

# Psychological Healthcare Chatbot

## Introduction.

Emotional health is a fundamental component of a person's overall well-being. It refers to the general state of mind and the ability to manage emotions, stress and interpersonal relationships in a healthy manner. However, there are currently several cases of emotional or mental health difficulties, which are generated from various factors involved in people's daily lives. One of the problems that this presents is the efficient attention of this type of situation, even more when we talk about an emotional crisis.

Taking this into account, for this project we propose to develop an expert system, which is a computer system that simulates human reasoning to solve problems in a specific domain through established rules and facts determined within the same, focused on offering help in situations of emotional crisis that a person may have, that is, a system of psychological emergencies, where the response will be given in the form of suggestions against the condition that the user is presenting.

## Problem Statement and Objectives.

Based on the above, the objective of the project is to create an expert system which fulfills the function of recommending solutions to the crisis or situation suffered by the user, without giving a diagnosis related to what the user is feeling or expressing.

## Requirements Analysis.

High-level requirements

- To be able to log in to the system.
- To be able to select the different symptom options.
- To be able to obtain the recommendation from the selected symptoms and the user's history.
- To be able to log out.

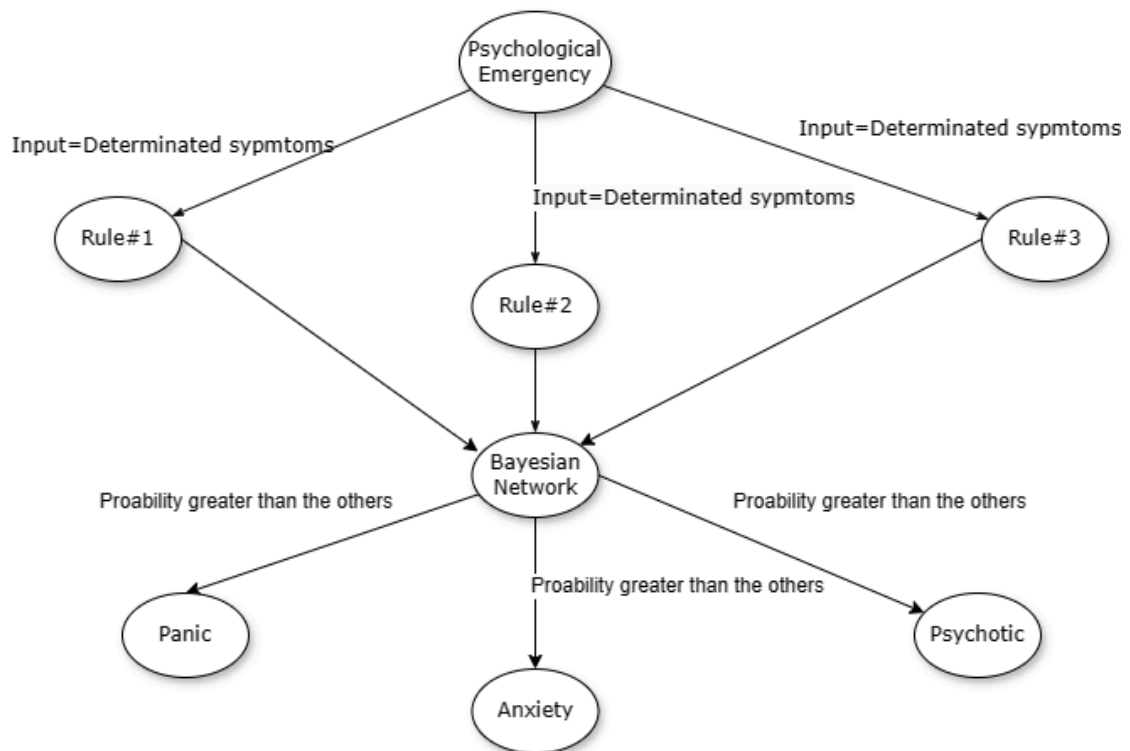
Taking into account these requirements and the objective set out above, from the entries given by the user and background (symptoms or recommendations given previously by the system) the system will deploy the suggestions to give.

## Knowledge Acquisition and Representation.

The knowledge source used for this project was the information got from a sixth semester psychology student of ICESI University and student from the same institution with experience in psychological first aid

- Knowledge representation:  
If the user has hyperventilation, distortion of reality, ideas of self-injury, body tremors, blurred vision or any other symptom (that is represented by binary values) is checked or processed inside Bayesian network, where taking into account the input, we get the probabilities to get one or other diagnosis. When we get this values is compared between they to see who is the greatest and with that is determined what recommendation display to the user

- Detail control structure:



- Facts internal structure:  
Taking into account the inputs given by the user, the facts will be stored from the Fact class of Expert, which inherits from Python dictionary, where the symptoms given by the user will be stored in the form of key-value for processing within the system together with the diagnoses obtained from the Bayesian network.
- Preliminary user interface:  
Through a GUI it will show the options of the symptoms to be chosen by the user (represented with buttons) where he/she will choose the ones he/she is experiencing at that moment. When choosing one, other options related to the selected one are displayed.

## System Design.

### GUI and user instructions.

If you want to use the application, you should register and then log in to the application.

A screenshot of a web browser showing the 'Register' page. The browser's address bar displays 'airpsychoapp.wittymoss-a619893d.eastus.azurecontainerapps.io/register/'. The page features a white registration form centered on a light gray background. The form has the title 'Register' at the top. It contains three input fields: 'Username' with a note 'Required. 150 characters or fewer. Letters, digits and @/./+/-/\_ only.', 'Email address', and 'Password'. Below these fields is a dark gray 'Register' button. At the bottom of the form, there is a link that says '¿Ya tienes una cuenta? [Inicia sesión aquí](#)'.

When you finish the sign-up, you will be redirected to the login view.

A screenshot of a web browser showing the 'Login' page. The browser's address bar displays 'airpsychoapp.wittymoss-a619893d.eastus.azurecontainerapps.io'. The page features a white login form centered on a light gray background. The form has the title 'Login' at the top. It contains two input fields: 'Username' and 'Password'. Below these fields is a dark gray 'Login' button. At the bottom of the form, there is a link that says '¿No tienes una cuenta? [Regístrate aquí](#)'.

The main view of the application show you a button that redirects you to the psychological chat.

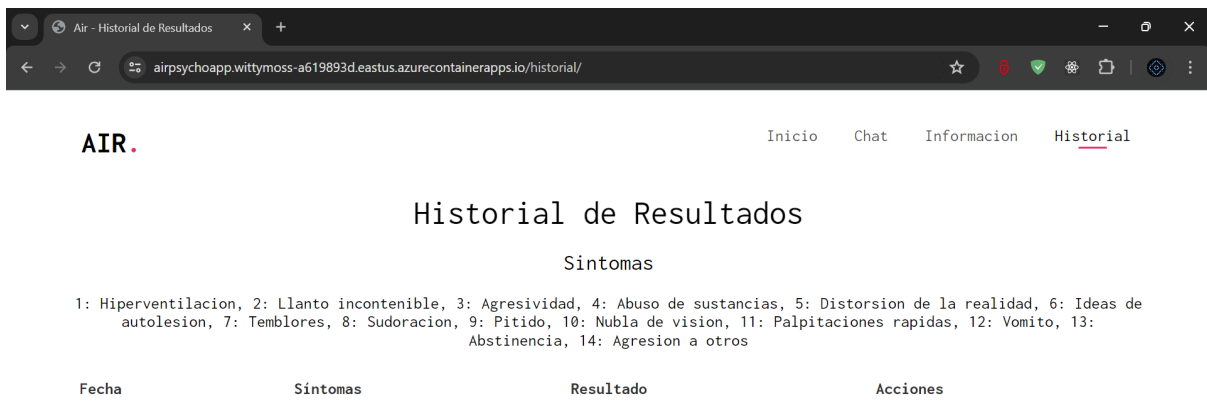


If you go to the “Information” link, it will show you information about us and the definitions of some symptoms of your interest.

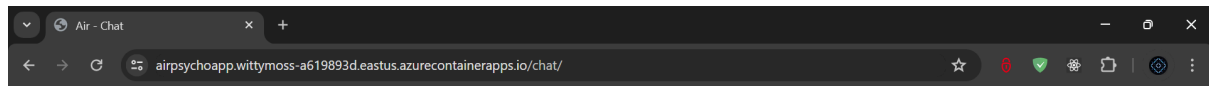




Also, if you go to the “Historial” link, it will show you the history of your queries on the application.



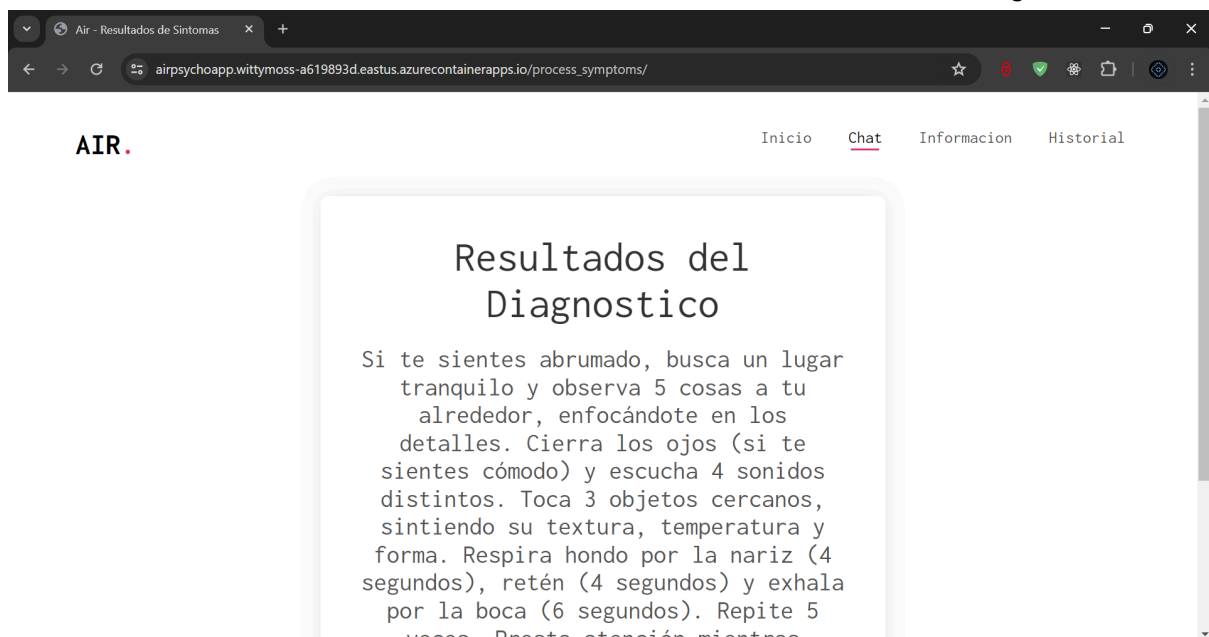
When you go to the “Chat” link, it will show you some symptoms that you can select and depending on what you select, it will show you a guide of how to deal with the symptoms you selected or more symptoms to finally give you the guide.



AIR.  
Cuales son los sintomas que estas experimentando en este momento?



For this case, I selected “Abuso de sustancias” and this is the result of the diagnosis.



Finally, when you finish using the application, you can log out, and you will be redirected to the login view again.

## Implementation Details.

### Used technologies.

For the development of this project, we decided to use the **Python** programming language, because it has a wide variety of libraries used in the field of AI. In this case, for the development of expert systems. Additionally, for the development of the application, we used the **Django** web development framework. The application was developed for a web

environment and deployed on the **Azure** cloud. Finally, the main libraries used for the project and for developing the expert system were **Experta** and **Pgmpy**.

### **Coding Techniques and Source Code Style.**

For this project, we are using the style guide PEP8 (Python Enhancement Proposal 8).

#### **Naming conventions.**

- For variables and functions names, we use snake case.
- For class names, we use pascal case.
- For constant name, we use upper case with words separated by underscores.

#### **Code style.**

- For indentation, we use 4 spaces per indentation level.
- For line length, we use 79 characters.
- We use blank lines to separate functions and classes, and within functions to separate blocks of logic.
- We import one library per line and at the beginning of the file.

#### **Data storage strategies.**

For this project, we decided to use the SQLite database. The reasons why we decided to use this database is because of its portability, performance, zero configurations, cross-platform and it doesn't require external dependencies. Also, according to the lifecycle of an expert system, this being a prototype is appropriate for testing and when we get to a MVP, we can change it for another database.

### **Testing and Validation.**

- **Test Case 1**
  - **Test Case Name:** Obtain advice related to psychotic state
  - **Objective:** From user input, obtain a prediction of psychotic state.
  - **Input conditions:** Boolean values from GUI selection
  - **Expected result:** The following message should be displayed: "Debes llamar a un número de emergencia o a alguien de tu entera confianza, entiende que tu vida vale mucho".
- **Test Case 2**
  - **Test Case Name:** Obtain advice related to anxiety state
  - **Objective:** From user input, obtain a prediction of anxiety state.
  - **Input conditions:** Boolean values from GUI selection
  - **Expected result:** The following message should be displayed: "Si te sientes abrumado, busca un lugar tranquilo y observa 5 cosas a tu alrededor, enfocándote en los detalles. Cierra los ojos (si te sientes cómodo) y escucha 4 sonidos distintos. Toca 3 objetos cercanos, sintiendo su textura, temperatura y forma. Respira hondo por la nariz (4 segundos), retén (4 segundos) y exhala por la boca (6 segundos). Repite 5 veces. Presta

atención mientras respiras a lo que ves, oyes y tocas, manteniéndote presente. Recuerda, está bien tomarte un tiempo para ti. Este ejercicio te ayuda a encontrar paz y claridad. Respira y tómate tu tiempo.”.

- **Test Case 3**

- **Test Case Name:** Obtain advice related to anxiety state
- **Objective:** From user input obtain a prediction of anxiety state.
- **Input conditions:** Boolean values from GUI selection
- **Expected result:** The following message should be displayed: “Si te sientes abrumado, busca un lugar tranquilo y observa 5 cosas a tu alrededor, enfocándote en los detalles. Cierra los ojos (si te sientes cómodo) y escucha 4 sonidos distintos. Toca 3 objetos cercanos, sintiendo su textura, temperatura y forma. Respira hondo por la nariz (4 segundos), retén (4 segundos) y exhala por la boca (6 segundos). Repite 5 veces. Presta atención mientras respiras a lo que ves, oyes y tocas, manteniéndote presente. Recuerda, está bien tomarte un tiempo para ti. Este ejercicio te ayuda a encontrar paz y claridad. Respira y tómate tu tiempo.”.

- **Test Case 4**

- **Test Case Name:** Obtain advice related to panic state
- **Objective:** From user input obtain a prediction of panic state.
- **Input conditions:** Boolean values from GUI selection
- **Expected result:** The following message should be displayed: “Debes respirar conscientemente, intenta contar hasta 10 y luego regresa a contar hacia atrás, busca un lugar tranquilo y seguro. Trata de no estar solo, llama a alguien de confianza.”.

### **Deployment.**

This project was deployed on the **Azure** cloud computer platform using **GitHub actions**. You can access the project through this link:

<https://airpsychoapp.wittymoss-a619893d.eastus.azurecontainerapps.io/>

### **Conclusion and Future Work.**

Based on the stated objective and the context of the problem, we can say that we have met the objective of providing a solution, which provides instant answers to the psychological crisis that the user may go through, using an approach to an expert in the field to provide that answer or help.

For future work, it is proposed to expand the help options along with the types of diagnosis to cover a better range of advice for the user.

### **References.**

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