is the quiz question randomly chosen, the opponent will also have a randomly generated action similar to the user where they can reduce user health point, and recover their own health. If the user decided to end the game they can choose to surrender.

## 5.4 Intelligent Knowledge bot

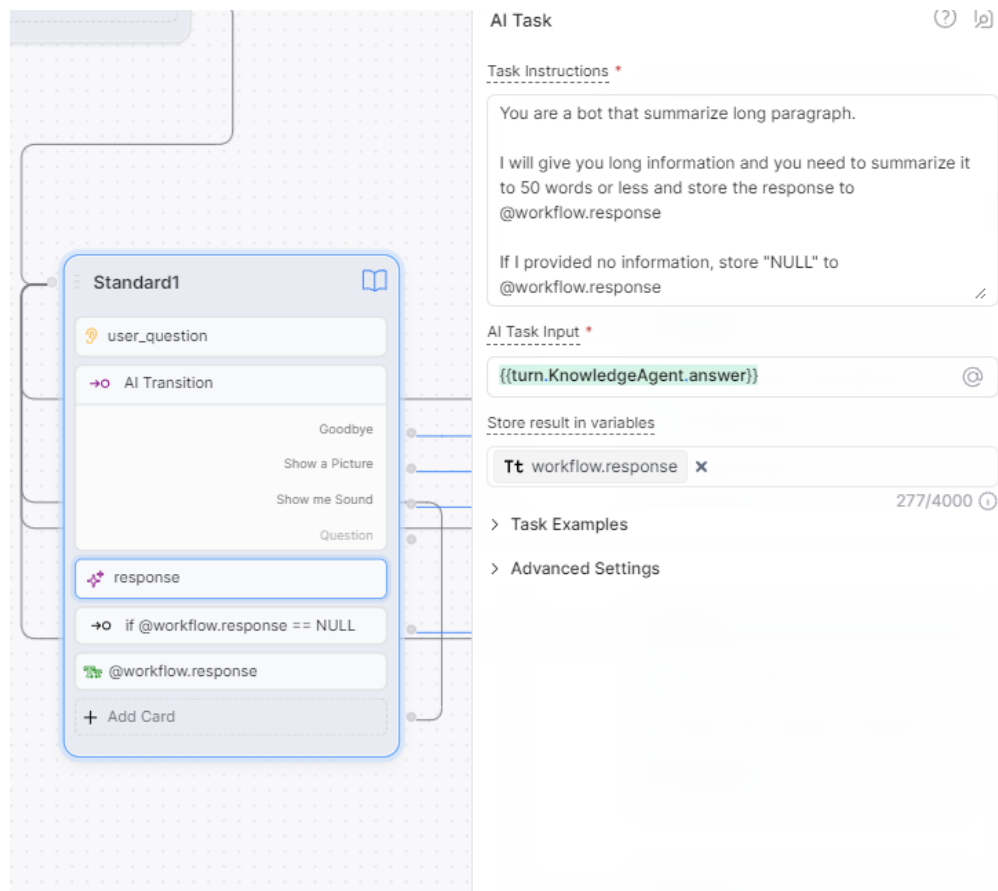


Figure 5.8: Coding behind the semi-intelligent knowledge bot.

Leading to the main knowledge chatbot, the chatbot will first remind the user it can only answer any question in relation to Kendang, if the user attempt to ask something outside of its expertise, it will not able to answer him/her. The AI transition is used in the system to detect keyword in user input, for example if the user asked for a picture, the bot will recognize it and provide some picture to the user. When user seeks information of Kendang, the bot will search its knowledge base for an answer, which then will be pass to the Ai to summarize so that the answer become



presentable and easy to digest. The ways to conclude the conversation is an easy one, user just need to type it goodbye or similar term such as “I’m going” or “See you”, and the bot will be able to recognize the intention of user and conclude the conversation.

## 5.5 Rating functionality

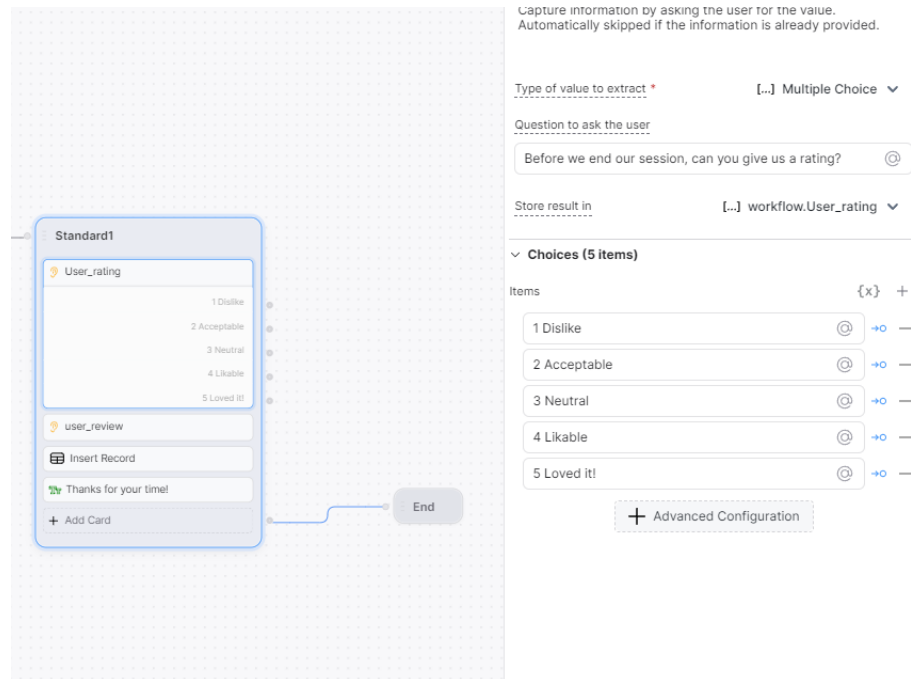


Figure 5.9: Rating system to let user rate their experience

After concluding the conversation, the user can provide rating to the chatbot, they have the choice to rate from 1 to 5. The user can also type a short review for the chatbot and express their opinion on it. The rating and the review will be recorded in the database so it can be analyzed to improve the system.

## 5.6 Timeout

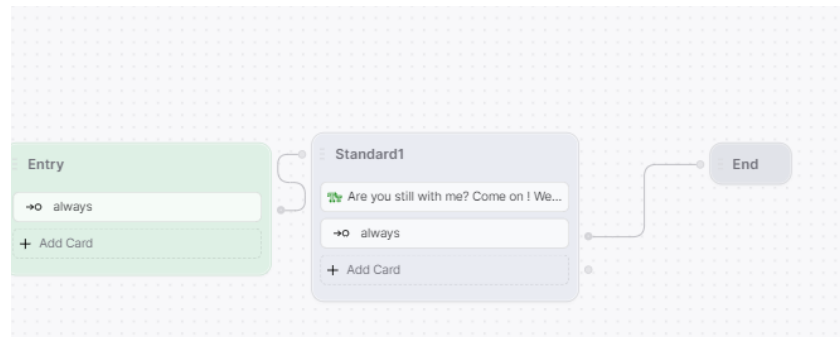


Figure 5.10: Timeout system if the user leave the system idling

The system will try to get user attention if there is no reaction from the user in about 10 minutes. After 30 minutes without any response from the user, the system will close the connection to avoid too many unused server.

## **6. Conclusion**

Creating a chatbot with Botpress as the framework of choice has been a fulfilling and educational experience. Through this project, we were able to learn more about the complexities of conversational AI and gain insightful knowledge about the difficulties and possibilities of using chatbots in real-world settings.

Throughout this project, we have discovered a number of important lessons. First of all, it is impossible to exaggerate the significance of a strong and intuitive framework. Botpress turned out to be a great option because it provided a strong yet adaptable platform that made the development process easier. Because of its comprehensive documentation and modular architecture, we were able to integrate external services, create conversational flows more quickly, and modify the chatbot to meet changing needs.

In addition, we developed a thorough grasp of the importance of natural language processing (NLP) and how it is essential to a chatbot's efficacy. By incorporating cutting-edge natural language processing (NLP) models, our Botpress chatbot became more adept at comprehending and reacting to user input, which improved the user experience in general.

With that said, there is also improvement to be had for further endeavour of making a chatbot. First of all, more languages could be included in the chatbot, in our chatbot there is only one language of choice which is English, if other language is provided It could lead to a better learning experience for user that could not understand English. Furthermore, the absence of an instructional component in the chatbot's functionality. While the primary purpose was to provide knowledge to the user, the chatbot could be more effective by guiding users on how to utilize the musical instrument Kendang. Incorporating a tutorial or guidance system within the chatbot interface could significantly improve user engagement and satisfaction.

In conclusion, learning how to create a chatbot with Botpress has advanced our comprehension of conversational AI. Future improvements can be guided by the lessons learned, especially with regard to UX design, language support, and instructional elements. We hope to develop a more efficient and adaptable chatbot that not only meets but surpasses user expectations by tackling these areas for improvement and adding user-centric features.

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## 8. Workload Matrix

### Work Load Matrix

No.	Task Component	Terence Lim Dao Liang TP073243	Angelina Leanore TP072929	Eraliev Suimonkul TP068888
<b>1</b>	<b>Problem Specification</b>			
Abstract		33%	33%	33%
Problem Statement		33%	33%	33%
<b>2</b>	<b>Knowledge Acquisition</b>			
Types of Expert Systems		33%	33%	33%
Literature Review on Chatbots		33%	33%	33%
<b>3</b>	<b>Knowledge Representation</b>			
Semantic Nets/ Networks		33%	33%	33%
<b>4</b>	<b>Implementation</b>			
Avatar Design		33%	33%	33%
Knowledge Base Implementation		33%	33%	33%
Test Plan / Screenshots of Features		33%	33%	33%
User Acceptance Testing		33%	33%	33%
Results of Questionnaire		33%	33%	33%
<b>5</b>	<b>Conclusion</b>			
Future Enhancements		33%	33%	33%
Challenges Faced		33%	33%	33%
Sig		