CHATFORSENIOR: AN INTELLIGENT CHATBOT COMMUNICATION SYSTEM FOR DEPRESSION RELIEF USING ARTIFICIAL INTELLIGENCE AND NATURAL LANGUAGE PROCESSING

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ABSTRACT

In recent years, loneliness has appeared in lives for both young and old individuals. As cases of the COVID-19 virus are going up people have dealt more with loneliness and depression especially the seniors [5]. Some have even changed their whole lifestyle because they feel empty and isolated. Others will either try to isolate themselves more or use dangerous ways to quickly get rid of the feeling.To solve this major problem, I have created a digital online communication app which young individuals can have long chats with seniors who are alone and lonely. My application uses real time communication systems which can directly be sent to other users without any issues [6]. Our main goal is to have users have their own way of communicating, using familiar designs of applications we all have used before. By using new features we have created a more user-friendly based user experience which can be experienced throughout our application. Using immersive layouts of applications designs, advanced network connections, visual and data based analytic we are able to solve this major problem.

KEYWORDS

NLP, Mobile Dev, AI.

1. INTRODUCTION

Loneliness is a feeling that most people hate experiencing [4]. Whether you are a young individual or an old senior who has nothing else to live for, loneliness is painful. Feeling emotional pain is something that I, as a young individual, hate seeing [7]. It is also something I've experienced throughout my middle school years of being a transfer student from a different country. When I first arrived in America, I felt alone and confused. I barely knew any english at the time which is why it made it hard for me to communicate with other people. This is one of the major reasons I made this app to solve loneliness and get more people involved with other people. Our application solves this problem by having the benefits of talking to many different people around the globe. With the applications randomizer function, users can have a new individual to talk to once they are ready. A simple consequence users might experience is the lack of monitoring. Spme benefit of using this application is that it can solve this world wide problem and give people a good experience. It can also help young volunteers who want to learn more about teaching and motivation skills [8]. In the end, this problem/topic is important, because of

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how major this problem is. With the increased cases of COVID-19 going up everyday, the loneliness rate also goes up. This problem will continue to grow if no one steps in or does anything to come up with a solution. Therefore, I think it is necessary for more people like myself to pay attention to it.

Some of the existing related methods are any communication applications that allow one user to chat with another. Examples of these applications include WeChat, Instagram, Snapchat, etc. These applications all allow a user to directly communicate to another user using either the messaging feature or the video call feature. However none of these applications have such features that include helpful benefits to life like the applications I have built. Their implementations are also limited in scale which only allows users to chat with only the people they know or have gotten their info from [9]. Many other methods such as Omegle, Paltalk, MeetMe, all have another major problem that cannot be solved. Because all these applications are not secure, they are public to all users who are on the application. Privacy is also the respected thing that none of these mentioned applications provide which could lead to unsafe internet web browsing [10]. A big problem with these apps/websites is that they are not secure nor watched by any admin or moderators who are managing the data and servers. This means that there can be suspicious activities and interruptions of users. Without internet censorship many users might experience unpleasant ads or web internet traffic. When no privacy is presented no one will know whether one is at risk or not.

Our main goal is to help out the problem of loneliness and lessen the elders who are suffering from isolation. We have done precise research on how to work and make these applications so many different kinds of users can all enjoy the friendly based experience that we have to offer. The inspiration that made me want to make this app was the realization of how little I talk to my own grandparents [11]. Realization of this also made me discover a online public communication website called omegle, which is also a big contributor that inspired me to create this project. Some good and useful features of my applications are, first, the easy to use sign in and login screen. With easy access without any need of a third party app you can directly create a new account and start enjoying the apps experience. In comparison to websites like omegle, you will need to provide extra unnecessary authentication steps which can both cause time and safety. Secondly, our application provides a simple messaging feature where one can start messaging to another user right away. Last but definitely not least, we provide a new added feature of the random user finder, which allows users to find different registered users to chat with, similar to omegle. When clicking the button, the user will see a popup of the found user and be provided with a choice of deny or accept. Unlike omegle, we do not have a voice nor a camera feature due to it being quite unsafe for both elderly and young people. Therefore, we think that our application could perhaps help out the seniors and loneliness of many of different ages.

Having tested our applications on two scenarios, which are both using the help of my close friends, we have demonstrated that the techniques that have decreased the isolation of elders. Firstly, I gave one of my friends careful instructions on what to do each week. By using planned evaluation we can get an accurate result. We showed the usefulness of our project by making the test subjects use the application once per week. Using the application to communicate with other participants such as their grandparents. By the end of the week, we have gotten a result that they have gotten closer than ever with their grandparents. They are no longer isolated and alone but rather pleased that their grandchildren talked to them. Secondly, we used the apps provided feature of the random search finder. I have also asked one of my other friends to test this feature out to help out with my experiment. I have asked my friend to talk to a new person every day to see if the engine works or not. By having many registered users in the test we have gathered an accurate result that the random search finder is accurate and will find a different user every time. This feature has proved that by using our application you can find new people to talk to which

can spread the positive and the message that I was a creator is trying to spread out. In conclusion our experiments/test is overall positive which is proof that this application can benefit the problem of loneliness and isolation.

The rest of the paper is organized as follows: Section 2 challenges and problems that occurred while making the project and user's feedback. Section 3: explanation of out solution and carefully planned visuals. Section 4: experimentation and tests on individuals. Section 5: Related work and inspirations. Section 6: conclusion and future work and improvements.

2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

2.1. Coming Up Idea and Topic

One of the most difficult challenges of making this project come to life is actually coming up with the idea and problem/topic. The fact that we have to come up with a global wide problem got us stuck for days thinking what is necessary to be solved. Since our goal was to accomplish this problem and lessen this problem our team came up with the communication app. By using this application users can find more people to talk to and get closer to their close ones. The biggest risk of making a communication app is the privacy policy and getting peoples trust and approval. by providing good information we have gotten and ensure that everything is safe and usable for the users. When using our application users can feel a user-friendly experience while chatting.

2.2. Connecting to the global database

A second challenge that we have to face while creating this project is connecting to the global database. We will need to have a applications help to connect both the data and the service so we can get the chat to work. To solve this we have used the popular firebase console which utilizes and specializes in things like these [12]. By connecting our servers to the firebase database we can get a visual of how each user is able to communicate and their history of the communication. Seeing this, we are able to get real time messages being sent by both registered users. This also helps with the registered user count which gives us a precise amount of registered users that are currently utilizing our server. With the help of this we are able to get real info sent through users without any interruptions.

2.3. The use of Our in App Feature

The last and final challenge we had to face was the use of our in app feature, the random search finder [13]. This feature allows users to click and find a new stranger to talk to and chat with them. One big problem that has occurred while making this was the process of connecting to the real time registering users. If not connected, users will not find any users while using this feature. The difficulty of doing this is how we can have each new registered user be connected to the server and have pre-registered users link up to the new ones. The solution we found was simple. It was to make a code so that the registered user will directly link to the database right after registering. This allows both users to see the same uptime of the registered users which then allows the search finder to work properly.

3. SOLUTION

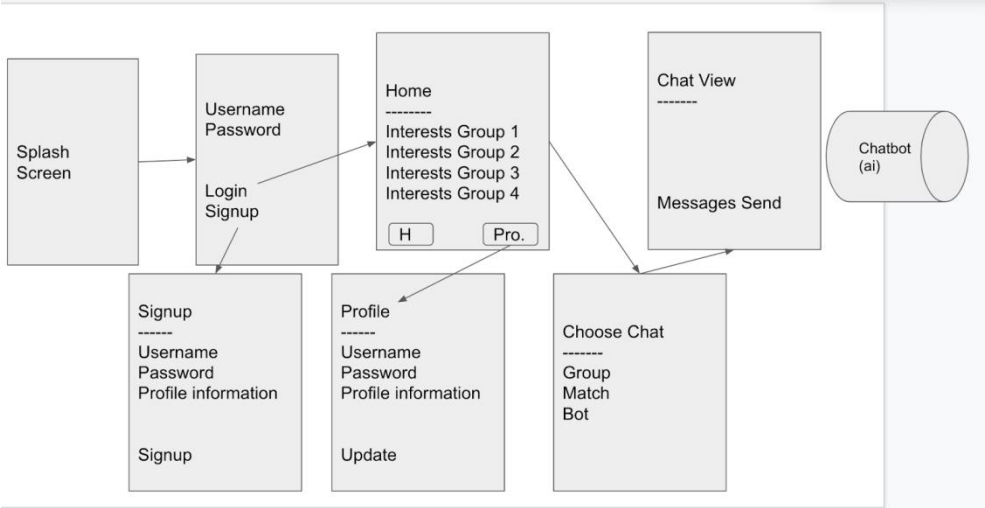

Figure 1. Basic layout and planning format draft

Chat4Seniors is a digital mobile communication application, where users can chat online through our database-connected messaging feature. Young volunteers can log on to the app and quickly make an account to start chatting with seniors that have already registered into our database. With our random search finder, seniors can find and chat with any random volunteers around the globe. Chat4Seniors also provides a user-friendly experience, which we will respect your privacy to the fullest and make sure that all application features work the best to your standards. This application's components work like any other application users have used before. The splash screen is digitally connected to the login and sign-up screen, which upon clicking on the app, it will directly force the user to the login screen. After logging in or creating an account, the system will automatically transfer the user to the next screen which is the application's main home screen. Here is where the user can use all our application features, such as the random search finder, settings, and messages. The settings icon is where the users can find our log-out button which will bring the user back to the login and sign-up screen [15]. The main technical challenge of our system is managing the database and recording each user's registered accounts. We have solved this problem by having our system be connected to the firebase console database; which can track real-time user interactions and account registrations. In order to achieve our desired goals, our application consists of 5 main components:

- A data layout of all different screens and functions and features
- A system connection to the database which stores personal data and registration info.
- A messaging screen which sends real time messages and users advance signals for connections.

For your further information we have provided detaily explained diagrams and pictures displaying all of the components and methods used in this project.

Figure 2. Icon

```
flutter_icons:
  android: "launcher_icons"
  ios: true
  image_path: "assets/icon.png"
```

Figure 3. Code of icon

3.1. Splash Screen

The splash screen is a screen which will only appear for a certain amount of time. It also uses a simple code (code above) which directly uses our selected picture (icons.png) from our selected folder (assets). After the time is up, the splash screen will automatically transfer the user to the next screen which is the log-in screen. On this page the user can see both the log-in and the sign-up button.

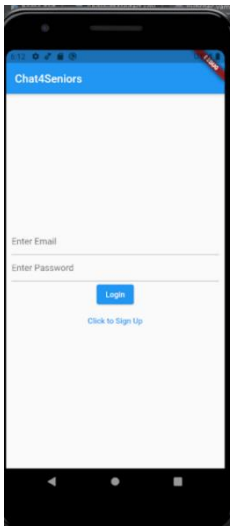

Figure 4. Log-in/Sign-up screen

3.2. Log-in/Sign-up Screen

The log-in and sign-up screen follow a similar concept with the splash screen. However, it does not have a time limit, it will only move to the next screen when either the user clicks on the login or the signup button. As for the login and signup, the user can either choose to log back in to their existing account or they can click the “sign up” button and create a new account. Once inside the sign up screen (Figure down below) the user will be able to create an account. The username and password however will require at least 3 letters and 6 numbers. If the user inputs something that doesn't meet the requirements, it will reject their request for creating a new account. Both screens use a code which utilizes the “Elevated button” code. The code simply adds a “click” command to your chosen buttons, and once a user has clicked the code it will transfer the user to the next screen.

```
return Scaffold(
  appBar: AppBar(
    title: Text('Chat4Seniors'),
  ), // AppBar
  body: Container(
    padding: EdgeInsets.symmetric(horizontal: 10),
    child: Form(
      key: widget._formKey,
      child: bodies[index]
    ) // Form
  ), // Container
); // Scaffold
}
void toggleIndex({required int targetIndex}) {
  setState(() {
    index = targetIndex;
  });
}
String? emailValidator(String? email) {
  if (email != null && !email.contains('@')) {
    return 'Please enter a valid email';
  }
  return null;
}
String? usernameValidator(String? username) {
  if (username != null && username.length < 3) {
    return 'Please enter a valid username with at least 3 characters';
  }
  return null;
}
String? passwordValidator(String? password) {
  if (password != null && password.length < 6) {
    return 'Password must be at least 6 characters long';
  }
  return null;
}
```

Figure 5. Code of sign up screen

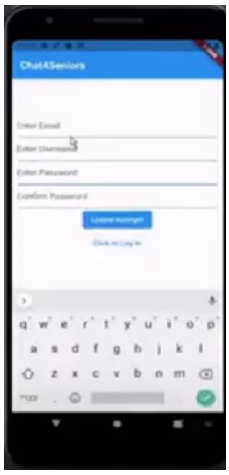

Figure 6. Home page

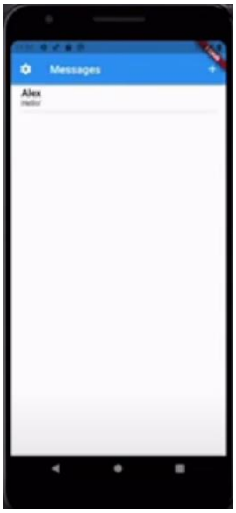

Figure 7. Message page

3.3. Home Screen

After the users have created an account or logged in to their existing account they are able to access the home screen which will provide them with many different features to experiment with. The home screen is the screen that many users will spend their most time on because it has the messaging feature which is used to communicate between users. In the figure above it shows the main screen with a fake user named Alex. On the upper left hand corner, there is a gear icon. This button will navigate the user to the sign out screen where the user can log out on demand whenever they want.

Figure 8. Setting page

Figure 9. User randomizer

3.4. Plus Icon/User Randomizer

In the upper right hand corner of the home page there is a plus icon which upon clicking will show a pop up showing a random user that has been found nearby. The current user can either accept the request or deny it. Upon accepting it, the user will see that a new tab of message will appear. The tab will show the most recently accepted user. In order to keep everything organized the randomizer will only search for people who have registered into our database and are nearby to you. As for the database and account checking we have linked our system to the firebase console which will track each and every user and their registration.

Figure 10. Messaging screen

3.5. Messaging Screen

The messaging screen is the screen that the user uses to communicate with other users. The blue bubble of a message (Seen Above) is the sender's message color. The sender will send a blue bubble message while the receiver gets it in green. The receiver's message icon is green. The messaging screen is only for one purpose which is to communicate and send messages to the other communicator.

4. EXPERIMENT

4.1. Experiment 1

Our solution solves the problem by making users communicate to more people and get less lonely elderlys. The problem is solved because we have helped out and built our own feature of the random search finder which a user can use to find any other registered user to talk to. With the help of this the solution is now fixed and there will be less lonely people due to the design of this advance feature. Throughout out time experimenting to see if our hypothesis was true or not I have asked many people including my own family members to try our application. We have provided them with instructions and guides of how to navigate and use the app effectively, with times of when to use the app, how to use the app, and how the app is helpful. As a result most of the feedbacks and comments came out positively with most of the people saying that this app was helpful and only a small amount saying that it was non helpful or just semi helpful.

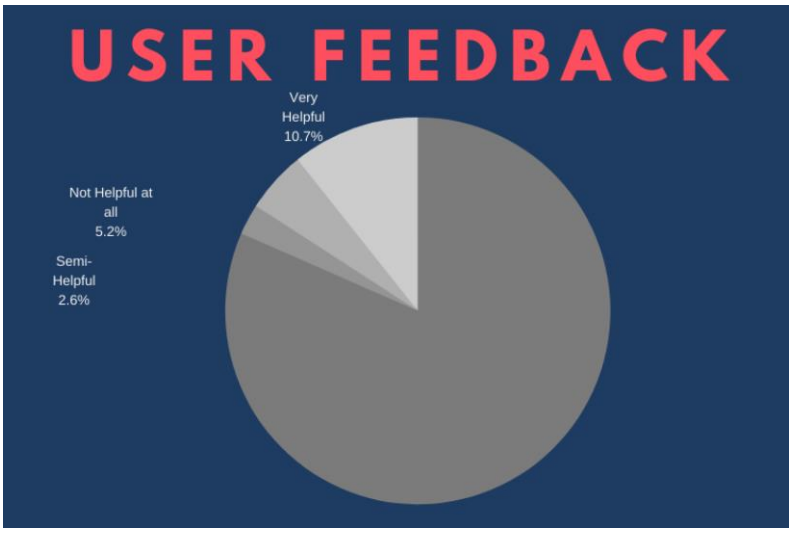

Figure 11. User feedback 1

The first experiment was a major success as almost 80% of the people said that our application was helpful. Looking at our graph we can see that only a small amount of people (10%) said that this application was very helpful. With the knowledge of this I have figured that many of my close friends are indeed experiencing or know someone who is experiencing isolation and loneliness. The result of this graph shows that most of the people find it helpful which means that our app is capable of solving this problem. Therefore I believe that the app is helpful to some and will help many who struggle with the problem while experimenting with it.

4.2. Experiment 2

With our second experiment we have solved the problem of getting the problem out to many other people including strangers. The solution was to get random people who wanted to help someone they know that is currently struggling with loneliness. Based on our experiment I have asked several strangers around school and community areas to try out our app. We gave them a demo account which was authorized by us and let them chat with any of their own friends. As a result of our second experiment many came back and rated that the app was too simple. Many said that there are many apps like this which are more helpful and have more features. However, around 30 percent of the people I've given this app to, said that the app actually helped them get to know more people and talk about their own struggles with strangers online who are also using the app.

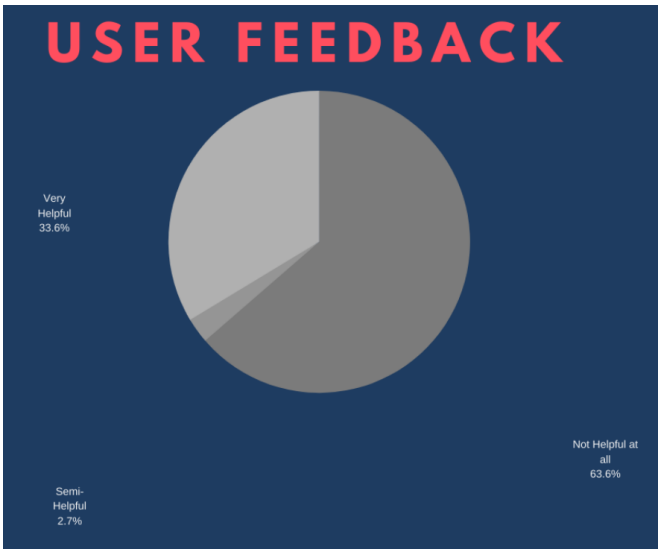

Figure 12. User feedback 2

Based on our graph of the second experimentation we can see that 63% of the total 20 strangers I've tested the app on said that it was not helpful. However 33% of the people said that it is helpful. This shows that strangers are more reliant on other application with the same features and functions, which makes my application seems simple and plain. With the information I've gathered many said that the app was just way too simple or the app had some small issues or problems. The remaining 2% of the people said that the app was semi helpful just thought that the app was creative and uses features of other apps. Due to the feedbacks I've gathered I have concluded that there will be more improvements to be made to the application in order to achieve further success in solving our problem.

In conclusion, the two experiments that we have conducted were overall a success with feedback that said that it helps them in some way. Many people in the first experiment said that the app was indeed helpful which helped them with loneliness and isolation. The problem that I've gotten so far from the first experiment was that It was too easy to use or had too few features. However we have overcome the challenge of trying to solve loneliness. Looking at our second experimentation we have gotten more negative feedback than positive. Since we tested this on strangers most of them didn't enjoy the app as much as my friends and family did. This is mainly because of the wide variety of other similar apps that have the same features as mine. Many have said it was just too underwhelming and not getting the same experience as other apps were giving them. By the end of the day, I think this application did quite meet my expectations with the results of both experiments. Though I think I would have expected more of a positive result from the strangers I tested my app on since we are mainly trying to focus on the worldwide problem of loneliness. Therefore, I think my app is a success in a way because It could help some people out with their problems and struggles.

5. RELATED WORK

Margaret Lubas, Jeniffer Mitchell, Gianluca De Leo have presented us with a digital alternative device that helps children with severe autism disorders. [1] They have created a Augmentative and Alternative Communication App with ads for kids with autism, using many different methods including a input and output design with screens and visuals to help the learning experience. [1] Comparing the two works of mine and theirs we have a similar purpose of trying to solve a worldwide problem. Although we have different app functions and features our

application can still solve problems that need to be looked at. The strength and differences of my app to his is that I definitely have more advanced features such as our random search finder. But he had used Graphic-based methods that allow for the creation of messages through combining symbols and images, and can often then be translated into speech.

Walker Z, McMahon DD, Rosenblatt K, Arner T have created an application which utilizes the similar format of the popular game Pokemon GO and uses its Augmented reality to create a learning environment for people of all ages. [2] Their work is fairly complicated with uses of advanced technology such as AR and UDL technology to help with this Augmented reality. To compare my work we also have a similar purpose of helping people. However what makes us different is that we are helping a specific group of people, the seniors and they are just helping the overall group of the whole population.

Guarino, G. Aceto, D. Ciuonzo, A. Montieri, V. Persico and A. Pescapè have made an app that analyzes the effect and pandemic speed and increase rates of the recent COVID-19 virus. [3] with rates going up they have created an app that helps see the cases and improve upon it to have an accurate value. The comparison between my app and theirs is that we have more of a messaging app not a analytical data based graph app. The main difference between ours is that we trying to spread awareness to the other people of the world. With both of our apps wanting to solve a problem that exists in the world.

6. CONCLUSIONS

To conclude we have made an online messaging app which helps out the major problem of loneliness and isolation in seniors [14]. With the use of our online database and real time messaging between users we can find that communication can be easier. Based on our experiments we can tell that most of the tests were positive and came back making the app better. Our method of the random search finder really helped many who tried the app and liked it, it also helped many to meet new people who are also trying to find other people.

The current state of the app is poor and is in definite need of improvements. Before starting the project I have thought of adding in maybe more features like a profile picture setting or a bio for the users. I have also thought about adding a video chat function where users can share their thoughts as a group. As of right now, the limitation of the app is that you can't have a full-on experience with the other user. In the future, I would like to add more advanced features that can help with a better user experience and improve it so that many users can have that experience with the other user.

To further evaluate our problem we have decided to keep on improving the application which can help out the problem much better. By improving features and breaking limitations we can make the app more useful to the everyday people who need it and want to use it for good.

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