

Overview of Sentience program:

Sentience is a basic deep learning chat bot. It will become more intelligent over time as its database is expanded. Right now it's current training model has been kept simple. It has a decent sized database that it uses to respond to a user's statements and questions. It will respond in a variety of ways based on what settings the user chooses. Users have the ability to use both text and audio to communicate with the chat bot which has been named "Caprica"; who can also speak through text or sound. If you don't have a microphone then you can't use voice option

All conversations with Caprica are stored and can be written to data files. these files can then be used to enhance her training. The purpose of this documentation is not to explain what this program is but rather how to use it.

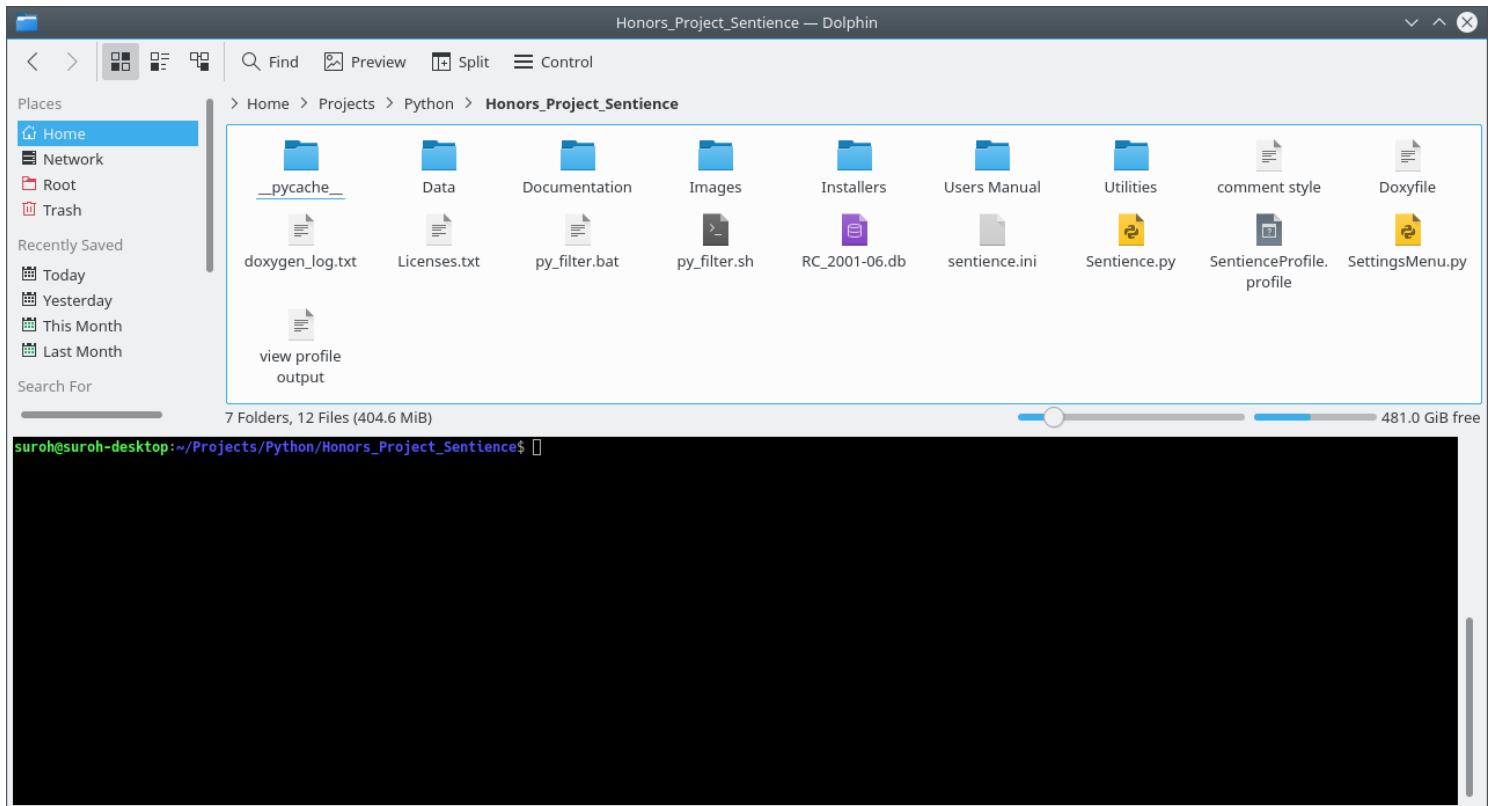
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Linux Instructions: Changing Directories, navigating to the project.

To change your current directory you have two options. If you're using Dolphin, simply open the folder where you've saved this program and then hit 'F4' which will open dolphins built in terminal. If you're not using dolphin you can navigate to the project by opening your terminal and typing 'cd Sentience'.

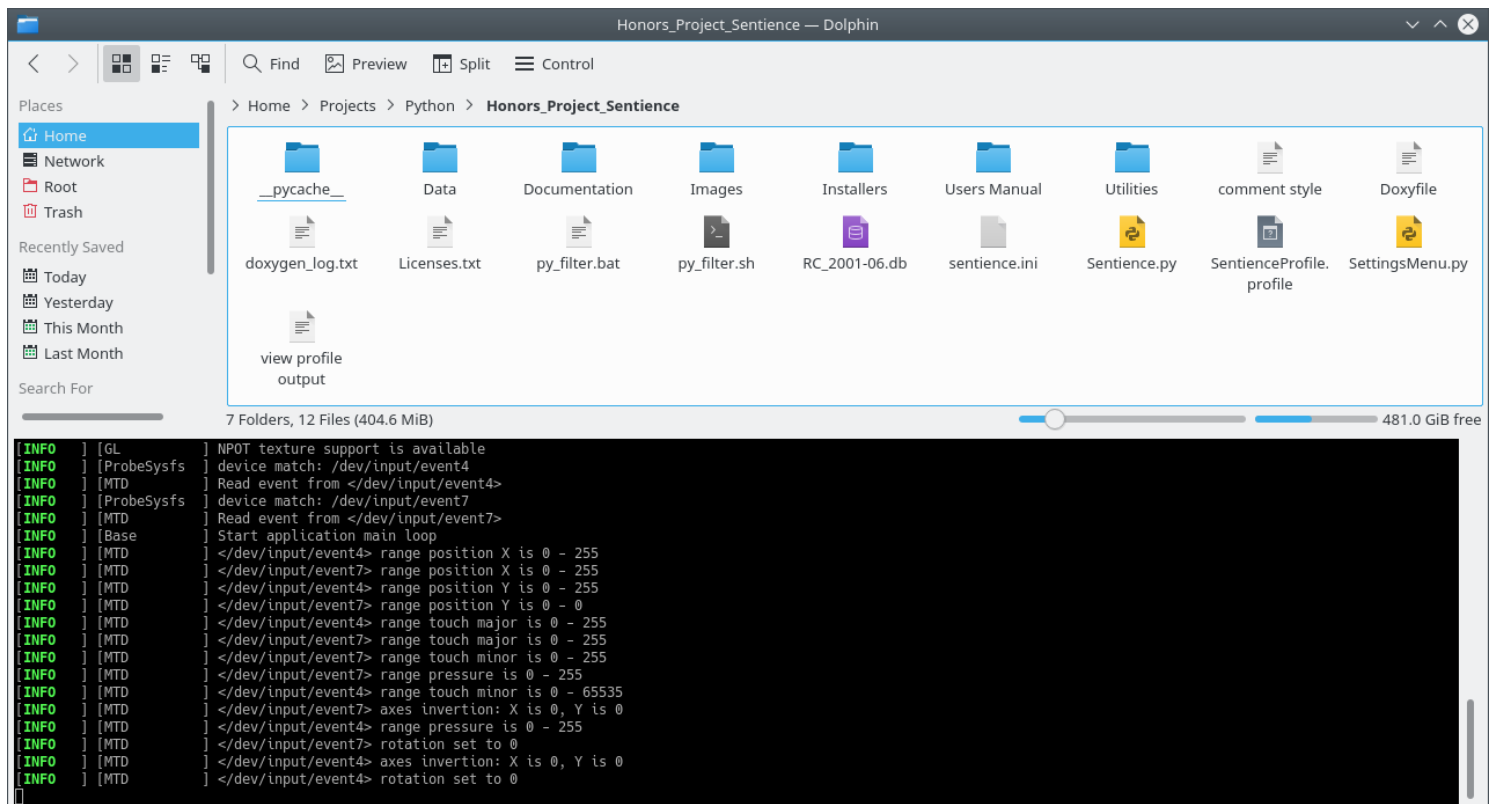
Note: The file path on my machine is different because I've named my folder differently. When you receive this program the folder containing this program will be named 'Sentience'. Once you've made it to the folder it should look similar to the below Image¹.



Linux Instructions: Running the project

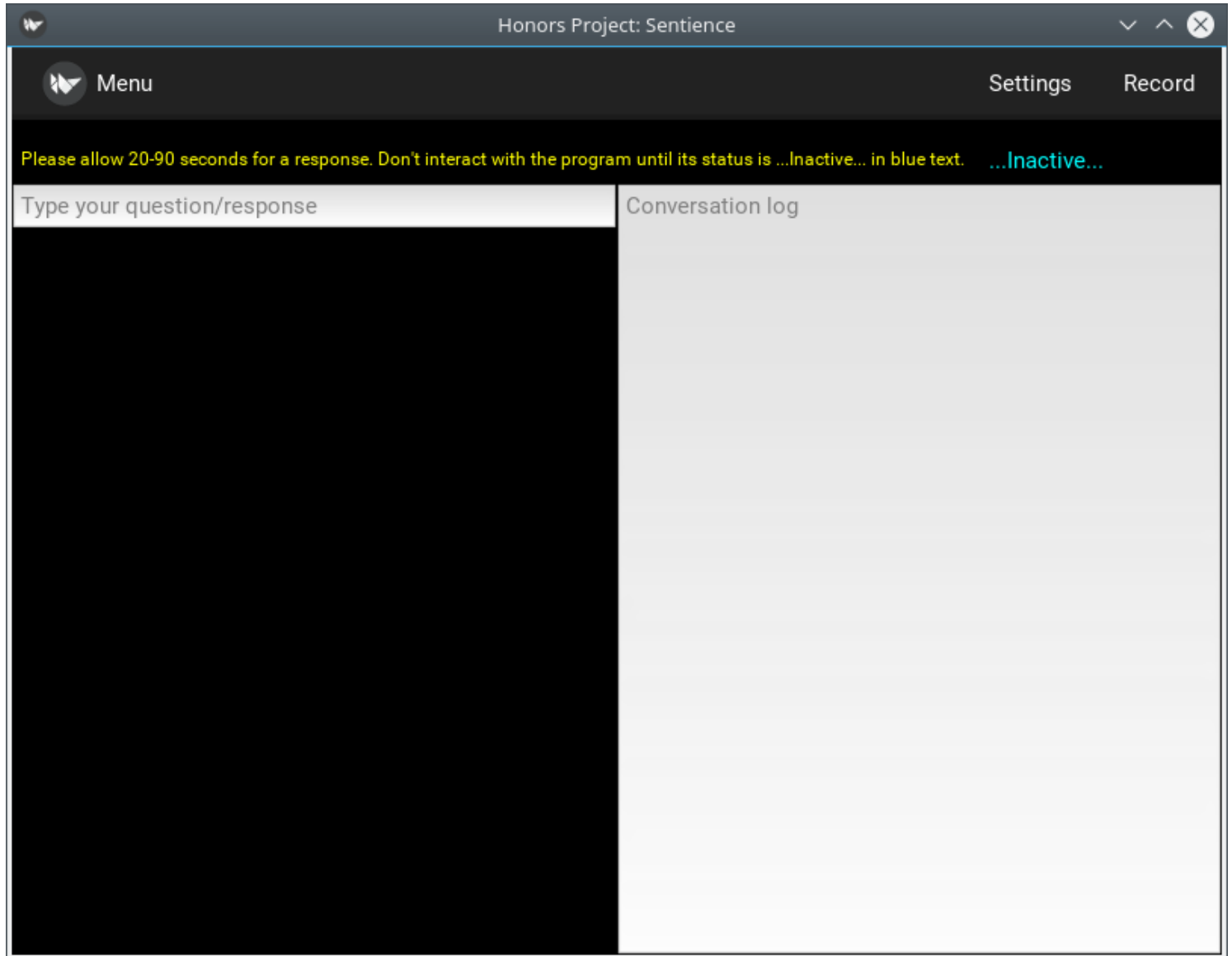
Now that you're in the proper location all you need to do to run the program is type "python3 Sentience.py". With that said, you may experience permission errors depending on your version of Linux. For instance, users on Ubuntu 17.10 may experience errors while trying to write files. While users on Ubuntu 14.10 may not. These two versions were picked arbitrarily, what's important is that these errors won't cause your program to crash.

However, they could result in a loss of functionality. So, you can remove the errors by running the program as root. To do this type, 'sudo python3 Sentience.py' then simply input your password when prompted. You'll know that your program is running because it will pop up. You'll also see output in your terminal which looks similar to the below image².



Linux: This is what the program looks like

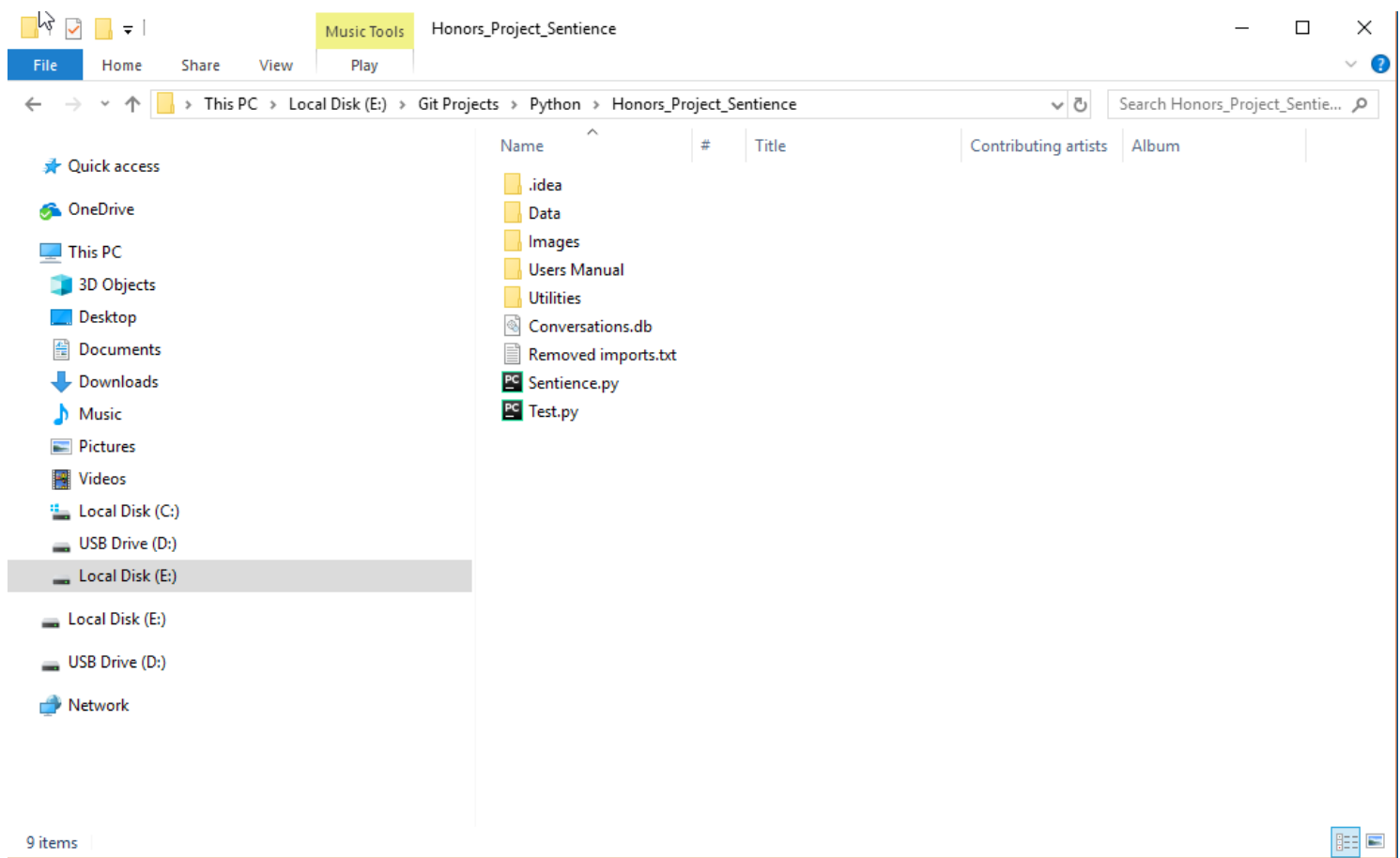
Now that you've successfully run the program, it should look like the below image³.



Windows instructions: navigating to the programs path

To navigate to the folder containing the program in windows. Simply open your file browser and open the folder where you saved this program. It should look similar to the image⁴ below.

Note: The name of your folder will be different than Mine but don't worry. your folder will be named 'Sentience'. You'll also have more files in the folder when you do this. That's okay because the only file you ever need to worry about or touch is the file named 'Sentience.py'.

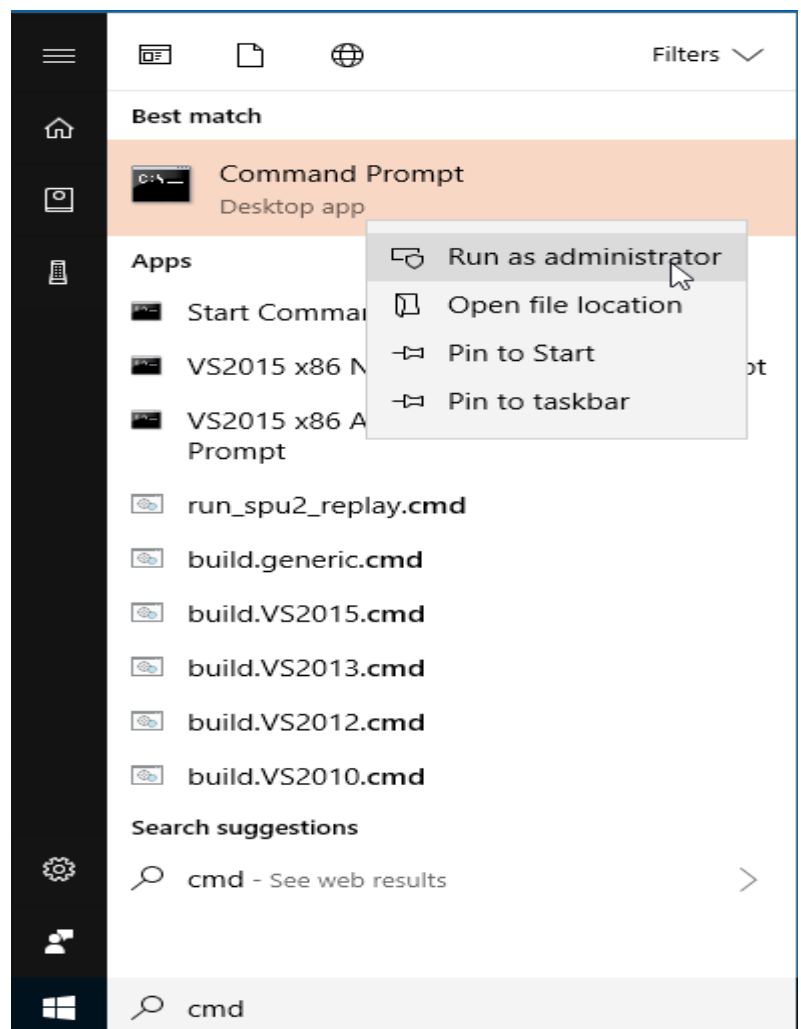


Windows instructions: opening an administrator command prompt

When running this program on windows you should do so through a command prompt with administrator privileges You can open a command prompt with administrator privileges by opening the menu and typing ‘cmd’ into the search bar.

When the ‘Command Prompt’ option pops up, right click on it and click ‘Run as administrator’. When the windows permission pop up box appears all you have to do is click the ‘Okay’ button.

It should look similar to the image⁵ below. Note: I’m doing this on Windows 10. The process is the same on the different Windows operating systems but the way it looks is different.



Windows instructions: changing command prompts directory

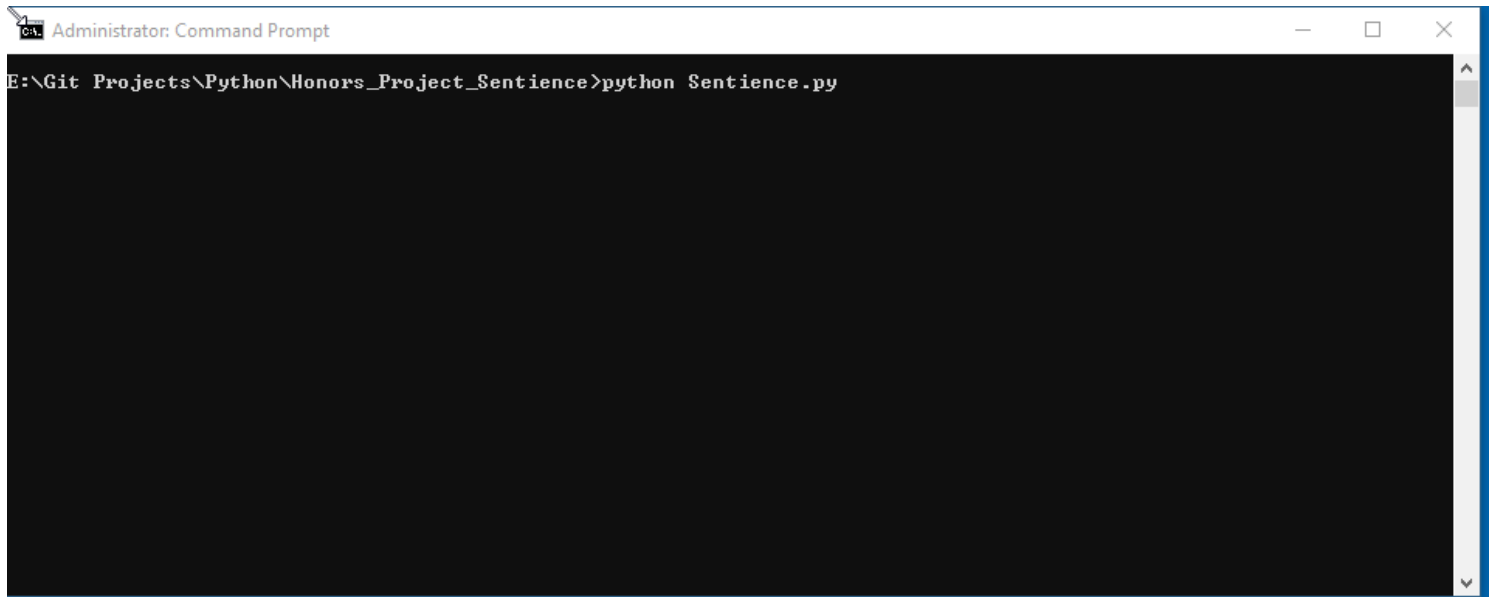
Once the command prompt⁶ has been opened. You need to change directories. you must navigate to the path where you've stored this program. That's why I had you open it earlier. Go ahead and copy the path of the program. Type "cd " and paste that copied path into the command prompt. It should look similar to the image below. Again, The path on your machine will be different. Once you've typed the above information in. Just hit the "enter" key on your keyboard. you're now in the proper directory and can run the program.

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a black background and a white title bar. The command prompt shows the current directory as "E:\>" and the user has entered the command "cd E:\Git Projects\Python\Honors_Project_Sentience". The command is highlighted in white text on the black background. The window also shows standard Windows window controls (minimize, maximize, close) in the top right corner.

```
Administrator: Command Prompt
E:\>cd E:\Git Projects\Python\Honors_Project_Sentience
```


Windows instructions: Running the program

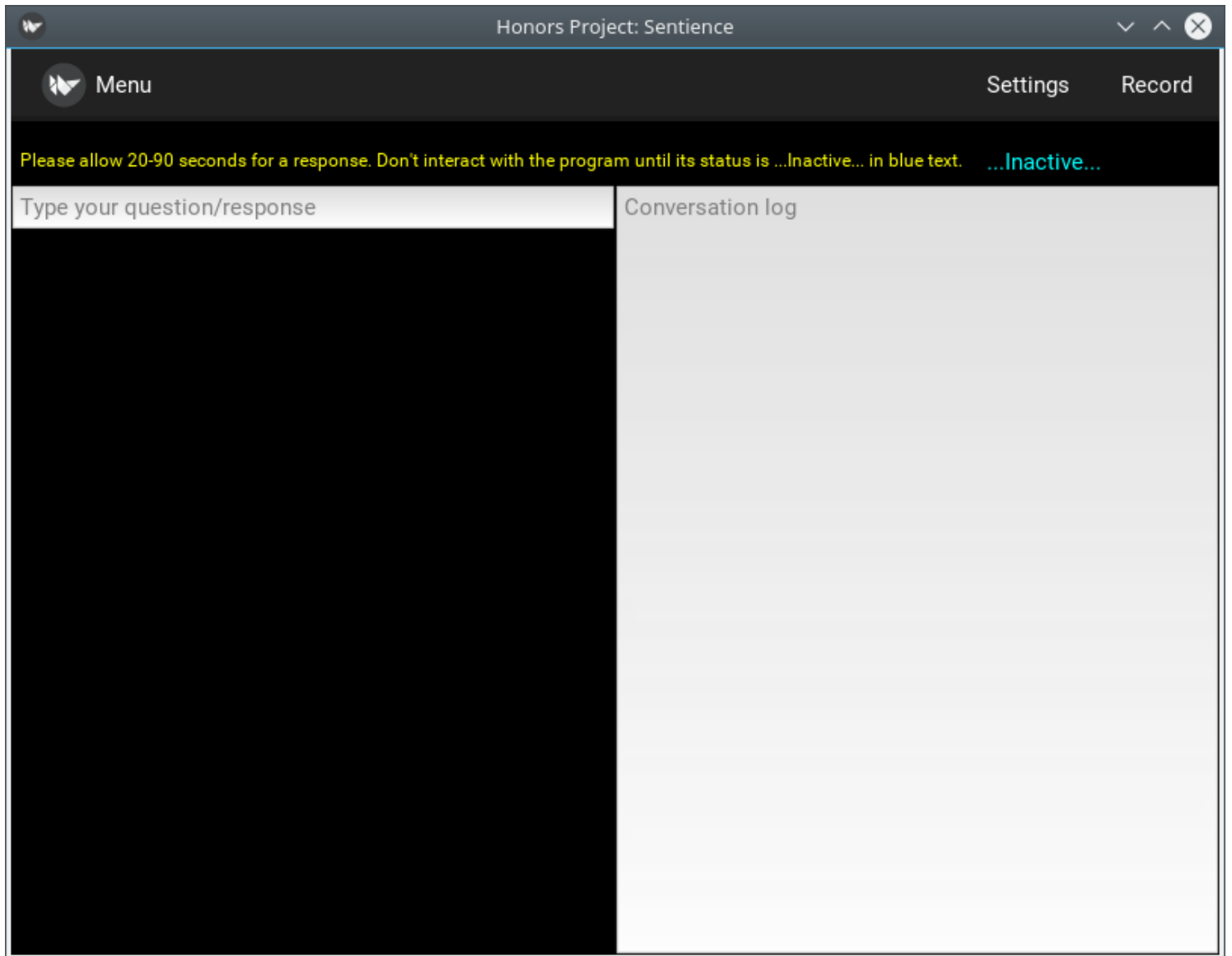
Now that you're ready to run the program, all you need to do is type "python Sentience.py" into your command prompt as seen in the image⁷ below. Then just hit the "Enter" key on your keyboard.

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window has a black background and white text. The command prompt shows the current directory as "E:\Git Projects\Python\Honors_Project_Sentience" followed by the command "python Sentience.py" which has been entered. The cursor is at the end of the command. The window's title bar includes standard Windows window controls (minimize, maximize, close) on the right side.

```
Administrator: Command Prompt  
E:\Git Projects\Python\Honors_Project_Sentience>python Sentience.py
```

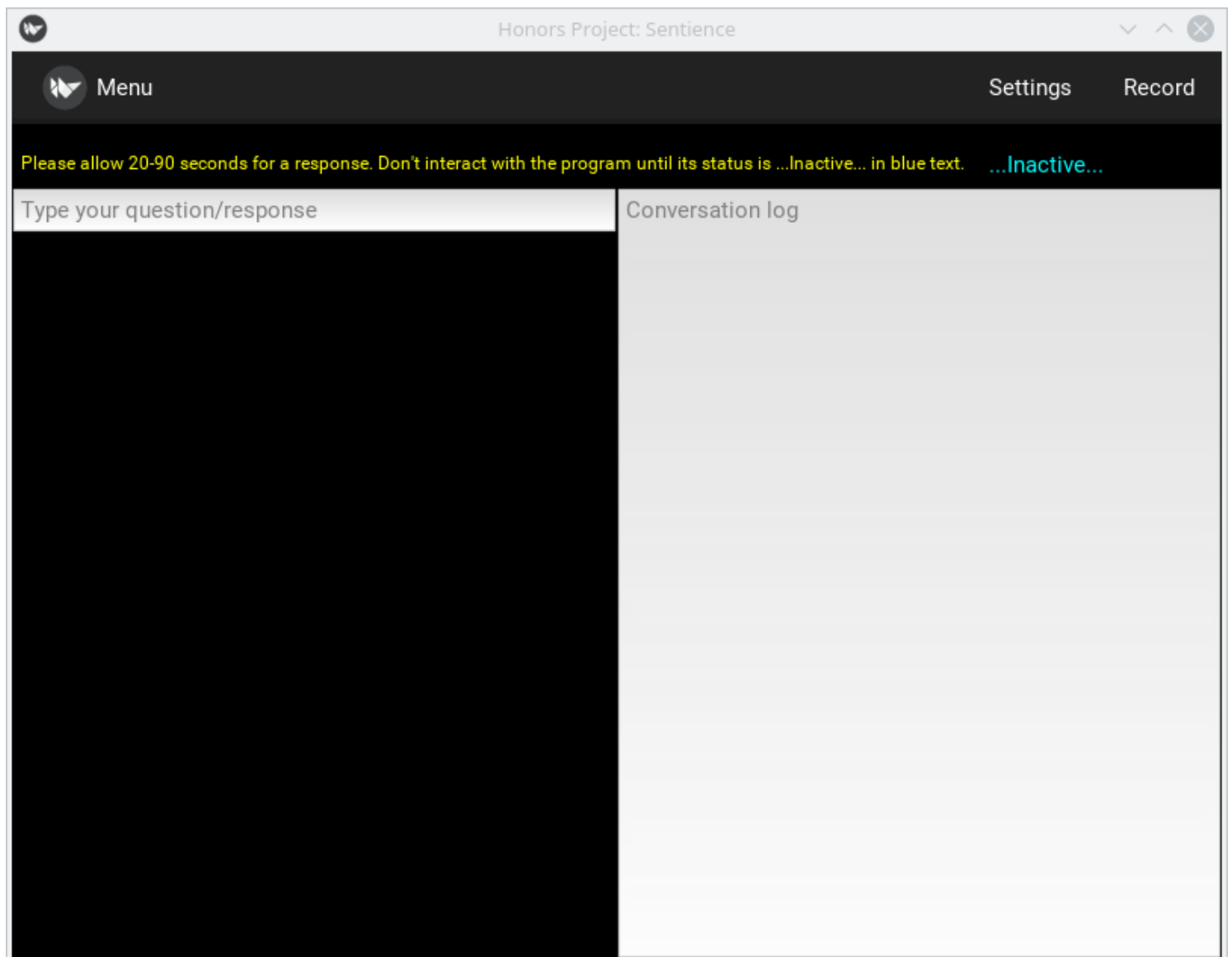
Windows instructions: Running the program

Once you've run the program it should look like the following image⁸.



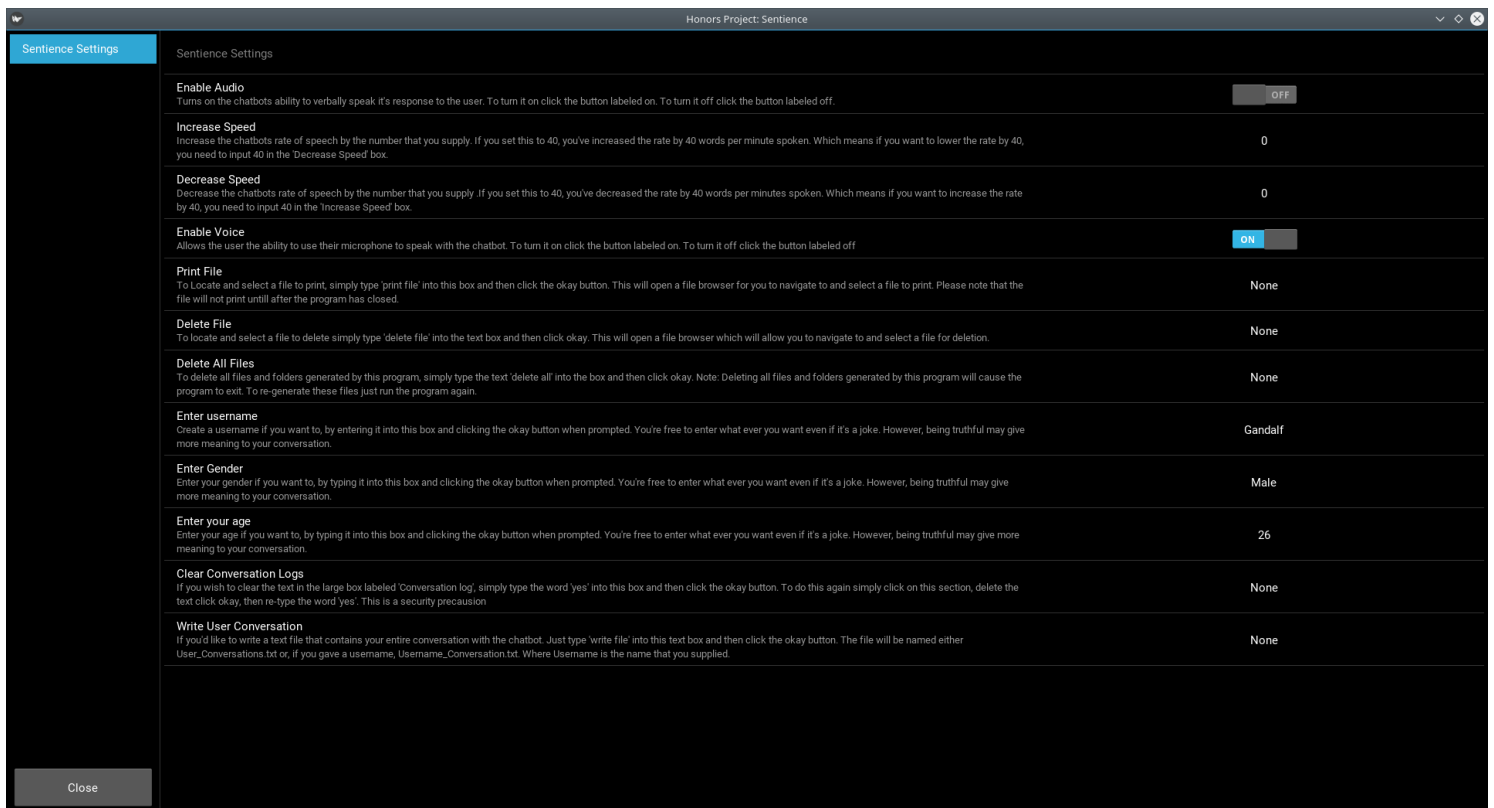
Changing the programs settings

You have the ability to change quite a few settings which directly impact how this program works. You can do this by opening the Settings menu. To open the menu simply click on the button labeled 'Settings' as seen in the image⁹ below.



Introduction to the settings menu

Now that you've opened the settings menu you'll see something that looks similar to the image¹⁰ below. Please note that this image was taken while the program was maximized in size. If you don't see all of these options you can simply scroll down the list. You'll note that each option has a clear description as to what each option does and how you'll use it, as well as how it will affect your program.



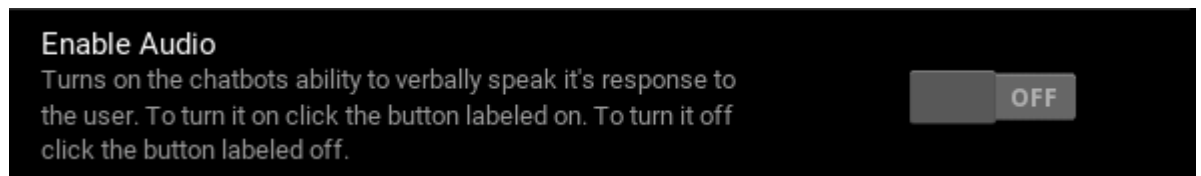
Settings Menu: Enable Audio

Once you've opened up the settings menu you have the ability to change many options. One of these options is the audio feature. The audio feature allows the chat bot to access your systems speech to text software. Which can be used to read a text response in the form of an audio response. Basically, If the audio option is enabled the chat bot will verbally speak to you.

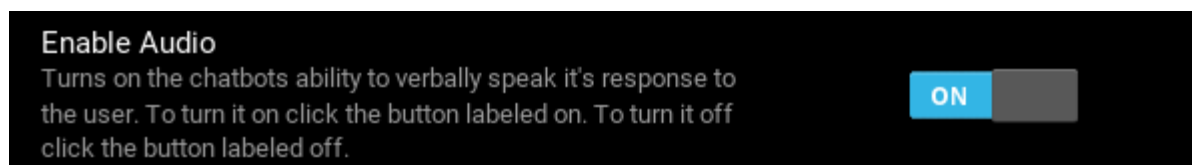
When the program is initially run the settings are all set to default options. The audio option will appear as the switch you see in the first image¹¹ below. On the first run of this program, and only the first run, you must click that. An audio message will be played telling you that the audio option has been disabled. This has the effect of changing the button to the second image¹² that you see below. Click this button one more time to enable the audio feature. If successful, a message will be played stating that the audio feature is enabled. If you close the program right now, and then restart it, the audio feature will still be enabled.

On every run after the first time that you use this program. You can choose to enable or disable the audio feature. If you want to disable the audio feature all you have to do is click the button when it says 'off'. To re-enable the audio feature all you have to do is click the button that says 'on'.

11 -->



12 -->

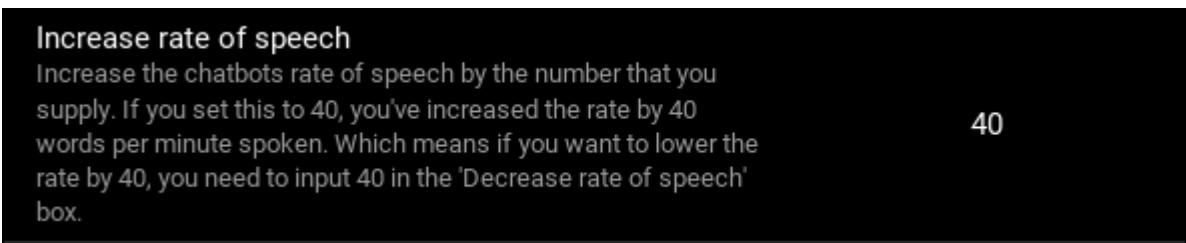


Settings Menu: Increase rate of speech

This is feature allows you to change the chat bots rate of speech. Essentially, the text to speech system can be modified to allow 'x' words to be spoken per minute. This means for example, that if you set this value to 40, the chat bot will be able to speak 40 words per minute faster. Increasing this value will impact how easily you'll be able to interpret what the chat bot is saying. If it's too high the words will be spoken so fast you won't be able to understand them. The same will occur if this value is too low.

This option is based off the default rate of speech which is automatically set to 160 words per minute. This sounds like it's a lot but it's not. All you have to remember is that if you increase the rate by say 40 you're setting it to be 200 etc..

To increase the rate of speech simply type the numerical value that you want to increase this figure by and then hit the button labeled 'okay'. You can do this by clicking on the 'Increase rate of speech' option as seen in the image¹³ below.

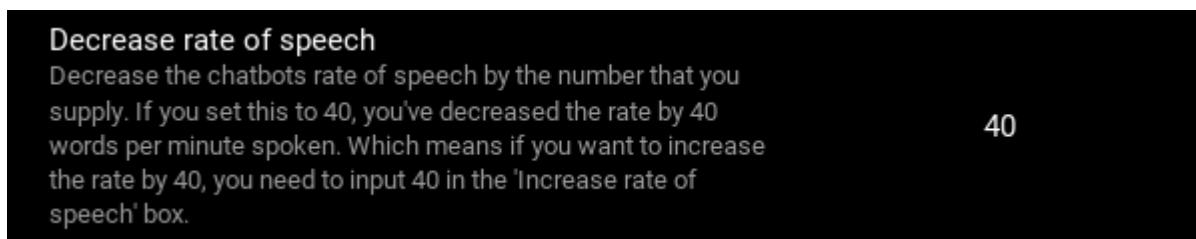


Settings Menu: Decrease rate of speech

This is feature allows you to change the chat bots rate of speech. Essentially, the text to speech system can be modified to allow 'x' words to be spoken per minute. This means for example, that if you set this value to 40, the chat bot will be able to speak 40 words per minute faster. Increasing this value will impact how easily you'll be able to interpret what the chat bot is saying. If it's too high the words will be spoken so fast you won't be able to understand them. The same will occur if this value is too low.

This option is based off the default rate of speech which is automatically set to 160 words per minute. This sounds like it's a lot but it's not. All you have to remember is that if you decrease the rate by say 40 you're setting it to be 120 etc..

To decrease the rate of speech simply type the numerical value that you want to decrease this figure by and then hit the button labeled 'okay'. You can do this by clicking on the 'Decrease rate of speech' option as seen in the image¹⁴ below.



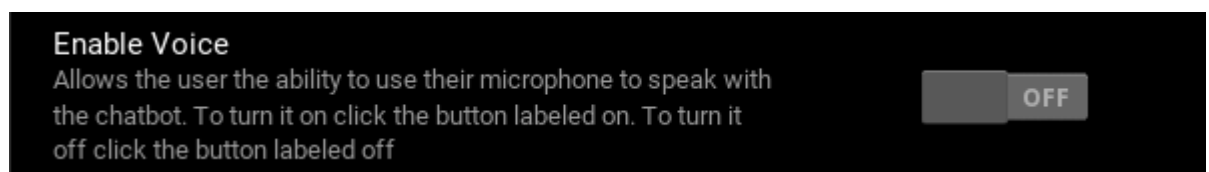
Settings Menu: Enable user voice mode

Once you've opened up the settings menu you have the ability to change many options. One of these options is the user voice feature. The user voice feature allows the program access to your microphone if you have one. If you don't have one then you can't use this option. Once the voice mode is active you can click the button labeled 'Record' on the menu bar. Once you click the 'Record' button you can begin speaking into your microphone. This feature allows you and the chat bot to communicate verbally with each other.

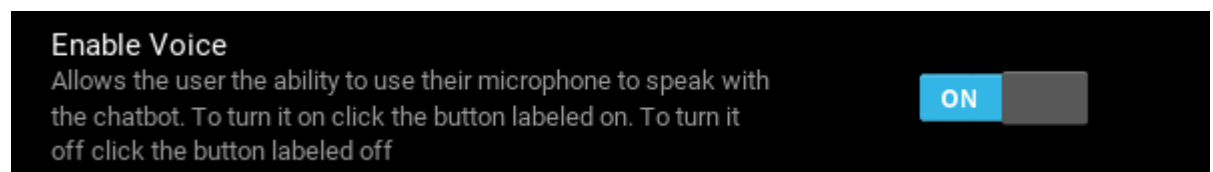
When the program is initially run the settings are all set to default options. The User voice option will first appear as the switch you see in the first image¹⁵ below. On the first run of this program, and only the first run, you must click that. An audio Message will be played telling you that the voice option has been disabled. This has the effect of changing the button to the second image¹⁶ that you see below. Click this button one more time to enable the user voice feature. If successful, a message will be played stating that the user voice feature is enabled. If you close the program right now, and then restart it, the user voice feature will still be enabled.

On every run after the first time that you use this program. You can choose to enable or disable the user voice feature. If you want to disable the user voice feature all you have to do is click the button when it says 'off'. To re-enable the user voice feature all you have to do is click the button that says 'on'.

15 -->



16 -->

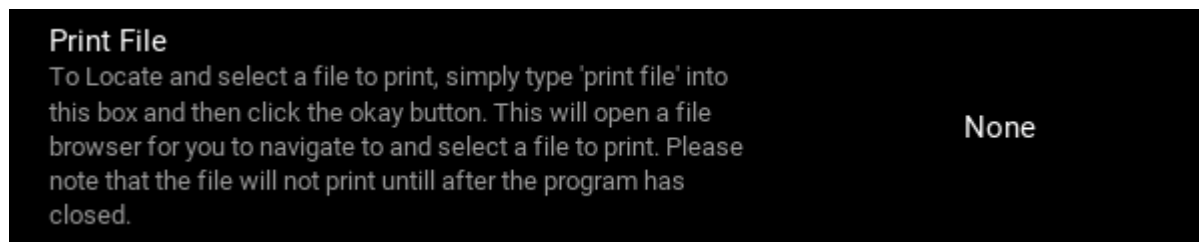


Settings Menu: Printing text files

If you want to print one of the text files containing your conversation(s) with the chat bot; you can do so by using the 'Print File' option as seen in the image¹⁷ below. To use this option simply type 'print file' into the box and then click the okay button.

If you follow the above instructions a new file browser window will pop up which will enable you to navigate to and select one of the files you wish to print. Once you've selected the file simply click the print button.

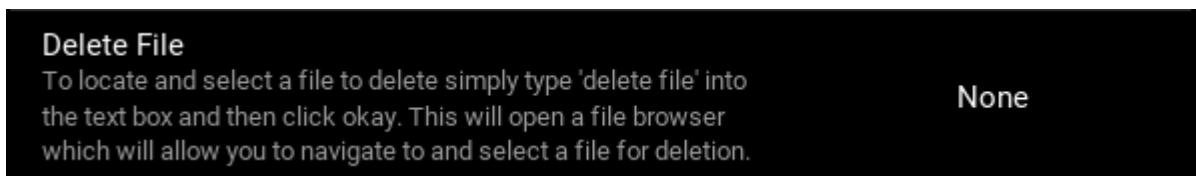
Note: Please note that this will not immediately print your file. Your file will Print after the program closes. This is an intended feature to ensure that any conversation you have with the chat bot is kept as up-to-date as possible.



Settings Menu: Deleting a text file

You also have the ability to select a single file (at a time) for deletion. If you Want to delete a file. Simply type 'delete file' into the 'Delete File' option as seen in the image¹⁸ below.

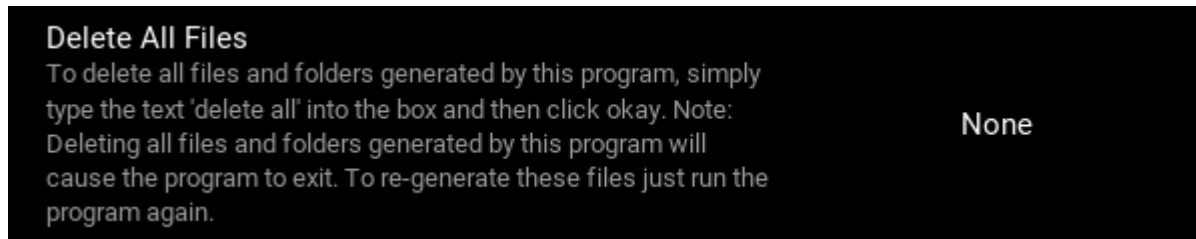
When you type 'delete file' into the 'Delete File' option a new file browser pop up window will show up on your screen. This will enable you to navigate to and select a file for deletion. Once you've selected the file you want to delete simply click the 'Delete' button.



Settings Menu: Deleting all files and folders generated by this program

You have the ability to delete all files and folders generated by this program. If you choose to do this simply type 'delete all' into the 'Delete All Files' option as seen in the image¹⁹ below and then click the 'okay' button.

Important: If you use this option the program will be closed. You can re-create these files by simply running the program again.



Settings Menu: Creating a user profile

You have the ability to setup what I call a user profile. This user profile consists of three separate values.

- 1) Username: You can input a name that you wish the chat bot to call you. This can be whatever you want. You can do this by entering the user name into the 'Enter username' option as seen in the image²⁰ below. Once entered click the okay button to save the change.

Enter username

Create a username if you want to, by entering it into this box and clicking the okay button when prompted. You're free to enter what ever you want even if it's a joke. However, being truthful may give more meaning to your conversation.

None

20

- 2) You can also supply the chat bot with your gender. Or not at all. All of the values in the user profile are entirely optional. This can also be whatever value that you want it to be. To use this option simply type your gender into the option labeled 'Enter Gender' as seen in the image below²¹ and then click the 'okay' button.

Enter Gender

Enter your gender if you want to, by typing it into this box and clicking the okay button when prompted. You're free to enter what ever you want even if it's a joke. However, being truthful may give more meaning to your conversation.

None

21

- 3) The last option for the user profile is your age. You can insert your age by typing the value into the box labeled 'Enter your Age' as seen in the image below²² and then click the 'okay' button. Just like with the other values this option is entirely optional.

Enter your age

Enter your age if you want to, by typing it into this box and clicking the okay button when prompted. You're free to enter what ever you want even if it's a joke. However, being truthful may give more meaning to your conversation.

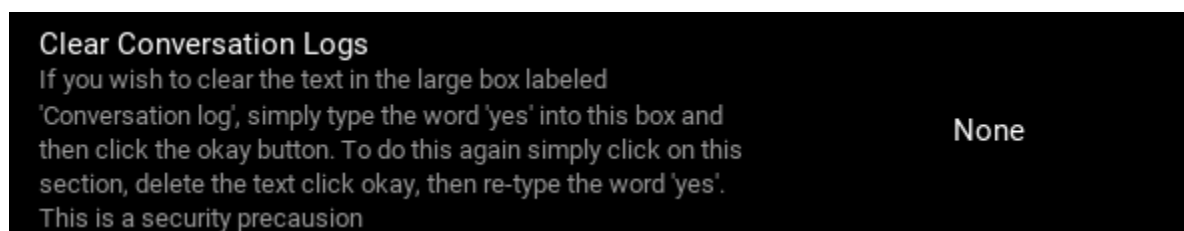
None

22

Settings Menu: Clearing the conversation log

You have the ability to clear the conversation box as well. This is the large white box labeled 'Conversation log' on the main screen. If you wish to clear this Box of all its text simply type 'yes' in the 'Clear Conversation Logs' option as seen in the image²³ below. Then just click the okay button.

Note: You can use this feature as many times as you like. However, as an added precaution to ensure that you don't accidentally clear the box. I've made it so that if you use this option once; you must delete the word 'yes' from the 'Clear Conversation Logs' option and then click the 'okay' button, and then re-type 'yes' and click the 'okay button', to clear the logs more than one time.

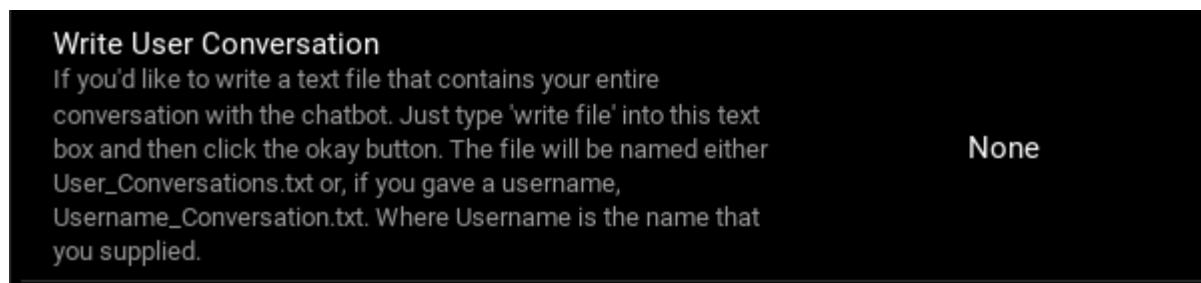


Settings Menu: Creating a personalized file

The last option that you have access to gives you the ability to create a personalized text file that contains your entire conversation with the chat bot. This file is named Username_Conversation.txt. Where Username is the name that you supplied.

This file can be further manipulated to advance the training of the chat bot. Furthermore, as mentioned earlier, you don't need to create a user profile and if you chose not to you can still generate this file!

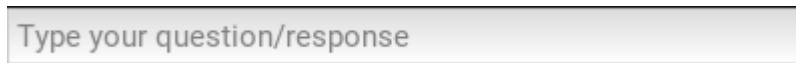
To create this personalized file type 'write file' in the 'Write User Conversation' option as seen in the image²⁴ below and then click the 'okay' button.



Talking to the chat bot: Sending a text response

Unless you've activated the user voice option you have to send your text to the chat bot by typing it into the input box. To do this, simply click the box as seen in the image²⁵ below. Type what ever it is that you want to say to the chat bot, and then hit the 'Enter' key on your keyboard.

Once you've hit the enter key you'll notice that the blue text in the upper right hand corner of the screen that said '...Inactive...' is now red and says '...Thinking...'. Please don't interact with the chat bot while it's thinking. In this stage it's attempting to generate the best possible response to your text.



Type your question/response

Talking to the chat bot: Sending a voice response

If you've activated the user voice option then you can send a message to the chat bot in the form of an audio recording. To this simply click the button labeled 'Record' on the menu bar, as seen in the image²⁶ below. Once you click this button you can begin speaking. Your microphone will remain open and active as long as it detects audio. This means that if you're in a noisy room you may want to quiet it down. Not only to ensure that the microphone stops recording but also to ensure the best possible transcription of your recording.

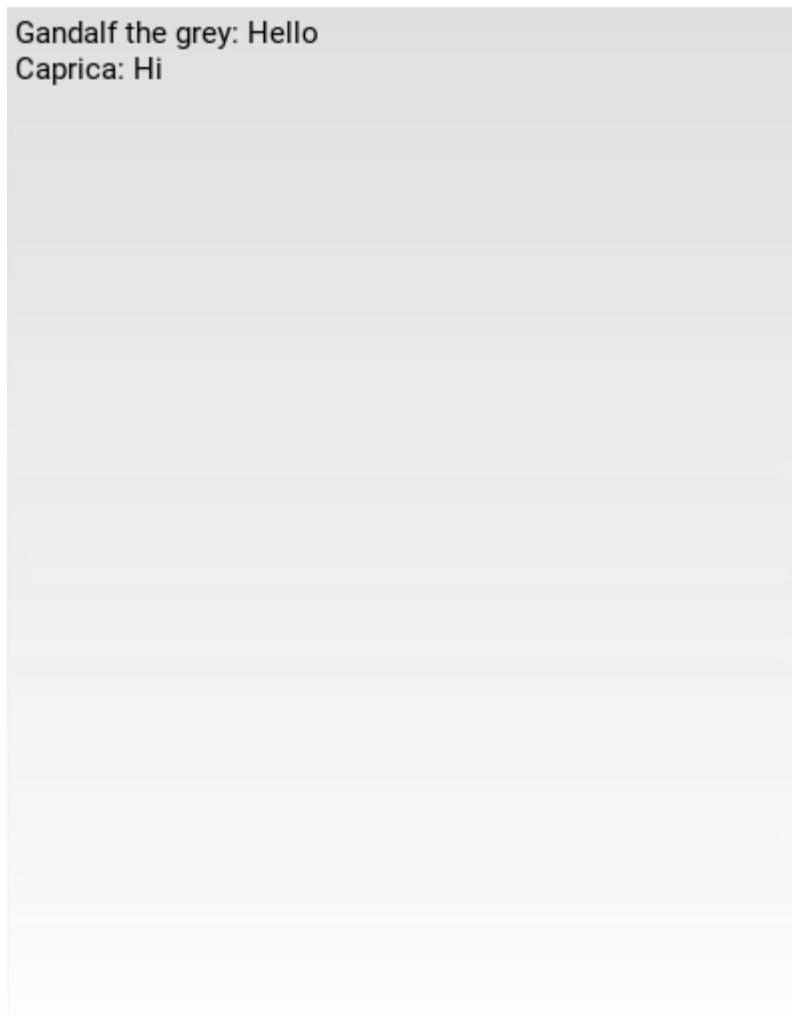
This option is experimental, not because it doesn't work, but simply because voice transcription is still a finicky idea. IF you want to ensure that you get the best possible response from the chat bot while using the voice option; please ensure that you speak clearly, and just as with the text option, when the blue text in the uppser right hand corner that says '...Inactive...' changes to '...Thinking...' in red text. Don't interact with the program until it again says '...Inactive...'.



Talking to the chat bot: Reading a response from the chat bot

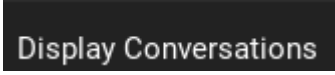
Regardless of whether or not you're using the text, audio, or voice option, your message and the chat bots response to that message are stored in the large white box named 'Conversation log' as seen in the image²⁸ below. Here you can view the messages that you've sent to the chat bot and the chat bots responses.

Note: This only logs the current message and generated response. This was done to ensure that the user wasn't overwhelmed by a conversation that could be quite large. With that said, if you wish to view the entire conversation inside this box, you can do so by accessing the 'Display Conversations' button on the menu bar.



Talking to the chat bot: Display Conversations

The ‘Display Conversations’ button on the menu bar as seen in the image²⁹ below. Allows you to display the entire conversation that you’ve had with the chat bot. This information is displayed in the conversation log box that you read about earlier.



Display Conversations

Installation Instructions: (Automatic Installation) Linux

Linux users have the option to manually install the required software for this program. If you'd like to access the install then navigate to and open the project directory. Once there, type `'cd Installers/Linux'` into your terminal. It's suggested but not required that you read the ReadMe file. Once ready to install the software type `'./install-sentence.sh'` into your terminal.

If you receive any errors while installing this software please scroll to the page in the users manual which dictates the Manual installation process.

Installation Instructions: (Manual Installation) Linux

If the automatic installer failed please open your *home* folder and run the following commands in order. Don't worry about manually typing each line, you can just copy and paste these commands into your terminal.

```
sudo apt-get install python3 python3-pip libexpat1-dev libpython3-dev python-pip-  
whl python3-dev python3-setuptools python3-wheel build-essential git ffmpeg  
libsdl2-dev libsdl2-image-dev libsdl2-mixer-dev libsdl2-ttf-dev libportmidi-dev  
libswscale-dev libavformat-dev libavcodec-dev zlib1g-dev swig libpulse-dev espeak
```

```
sudo apt-get update
```

```
wget - http://www.portaudio.com/archives/pa_stable_v190600_20161030.tgz
```

```
tar -xvzf pa_stable_v190600_20161030.tgz
```

```
cd portaudio
```

```
./configure && make
```

```
sudo make install
```

```
sudo apt-get update
```

```
sudo -H python3 -m pip install Cython==0.23
```

```
sudo -H python3 -m pip install kivy==1.9.1 pytsx3 chatterbot PyAudio  
PocketSphinx SpeechRecognition bleach boto boto3 botocore bz2file cffi click  
colorama command-not-found cryptography cssselect docutils fire flashtext Flask  
future gensim google-api-core google-api-python-client google-auth google-cloud-  
core google-resumable-media googleapis-common-protos html5lib httplib2 idna  
imbalanced-learn jedi Jinja2 jupyter jupyter-console jupyter-core kappa Keras  
luminoth lxml nltk notebook numpy pandas pendulum Pillow pyasn1 pycrypto  
pygobject pymongo PyNaCl PyOpenGL PyQt5 PySDL2 python-twitter pytz  
PyYAML pyzmq requests rsa scikit-learn scipy selenium setuptools sip six  
SQLAlchemy ssh-import-id style tensorflow tensorflow-gpu Theano tornado tqdm  
urllib3 wheel xkit xlwt
```

Installation Instructions: (Automatic Installation) Windows

Windows user have the option of use an automatic installer script. This script was written for the powershell. Only windows users that have powershell version 5.0 and higher can use the automatic installer. To check your version number, open the power shell as administrator. You do this the same way you opened the command prompt.

Once open type “\$PSVersionTable.PSVersion” and then hit enter. This will tell you what version of the powershell you’re running. If it is version 5.0 or higher, type “Set-ExecutionPolicy Unrestricted” and then hit the enter key. When prompted, hit “r” and then the enter key.

Next, open your project folder and copy its path. Type “cd” and paste that path into your powershell. Then type “cd Installers/Windows/” and then hit the enter key. Finally type “./Setup.ps1” and then hit the enter key.

Throughout the installation you’ll be prompted to hit the ‘y’ or ‘n’ key; carefully read this prompts and follow along until the installation is complete. If you experience any errors or are unable to use this due to your powershell version being less than 5.0. Please see the page in the user manual which details the Manual installation process.

Installation Instructions: (Manual Installation) Windows

Please follow these instructions and execute them as they appear in order.

- 1.) Download and install python 3.6.4 from <https://www.python.org/downloads/>
- 2) Download swigwin-3.0.12 from <http://www.swig.org/download.html> and unzip it to "C:\swigwin-3.0.12"
- 3) Download and install Visual Studio 2017 Community Edition from <https://www.visualstudio.com/downloads/#build-tools-for-visual-studio-2017>
- 4) Locate, download, and install the appropriate sqlite drivers from <http://www.ch-werner.de/sqliteodbc/>
- 5) Add "C:\swigwin-3.0.12" to your environment variable path
- 6) `python -m pip install --upgrade wheel setuptools`
- 7) `python -m pip install docutils pygments pypiwin32 kivy.deps.sdl2 kivy.deps.glew`
- 8) `python -m pip install kivy.deps.gstreamer kivy.deps.angle`
- 9) `python -m pip install Cython`
- 10) `python -m pip install kivy kivy_examples pandas xlwt chatterbot speechrecognition pocketsphinx pyttsx3 PyAudio`

File paths: Linux file paths

1. caprica_Statements.txt:

This is located at /home/user/.SentienceFiles/
caprica_Statements.txt holds all of the response generated by the
Chat bot in response to the user.

2. User_Statements.txt:

This located at /home/user/.SentienceFiles/ User_Statements.txt holds all of the
responses provided by the user.

3. Username_Conversation.txt This file will be named

Username_Conversation by default if no user profile is ever created. If a user profile
is created the Username will reflect the username supplied by the user. It's also
stored in /home/user/.SentienceFiles/

These files can all be manipulated to provide further training for the
Chat bot, or simply to maintain for your records and later research.

I will list each file path in full again if you desire to print them.

/home/user/.SentienceFiles/Caprica_Statements.txt

/home/user/.SentienceFiles/User_Statements.txt

/home/user/.SentienceFiles/Username_Conversation.txt

File paths: Windows file paths

1. caprica_Statements.txt:

This is located at C:\SentienceFiles\
caprica_Statements.txt holds all of the response generated by the
Chat bot in response to the user.

2. User_Statements.txt:

This located at C:\SentienceFiles\ User_Statements.txt holds all of the responses
provided by the user.

3. Username_Conversation.txt This file will be named

Username_Conversation by default if no user profile is ever created. If a user profile
is created the Username will reflect the username supplied by the user. It's also
stored in C:\SentienceFiles\

These files can all be manipulated to provide further training for the
Chat bot, or simply to maintain for your records and later research.

I will list each file path in full again if you desire to print them.

C:\SentienceFiles\Caprica_Statements.txt

C:\SentienceFiles\User_Statements.txt

C:\SentienceFiles\Username_Conversation.txt

Documentation

The documentation for this program is located in the project directory, in the folder named “Documentation”. Within that folder you’ll see two other folders.

1) Latex: The latex folder contains a pdf file of the documentation. To view this file locate and open the pdf named “refman.pdf”.

2) Html: The Html folder contains a series of html documents, this is probably the easiest way to view the documentation. Unless you’re like me and also love .pdfs. To view the html document locate and open the file named “index.html”.