Expression Tracker : Sentiment Analysis for Dyslexic Kids During Gameplay

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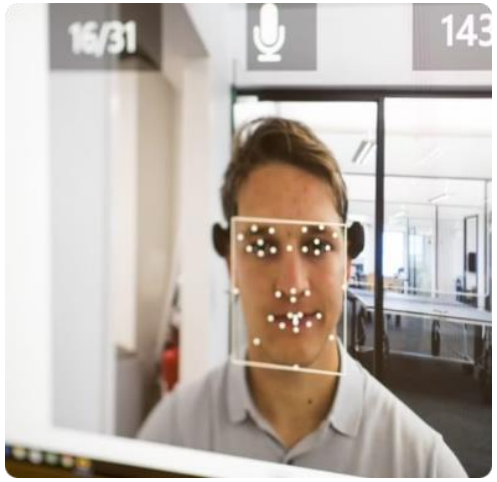
Project Components

Image Capture & Processing Module

Focusing on capturing their facial expressions.



Facial Expression Recognition (FER) system system

Identifies key emotions like happiness, sadness, surprise, anger, and neutral.

Sentiment Analysis

Classified facial expressions are mapped to corresponding emotional states.

Data Structures

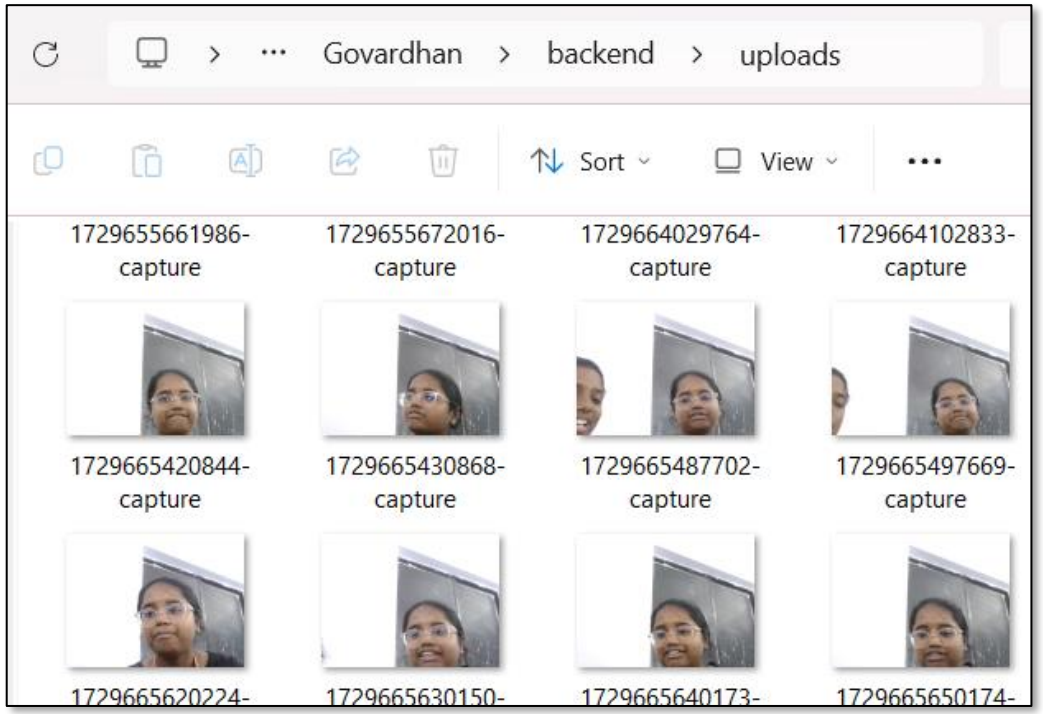
```
JS schema.js > sessionSchema
1   const mongoose = require('mongoose');
2   // Define a schema for session data
3
4   const sessionSchema = new mongoose.Schema({
5     sessionId: { type: String, required: true },
6     sessionName: { type: String, required: true },
7     imagePaths: [String],// Array of strings for image paths
8     screenshotPaths: [String],// Array of strings for screenshot paths
9     timestamp: { type: [String],
10    default: () => [new Date().toLocaleDateString(),
11    new Date().toLocaleTimeString()] },
12    // Store date and time as an array
13    modelResponse: { type: Array, required: false }
14  });
15
16  // Create a model for the schema
17  const Session = mongoose.model('Session', sessionSchema);
18  module.exports = Session;
19
```

SCHEMA.JS

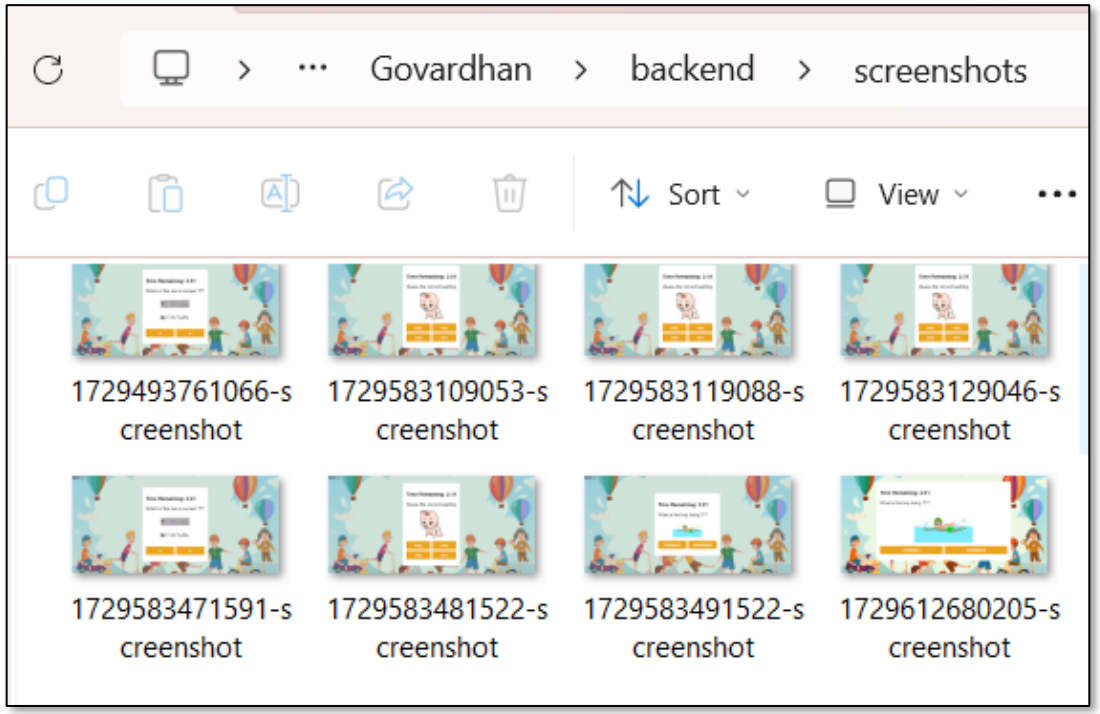
MONGODB DATA STRUCTURE

The system leverages various data structures to store and manage:

- collected information i.e. image paths of the child captured images
- Screenshot paths taken of the website
- Model Responses
- user profiles (Session ID & Session Name)



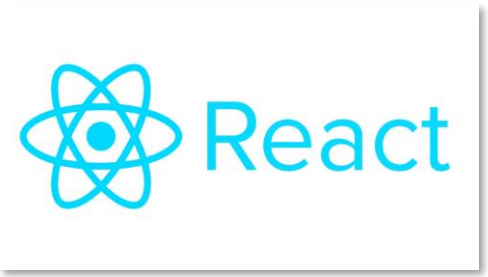
Webcam images in uploads folder



Screenshots of the game in screenshots folder

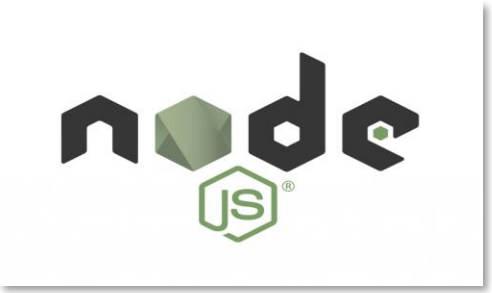
FRONTEND

- 1.React
- 2. css (with Bootstrap)



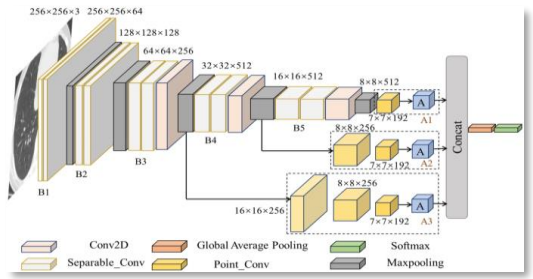
BACKEND

- 1.Node.js (Middleware)
- 2.Express (Middleware)
- 3.MongoDb (Database)



DEEPLEARNING

- Convolutional Neural Network



Hugging Face's vit-face-expression model provides an API to analyze facial expressions, making it easy to track emotions during gameplay. By sending images of the player to Hugging Face's API, we get back emotion labels and confidence scores in real time, like "happy" or "sad."

Testing the model

Test Image

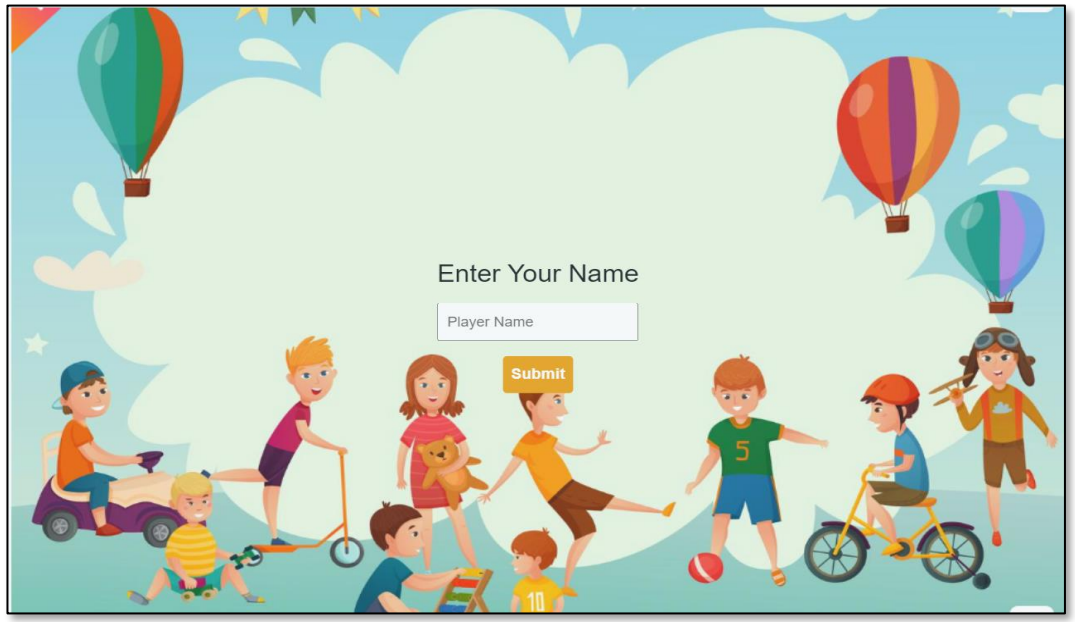
```
PS C:\Users\Govardhan\media-server> node test.js
[
   {
      "label": "happy",
      "score": 0.997902512550354
   },
   {
      "label": "neutral",
      "score": 0.5727202296257019
   },
   {
      "label": "surprise",
      "score": 0.4737154543399811
   },
   {
      "label": "disgust",
      "score": 0.17758150398731232
   },
   {
      "label": "sad",
      "score": 0.16293424367904663
   }
]
PS C:\Users\Govardhan\media-server>
```

Model Response

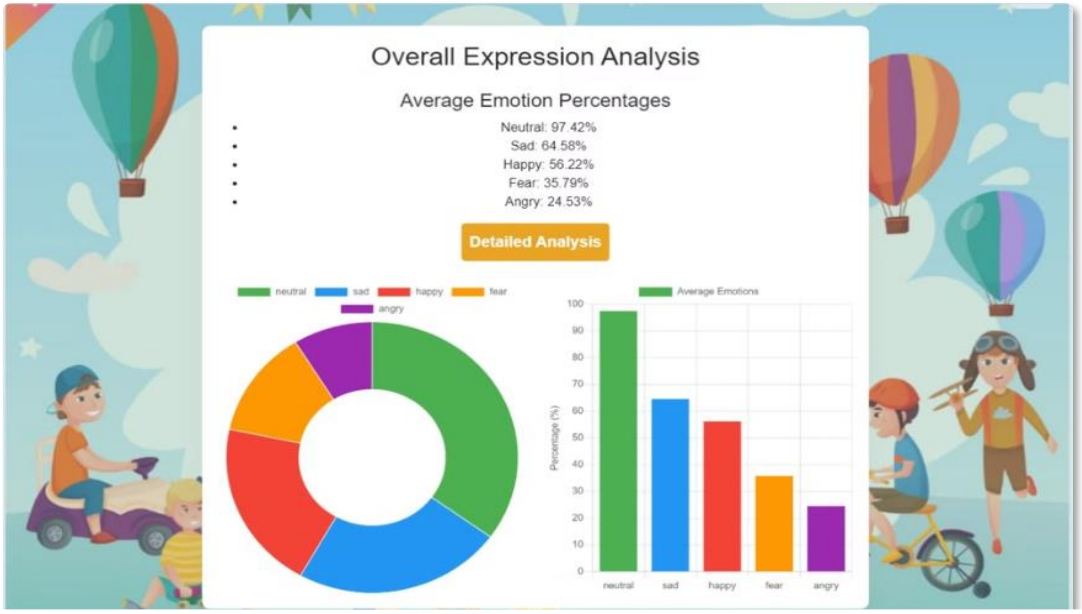
User Roles and Application Interfaces

ROLE	DESCRIPTION
CHILD	The child engages with the educational game, supplying data via webcam and screenshot captures.
ADMIN	Game designers use sentiment analysis to boost engagement, while therapists track emotions to personalize therapy sessions.

Input and Output Screens

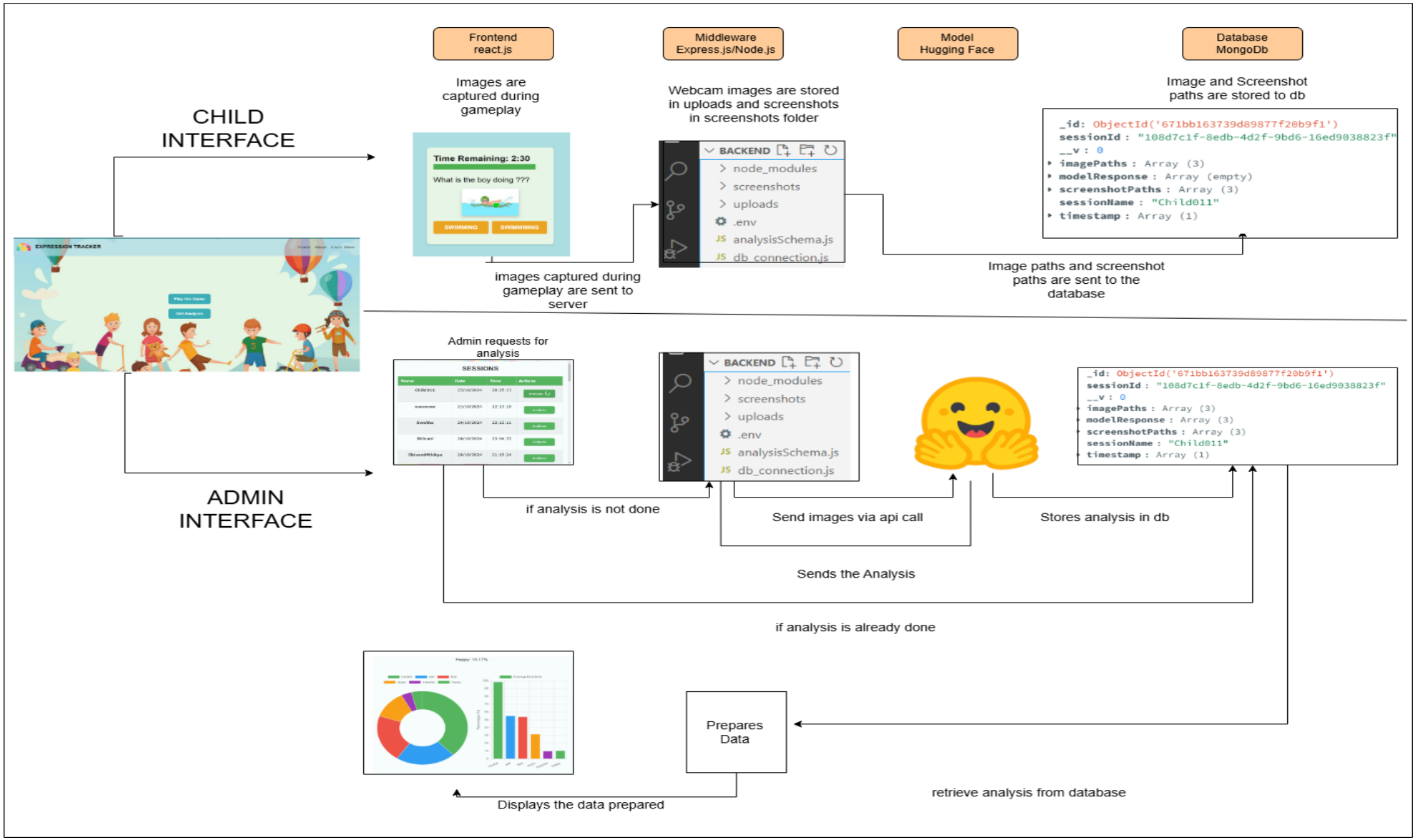


INPUT



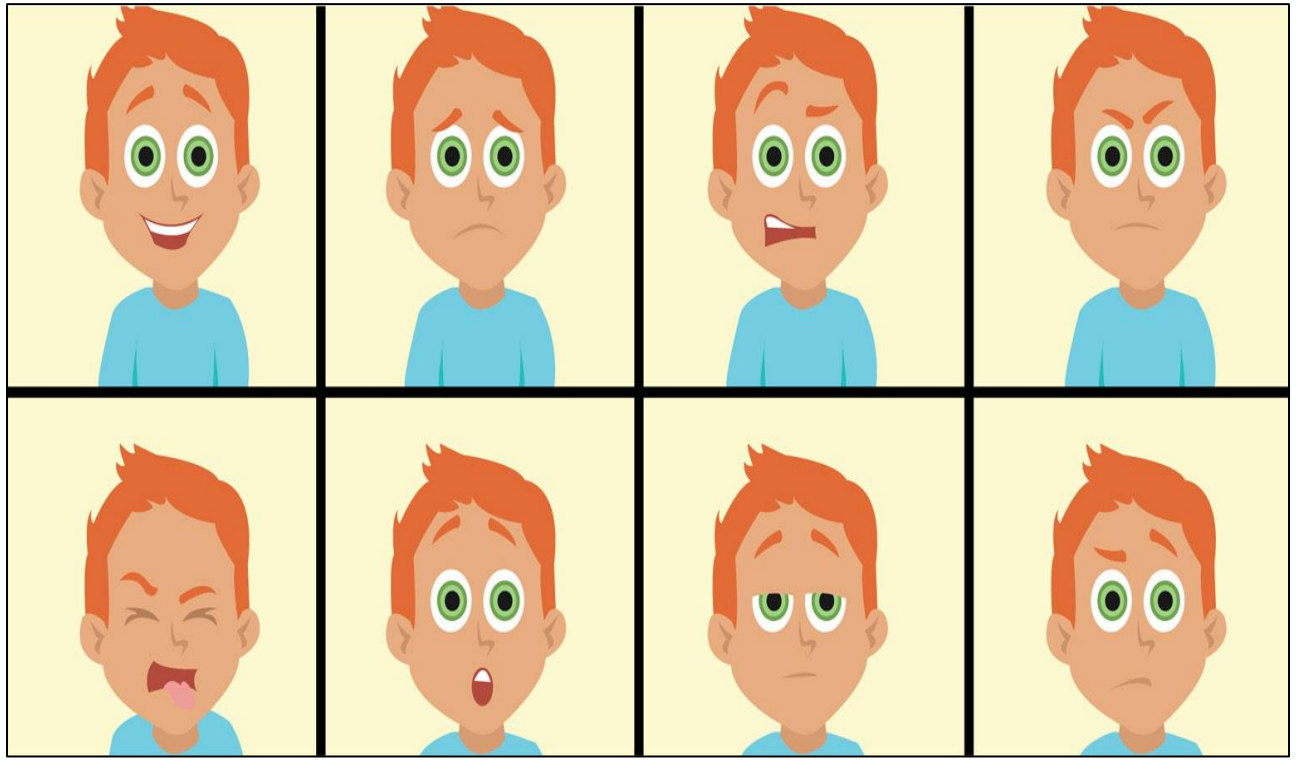
OUTPUT

WORKFLOW


Frontend
react.js
Middleware
Express.js/Node.js
Model
Hugging Face
Database
MongoDb
CHILD
INTERFACE
Images are
captured during
gameplay
Webcam images are stored
in uploads and screenshots
in screenshots folder
Image and Screenshot
paths are stored to db
Time Remaining: 2:30
What is the boy doing ???
SWIMMING
SWIMMING
BACKEND
node_modules
screenshots
uploads
.env
analysisSchema.js
db_connection.js
_id: ObjectId('671bb163739d89877f20b9f1')
sessionId : "108d7c1f-8edb-4d2f-9bd6-16ed9038823f"
__v : 0
imagePaths : Array (3)
modelResponse : Array (empty)
screenshotPaths : Array (3)
sessionName : "Child011"
timestamp : Array (1)
images captured during
gameplay are sent to
server
Image paths and screenshot
paths are sent to the
database
Admin requests for
analysis
SESSIONS
ADMIN
INTERFACE
if analysis is not done
Send images via api call
Stores analysis in db
Sends the Analysis
if analysis is already done
Prepares
Data
Displays the data prepared
retrieve analysis from database

Business Logic

The core business logic revolves around mapping detected facial expressions to emotional states using the DL model, and then providing actionable insights for game optimization based on these emotional states.



References:

- Game based learning for dyslexic kids- https://www.researchgate.net/publication/366816971_Game-Based_Learning_as_a_Teaching_and_Learning_Tool_for_Dyslexic_Children

- Overview of React -https://www.researchgate.net/publication/374154236_Front-End_Development_in_React_An_Overview

- Extraction of facial expressions from images - https://www.researchgate.net/publication/362369382_Prediction_of_Image_Preferences_from_Spontaneous_Facial_Expressions

THANK YOU