End User Guide

1. Web Application Layout

1.1 Before uploading video

Welcome to our web application. This report provides an overview of the layout and functionality you'll encounter while using our platform. We'll begin by introducing the graphical user interface (GUI) elements you'll see upon entering the page.

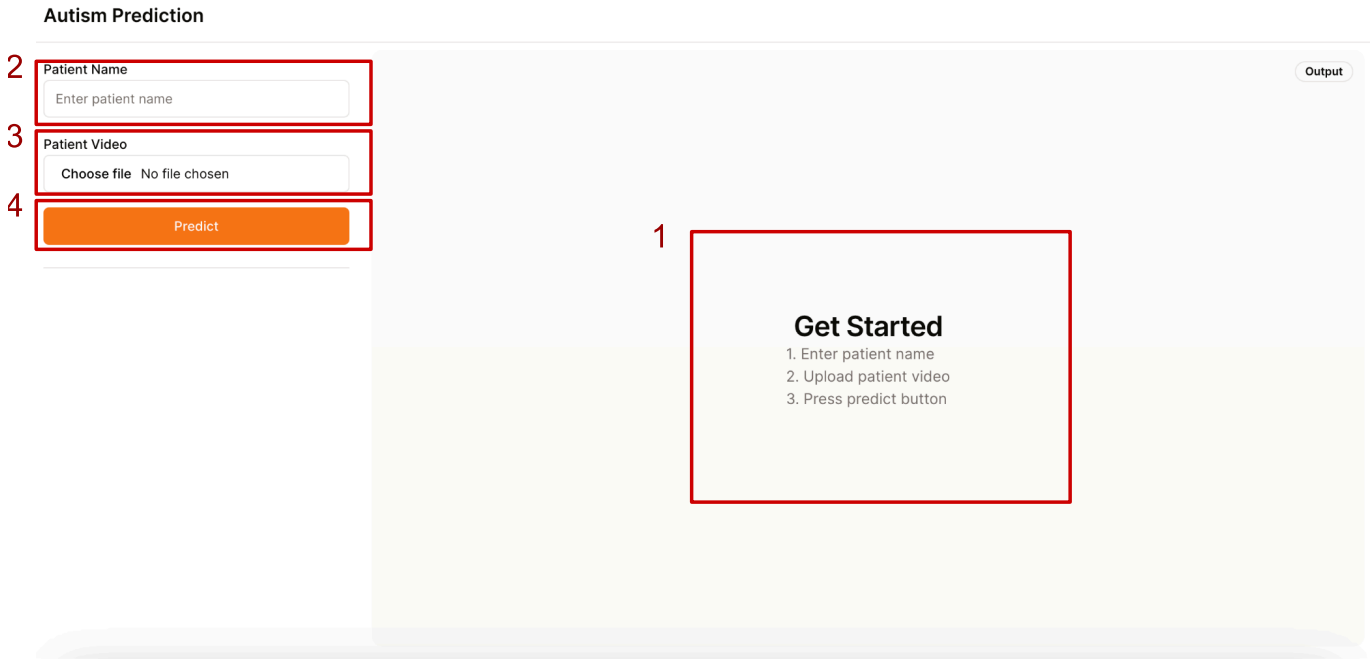


Figure 1. Web Application Landing Page

No	GUI Element	Description
1	User Onboarding Guide	The User Onboarding Guide is a key element designed to provide new users with an introduction to our platform upon landing on the page. By following the guide, users can quickly understand how to navigate the interface, leading to higher user retention [1].
2	Patient Name Input	This input field is required for accurate tracking and follow-up care.
3	Video Upload	To initiate the process of predicting behavior and emotions, you will need to provide a video file of the child for analysis. The application accepts video files in MP4 and MOV formats, each below 100 MB in size. You can upload the video using either of the following methods: A. Choose File Bar: Click the bar to open a file explorer and select the MP4 video file. B. Drag and Drop: Drag and drop the MP4 video file into the designated area.

		Both methods will upload the video for behavior and emotion prediction. If you mistakenly upload the wrong file and need to replace it, selecting the new file will overwrite the previous one.
4	Predict Button	Once you have successfully uploaded an MP4 or MOV video file, you can initiate the prediction process by clicking the "Predict" button. Upon clicking this button, the application will: 1. Pass the uploaded video through the behavior and emotion prediction model. 2. Analyze each frame of the video to detect and classify the child's actions and emotions. Note: Generating the video may take a few moments, depending on the length and complexity of the video.

Table 1. GUI Elements Before Uploading Video

1.2 After uploading video

After providing an appropriate name and uploading a video, our model runs in the background to analyze the video. Once completed, you'll see the above output page where comprehensive insights are provided. In this section, we'll guide you through each component of the output, facilitating a better understanding of the analysis results and how to interpret them effectively.

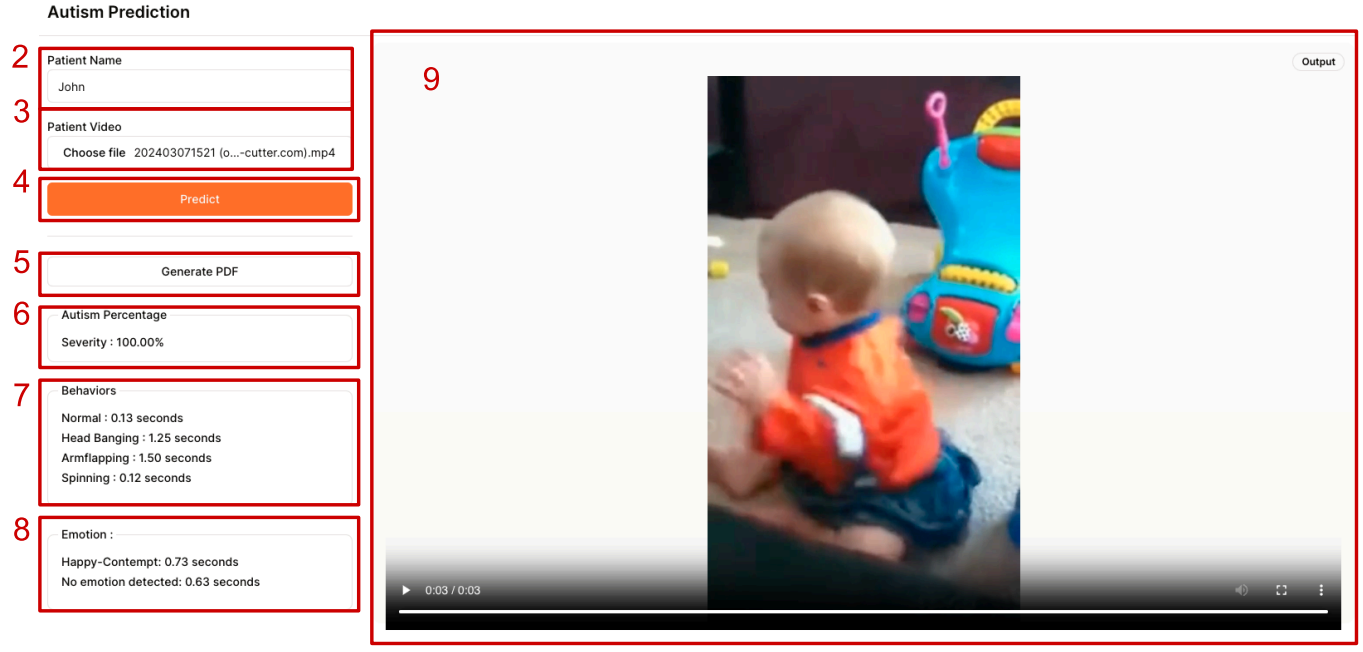


Figure 2. Web Application Result Output Page

No	GUI Element	Description
5	Generate Pdf Button	After the prediction process is complete, you can generate a comprehensive PDF report by clicking the "Generate PDF" button. This report will include the

		following information: Autistic Action Total Duration: A detailed timeline illustrating the total duration (in seconds or minutes) and occurrence of each autistic action detected (arm flapping, spinning, head-banging, and normal behavior). Emotion Duration Analysis: The total duration (in seconds) the child displayed each identified emotion, such as happiness, sadness, anger, or neutral. Percentage of Being Autistic: After analyzing the child's behavior and emotions, the report will provide an overall percentage indicating the severity of the child having autism spectrum disorder (ASD).
6	Autism Severity Percentage	The Autism Percentage section provides an indication of the severity of autism in children based on our model.
7	Detected Autistic Behaviors and Duration	The results will display the total duration (in seconds) for each detected autistic behavior: 1. Normal 2. Head-banging 3. Arm flapping 4. Spinning
8	Emotion Recognition Duration	The results will show the total duration or percentage of time the child displayed each identified emotion.
9	Video Output	In the output section on the right side of the webpage, the processed video will be displayed. Detected autistic behaviors will be showcased in the top-left corner, while emotions will be indicated if the child's face is recognized within the output video.

Table 2. GUI Elements After Uploading Video

2. Using the Web Application

In this section, we'll guide you through the process step by step, from uploading your video to generating a PDF report. Let's get started!

1. **Installation**: For detailed instructions on how to install and set up the web application on your system, please refer to the technical guide provided with the installation package. This guide contains step-by-step instructions tailored to your specific environment and technology stack. Once the installation is complete, you can proceed with the steps outlined in this guide to use the application.

2. **Getting Started:** Open your web browser and go to http://localhost:3000/. You'll land on our homepage.

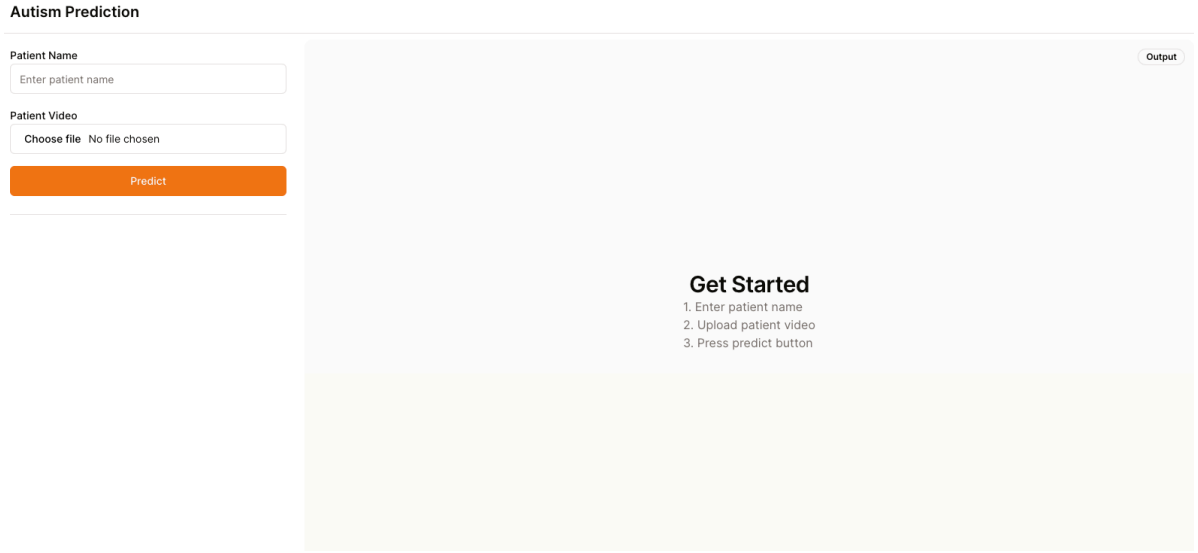


Figure 3. Web application landing page.

3. **Patient Name Input Field:** First, let's give our patient a name! Don't forget, it's essential to fill in this field before we move forward.

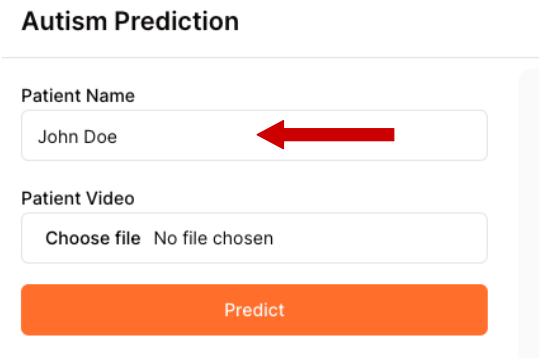


Figure 4. Patient Name Input Field

4. **Uploading Your Video:** To upload your video, simply drag and drop it onto the "Choose File" bar, or click on the bar and select your MP4 video from your computer. Only one video can be uploaded at a time.

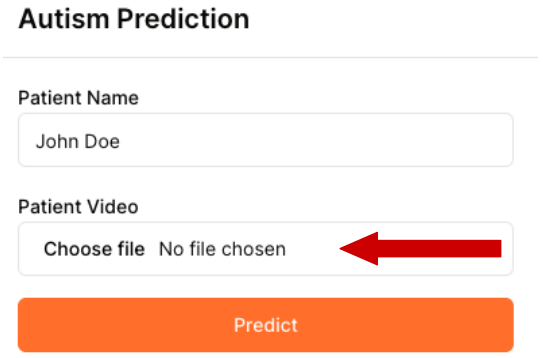


Figure 5. Upload Video Section

When you click the bar it will open a file explorer and select the MP4 video file.

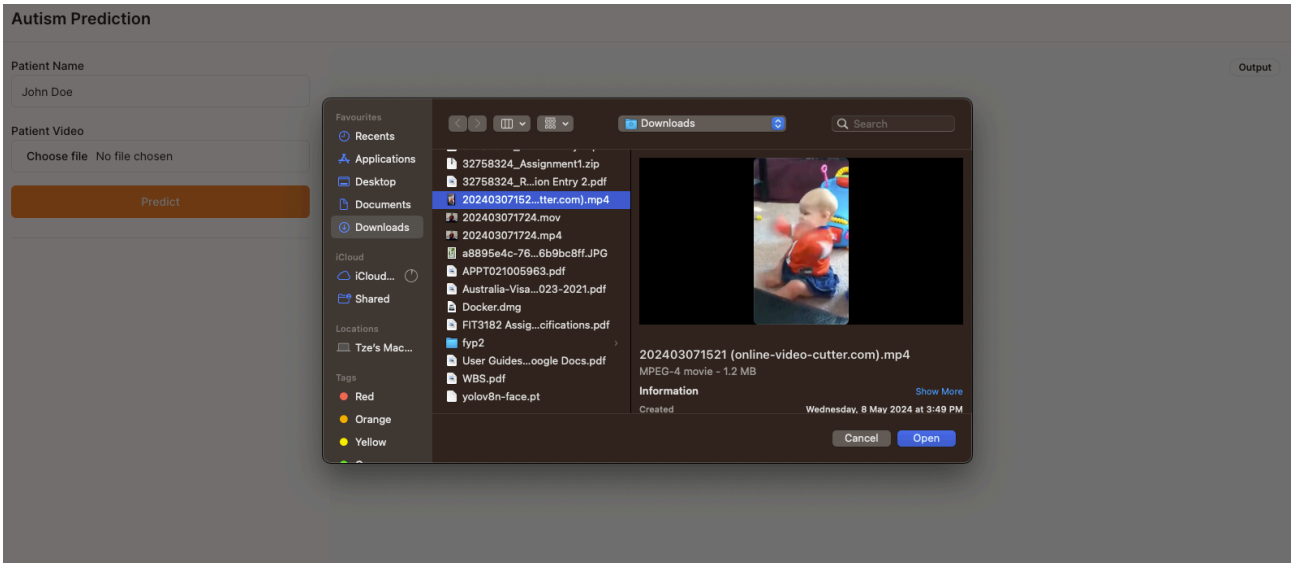


Figure 6. Uploading your video

Once the video is uploaded, the video file name will appear.

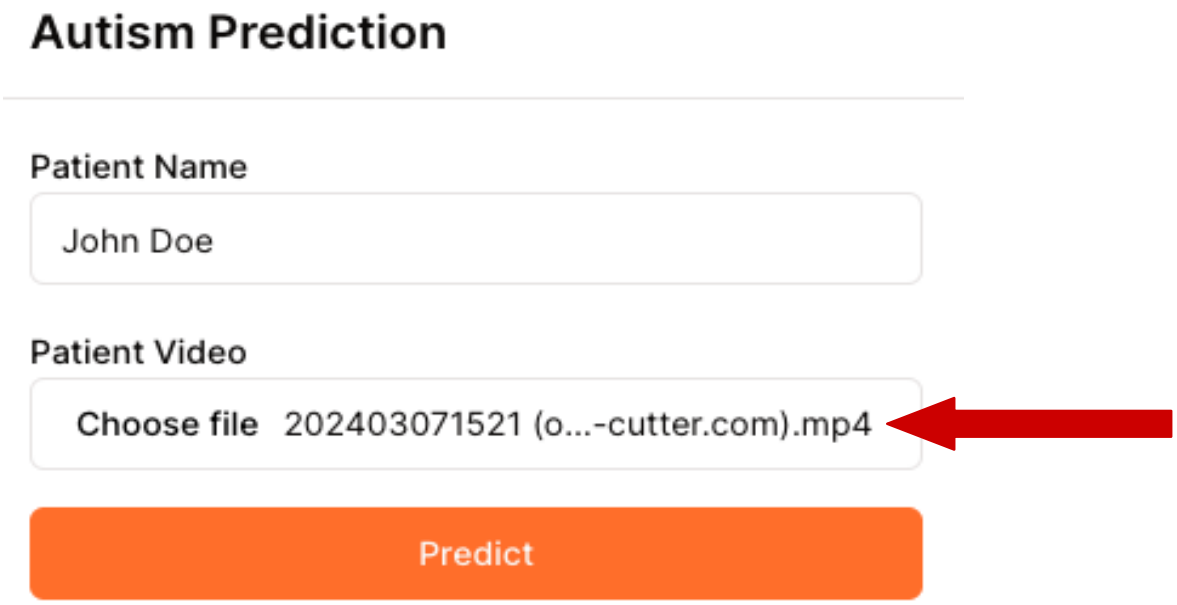


Figure 7. Uploaded video

5. **Changing Your Video:** Made a mistake or want to try a different video? No problem! Just click on the "Choose File" bar again and select another video file.

6. **Making Predictions:** Ready to see the magic happen? Click the "Predict" button once you've chosen your video. Then, seat back and relax while our clever model works its charm on your video. Good things take time, especially if your video's a hefty one!

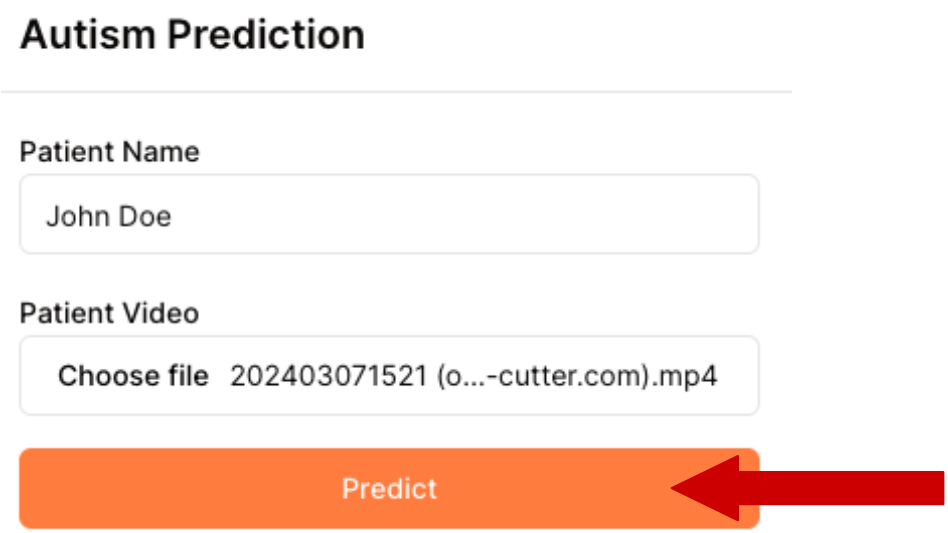


Figure 8. Click the “Predict” button

After clicking the predict button, you'll see the page below with 'loading' messages. During this time, users won't be able to upload another video. This helps prevent congestion and reduces the chance of user error.

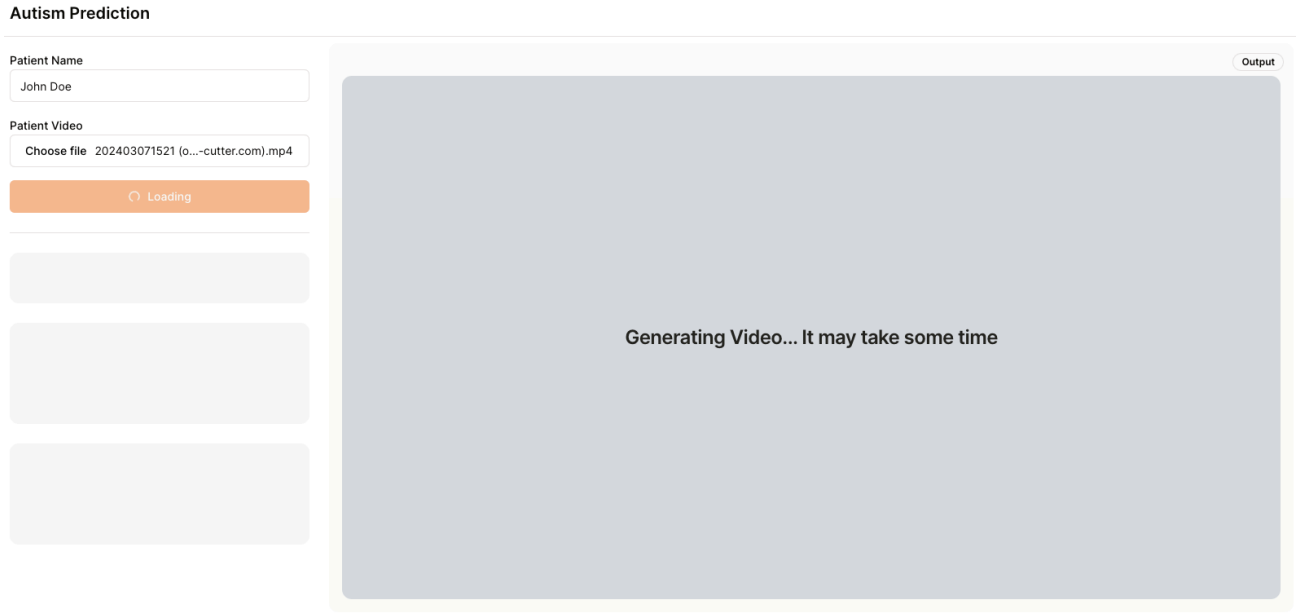


Figure 9. Predicting Video Process

7. **Viewing Results:** Voilà! Our model will reveal the total duration (in seconds) for each detected autistic behavior, as well as the total duration of time the child displayed each identified emotion, along with the severity of the autism. You'll find this information on the left side of the page.

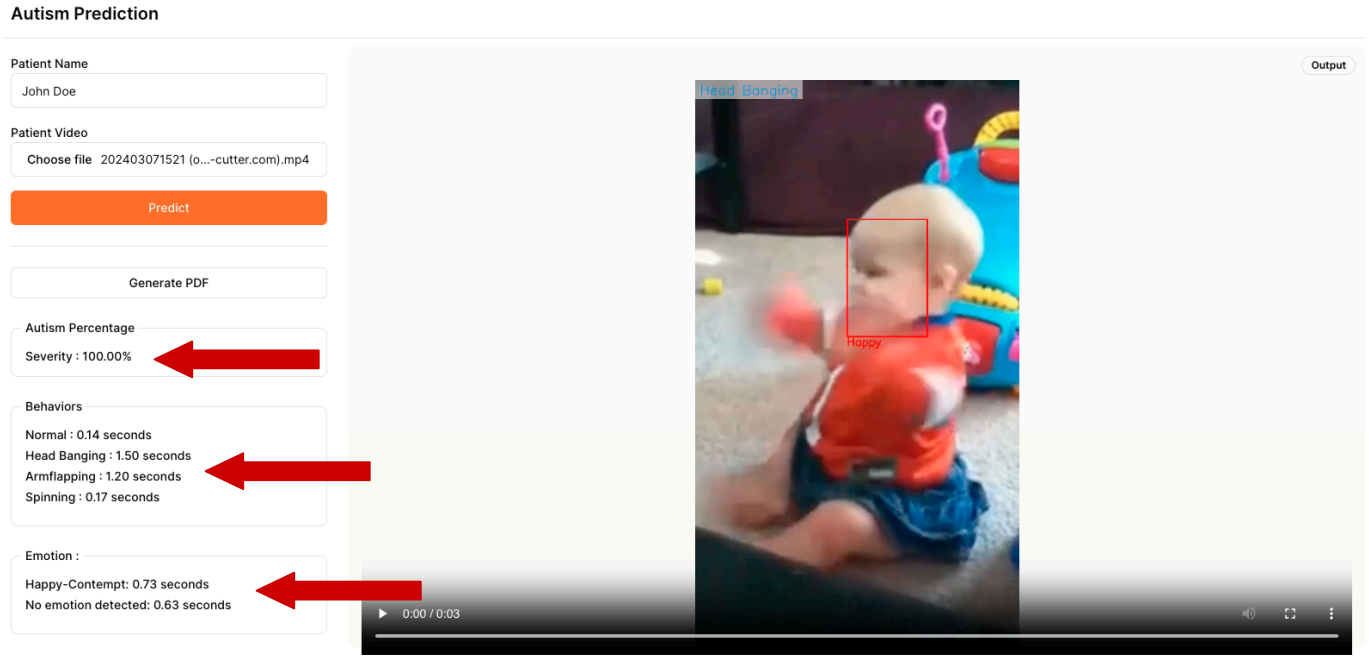


Figure 10. Results Displayed on Webpage

8. **Watching Processed Video:** The processed video will be showcased on the right side of the page, while the detected autistic behaviors will be displayed on the top left corner of the video. Additionally, the identified emotions will be visually represented within the frame of the video itself.

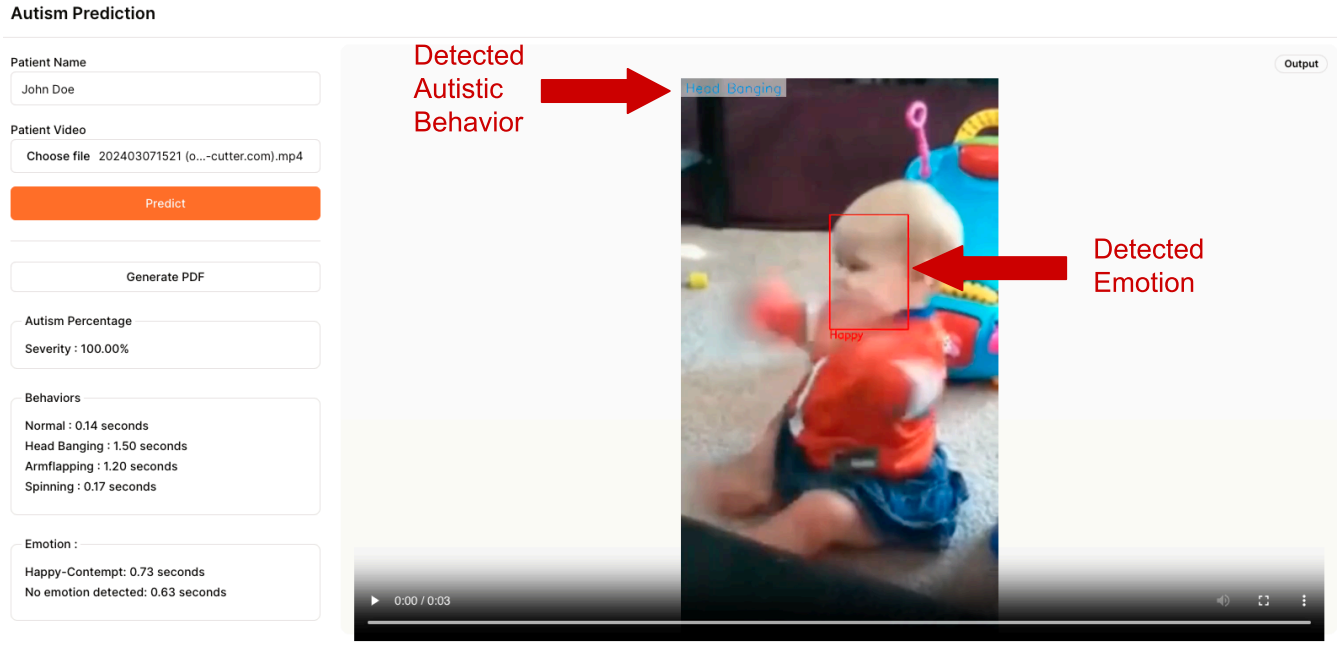


Figure 11. Process Video Layout

9. **Downloading Video:** You can download the output video too! Just Click download.

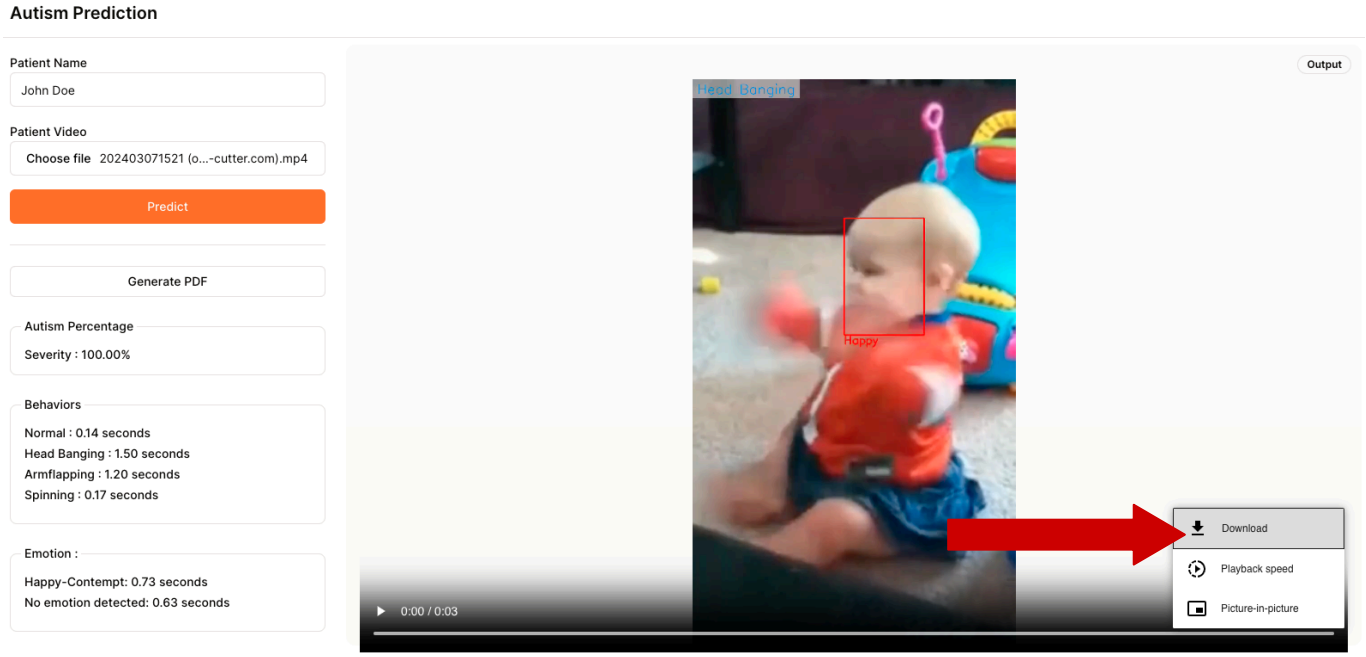


Figure 12. Download Button

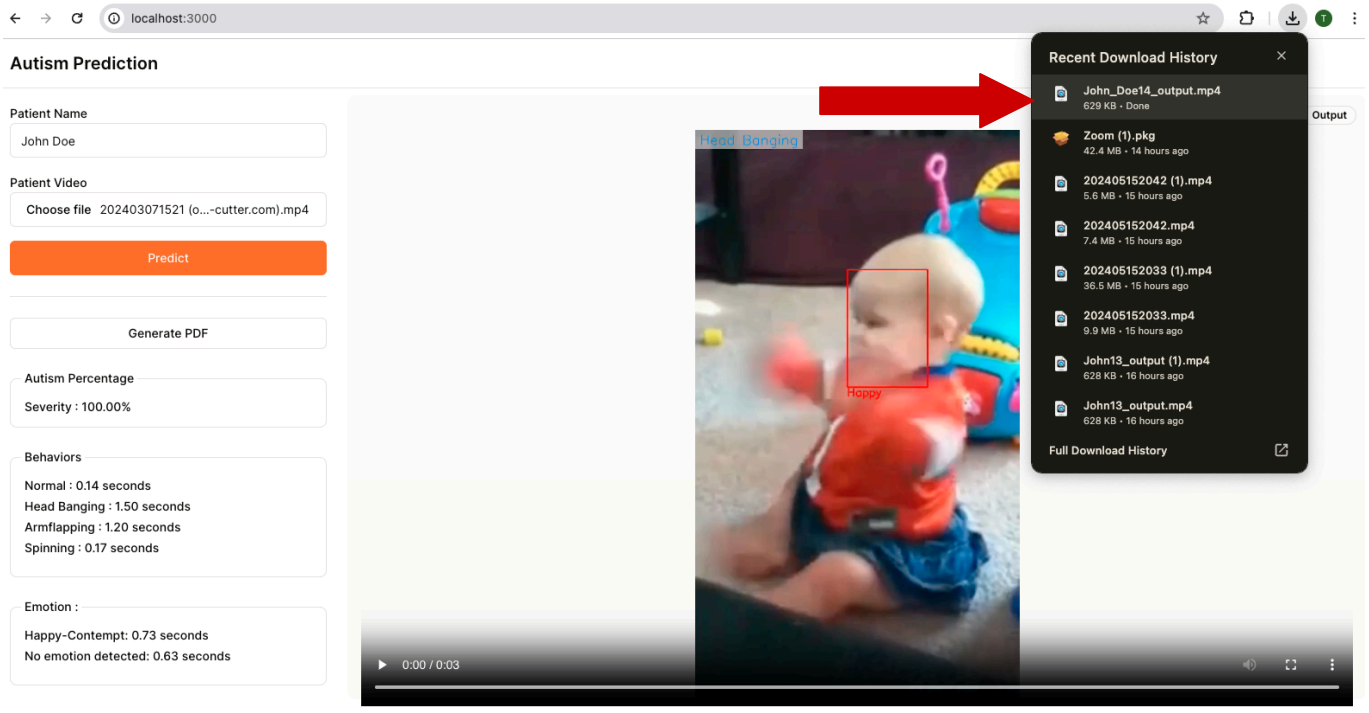


Figure 13. Downloaded Video

10. **Generating PDF Report:** Want to keep a record of your results? Click on the "Generate PDF" button to create a PDF report summarizing the analysis. The PDF report will be formatted in a table and it will serve as a valuable resource for further analysis, documentation, or sharing with relevant stakeholders.

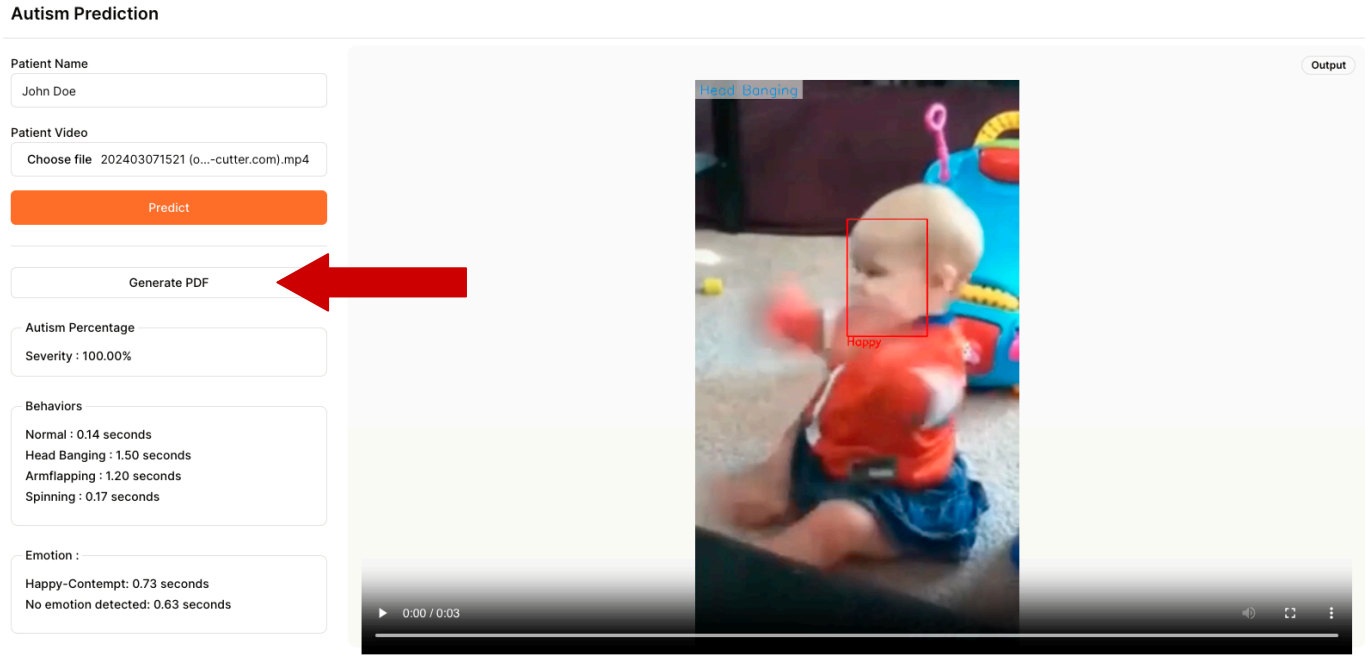


Figure 14. Generate PDF Button

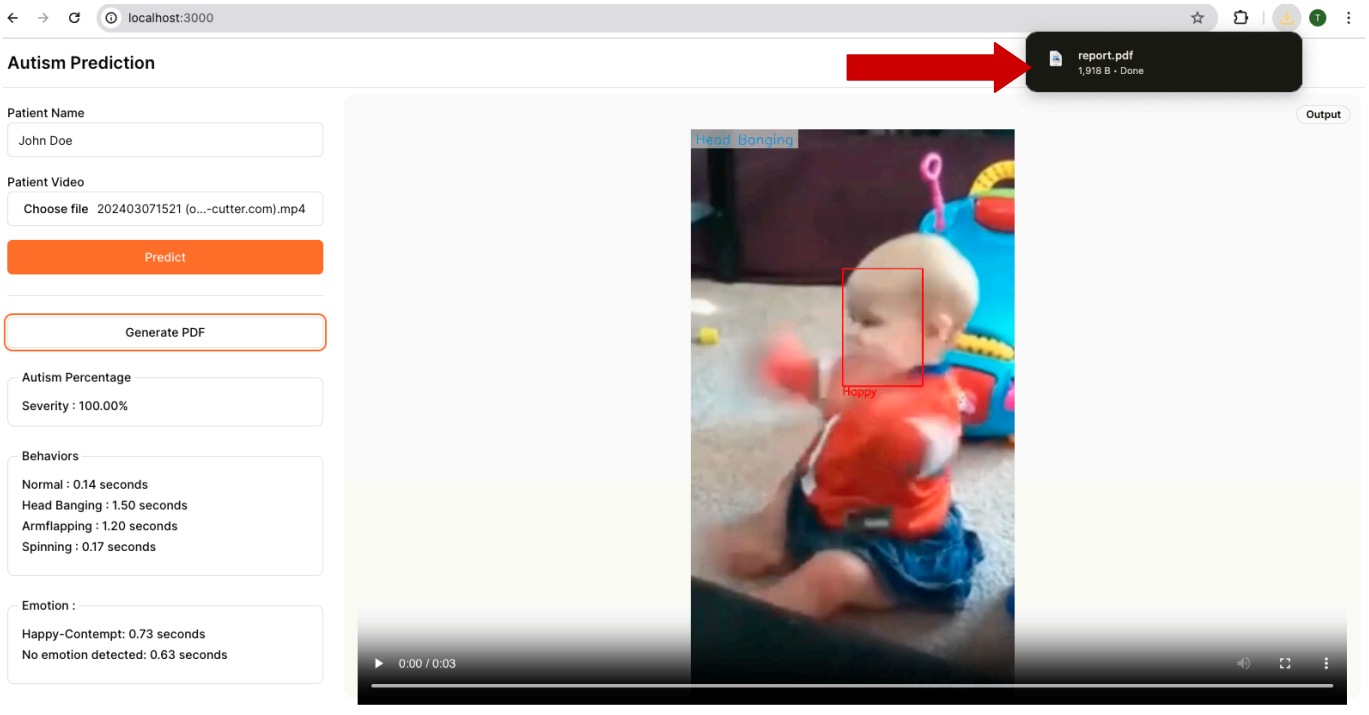


Figure 15. Generated PDF

11. **Exit Web Application:** You can just click the exit button on the tab then click control + c in Windows or cmd + c in Mac in both the terminal of react and django.

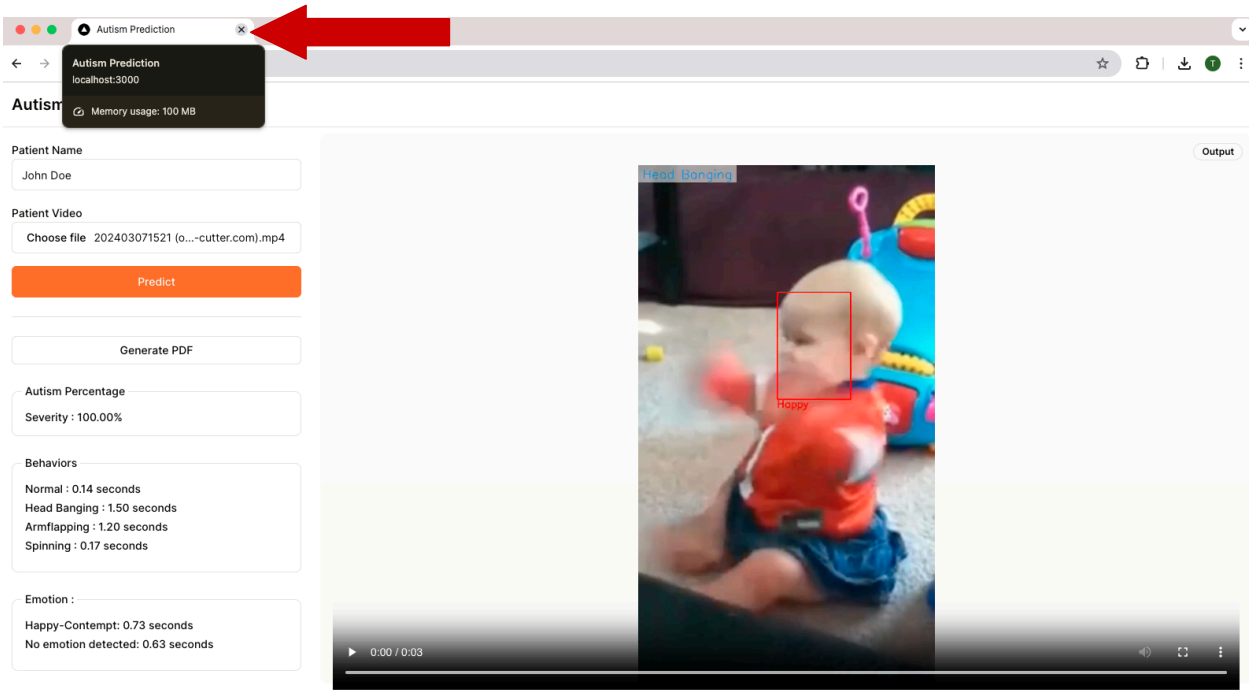


Figure 16. Click the Exit Button

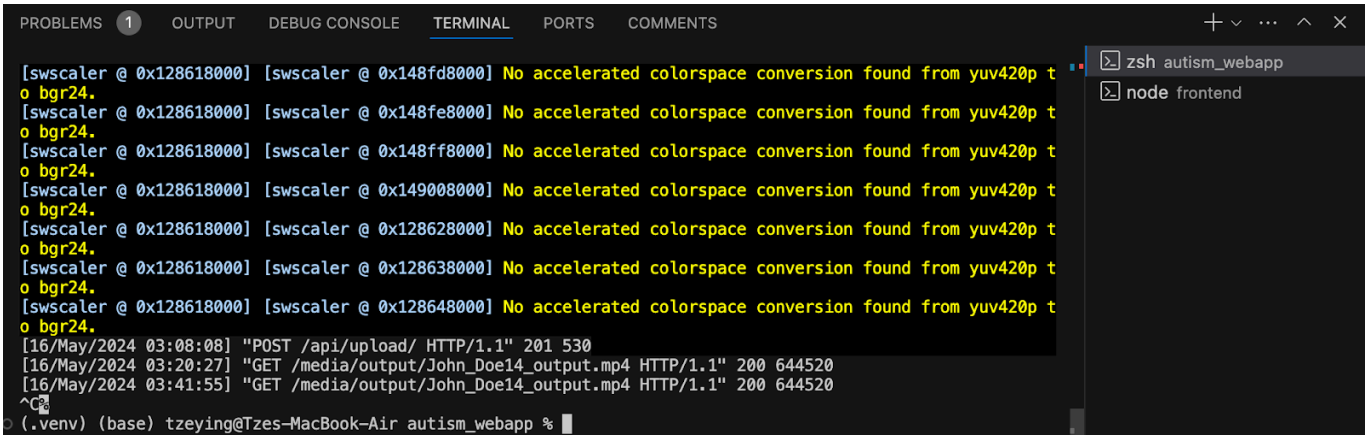


Figure 17. Django Terminal

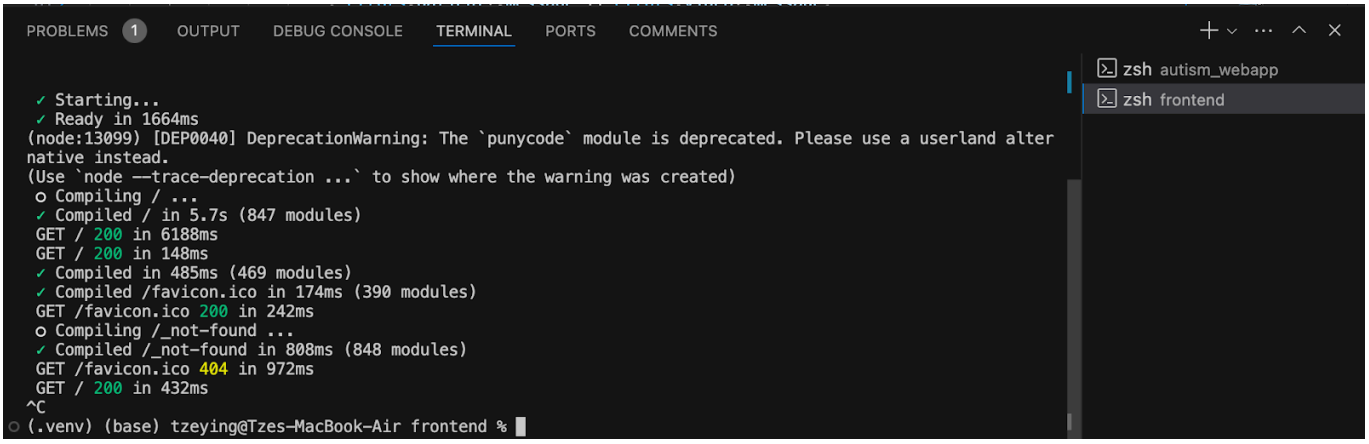


Figure 18. React Terminal

Technical User Guide

This section provides details on the system requirements needed, along with instructions on how to install and launch the web application.

1. System Requirements

1.1 Python and Node

The web application is built using Python for the backend and Node.js for the frontend. To run the application, you need to have Python and Node.js installed on your machine. Installation instructions for both can be found at the provided links [Python] [Node].

The application is developed using Python version 3.10.11 and Node.js version v21.3.0. However, during testing, we found that it requires at least Python 3.10 and Node.js v18.x to function properly. Using versions lower than these may result in failure, as verified through testing.

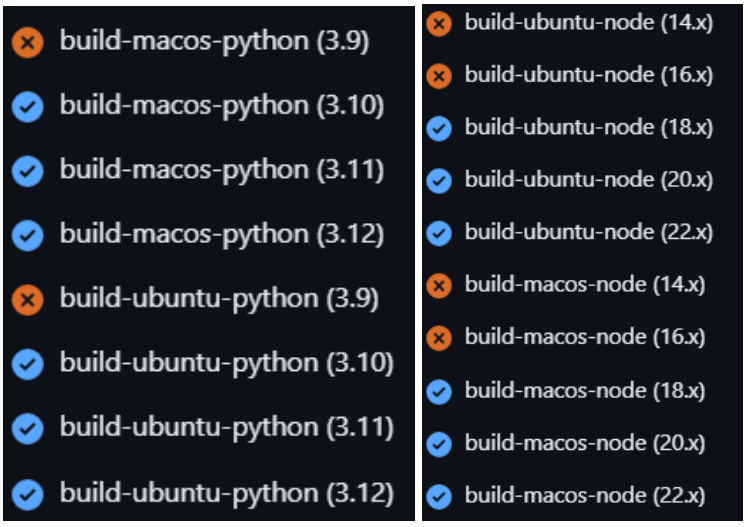


Figure 19. Github actions workflow testing on different versions of node and python.

For optimal performance and stability, we recommend using Python 3.10.11 and Node.js v21.3, which were the versions used during development.

Node Version	Status
14.x	FAIL
16.x	FAIL
18.x	PASS
20.x	PASS
21.3.0	**STABLE**
22.x	PASS

Table 3. Node Versions and Status when used in development

Python Version	Status
3.9	FAIL
3.10	PASS
3.10.11	**STABLE**
3.11	PASS
3.12	PASS

Table 4. Python Version and Status when used in development

1.2 FFMPEG

The web application relies on FFMPEG for video-related tasks. Thus, it's essential to install FFMPEG on your local machine. You can follow the instructions provided in this [link] [link] to install FFMPEG. Alternatively, for Windows systems, you can attempt installation using the command sudo apt install ffmpeg, while for MacOS, you can use brew install ffmpeg as an alternative method.

2. Web Application Installation

1. Navigate to our repository on GitHub by following this link: Autism-Prediction-Web
2. Locate the "Code" button. Click on it to reveal a dropdown menu. From there, either select the HTTPS option or click on the copy icon next to the link to copy the HTTPS URL for cloning the repository.

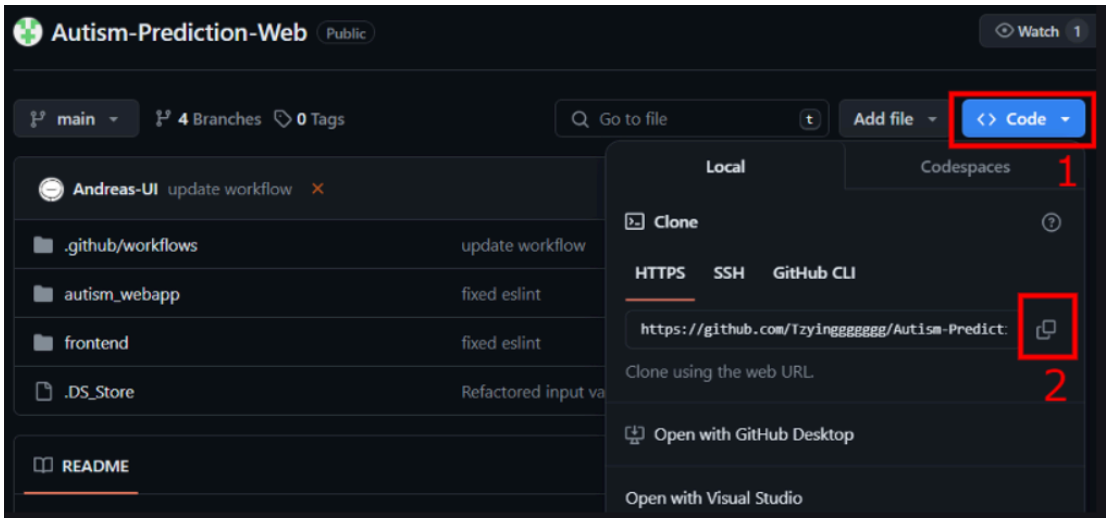


Figure 20. Steps to copy HTTPS link from Github repository.

3. Open a terminal on your local machine and navigate to the directory where you wish to store the repository. Once you're in the desired directory, execute the following command

   git clone <REPOSITORY_HTTPS_LINK>.

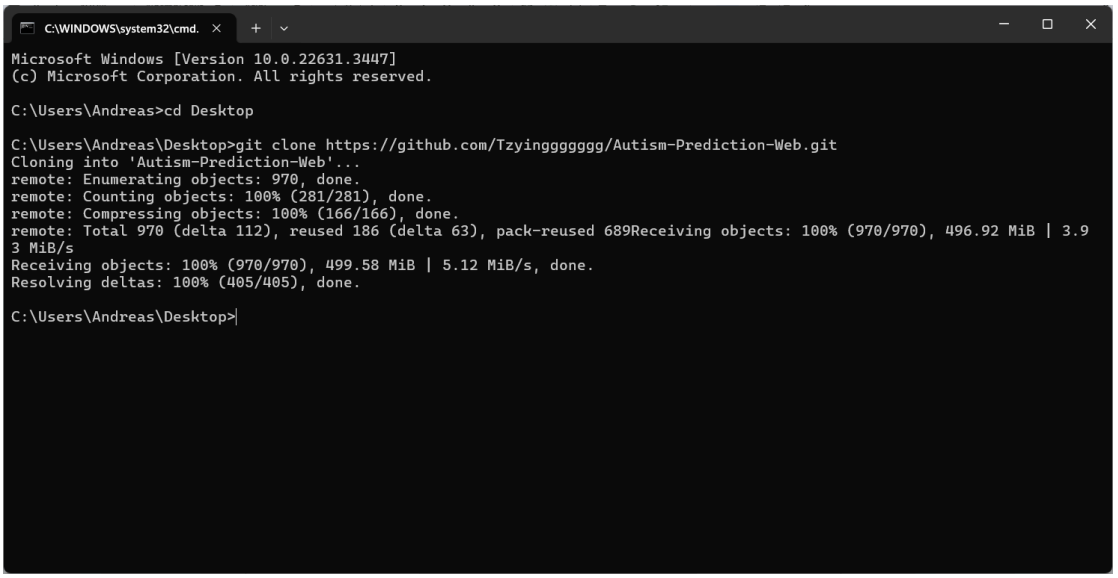


Figure 21. Cloning repository from the HTTPS link using git.

NOTE : Ensure that git is installed on your local device before running the command. If you need assistance with installing git, you can refer to this link for guidance on the installation process.

3. Web Application Setup

1. Navigate to the cloned repository named Autism-Prediction-Web.
2. Establish a Python environment to segregate existing packages and versions from your local machine. Execute the following command in your terminal:

   python -m venv .venv.

3. Activate the environment by executing .venv\Scripts\activate for Windows or source .venv/bin/activate for MacOS.
4. Upon activation, the terminal prompt should display (.venv) at the beginning of your directory path. Ensure that the environment is activated before proceeding.
5. Install all necessary libraries and packages for the web application by running the command make install

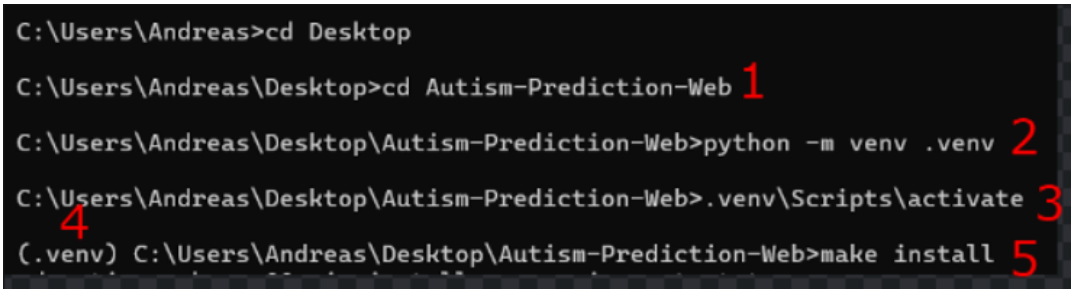


Figure 22. Steps on setting up the web application.

6. Allow time for the installation to complete, as it may require several moments.

4. Running Web Application

4.1 Running Backend

In a new terminal where the environment is activated (see Step 3 from the previous section), run make run-backend . Wait until the backend finishes loading. Upon completion, the server link will be displayed. For the backend, the local server link is located at http://127.0.0.1:8000/.

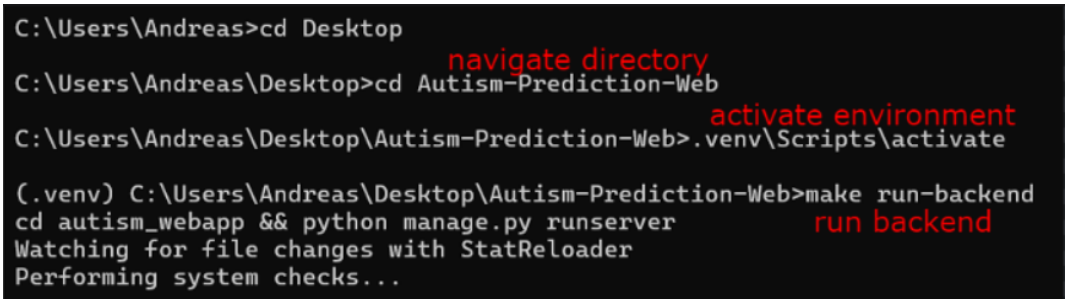


Figure 23. Initialize backend on terminal Part 1.

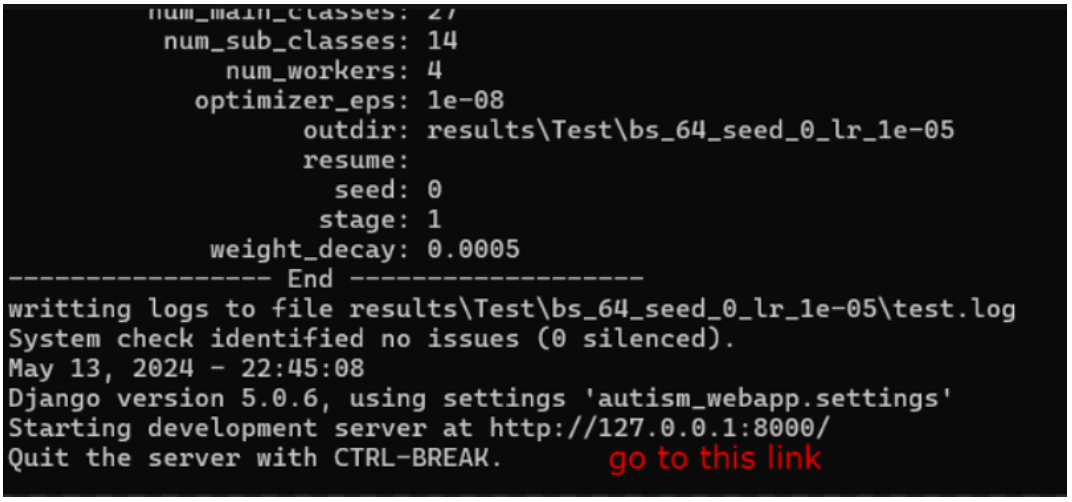


Figure 24. Initialize backend on terminal Part 2.

Figure 25. Running backend on browser.

4.2 Running Frontend

In a new terminal where the environment is activated (see Step 3 from the previous section), run make run-frontend. Wait until the frontend finishes loading. Upon completion, the server link will be displayed. For the frontend, the local server link is located at http://localhost:3000.

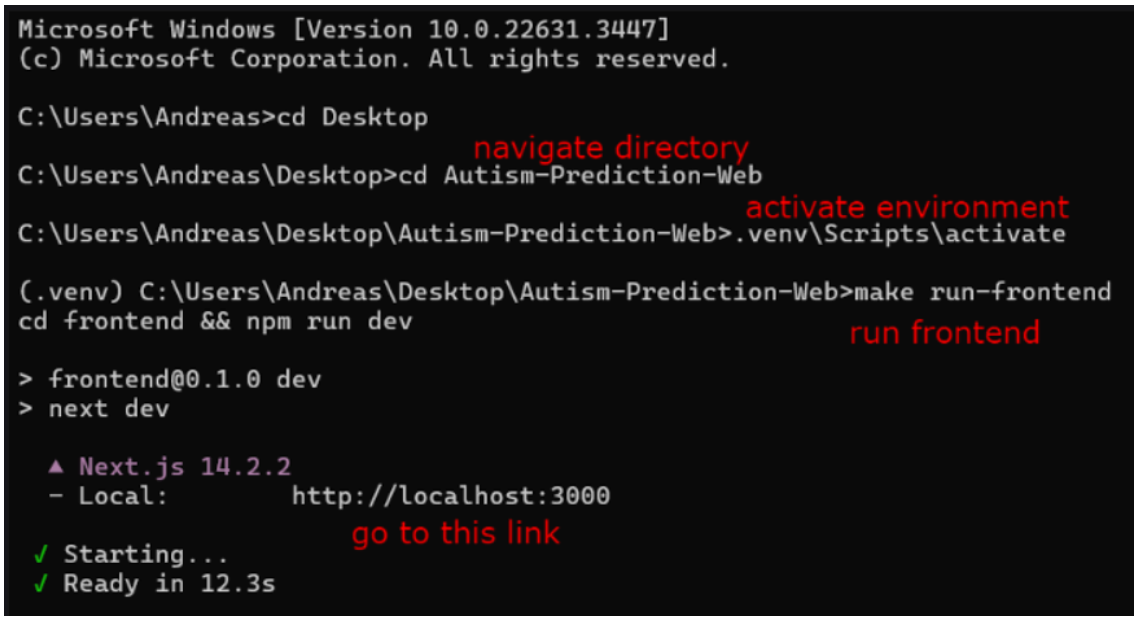


Figure 26. Initialize frontend on terminal.

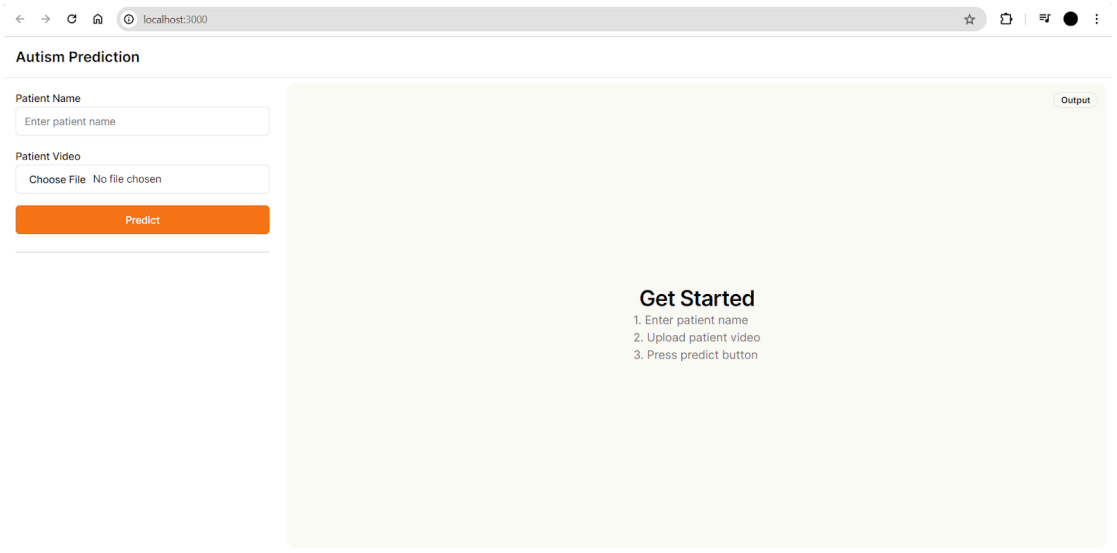


Figure 27. Running frontend on browser.

4.3 Important

It is necessary to have **two concurrently active terminals**—one dedicated to the backend and the other to the frontend—as outlined below. Please DO NOT close either terminal unless you intend to shut down the web application or halt the program.

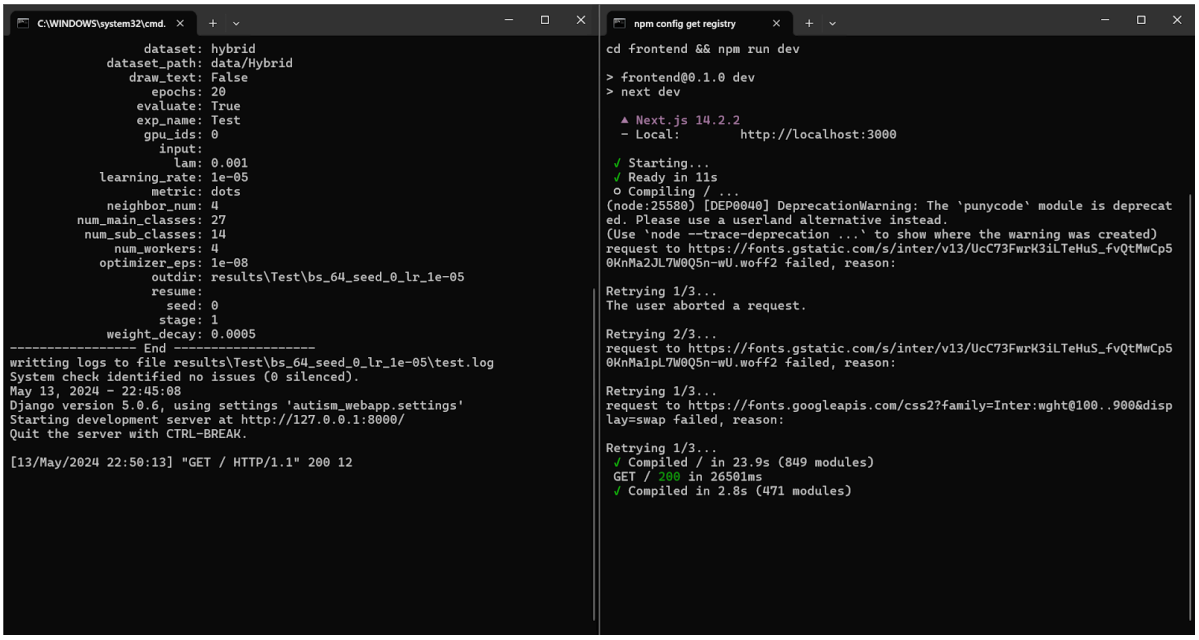


Figure 28. Two terminals active and run at the same time.

5. Troubleshooting

Error on setting up the web application

If either the frontend or backend fails during installation, consider adjusting your Python or Node.js versions accordingly. If the backend fails, try changing your Python version. Similarly, if the frontend encounters issues, consider adjusting your Node.js version.

To address these issues, delete the current folder, clone it again, and repeat the setup steps. This ensures a clean environment for the installation process.

Error on running the web application

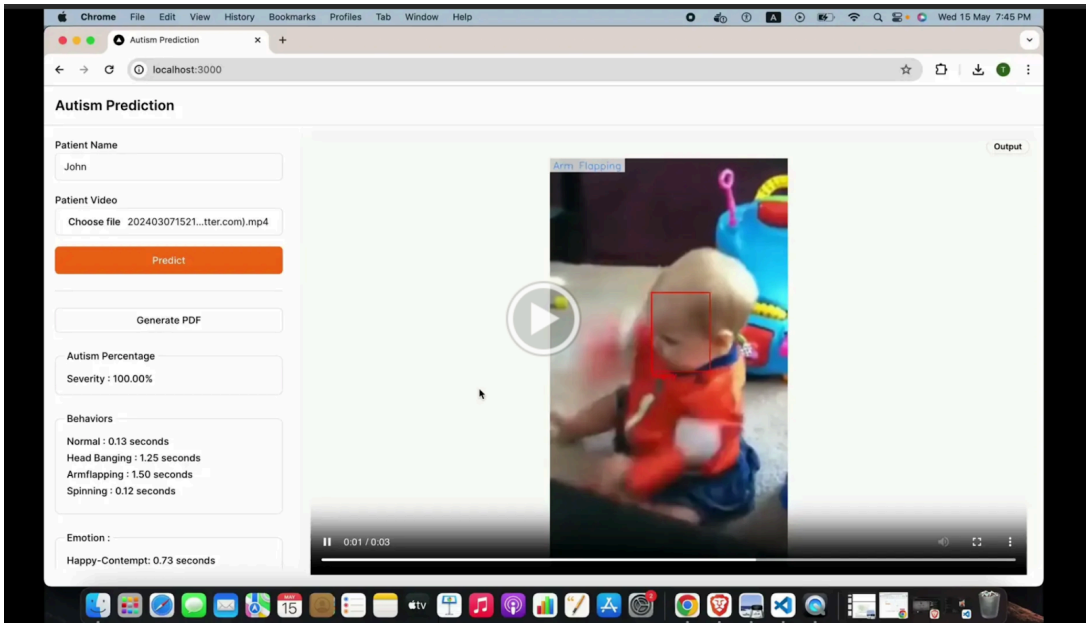
To prevent any errors when running the web application, it's important to double-check that all essential files and packages are installed properly. Make sure to verify the activation of the Python environment (.venv) where all installations take place, as the application depends on it to run.

Furthermore, ensure that FFMPEG is installed on your local machine, as it's a vital component of the web application for handling various video-related tasks. [link]

Appendix

1. Video Playback

Link to Screen Recording



2. Generated PDF Report

Link To Report

Patient Name : abcdefghijklmnopqrstuvwxyzabcd

Severity : 100.00%

Actions
normal: 0.00 seconds
headbanging: 2.34 seconds
armflapping: 0.00 seconds
spinning: 0.00 seconds

Emotions
Happy-Contempt: 1.66 seconds
Happy-Surprise-Fear-Contempt: 0.03 seconds
No emotion detected: 0.07 seconds