PROJECT SCHOOL (2024)

MILESTONE 2

2nd YEAR 1st SEMESTER

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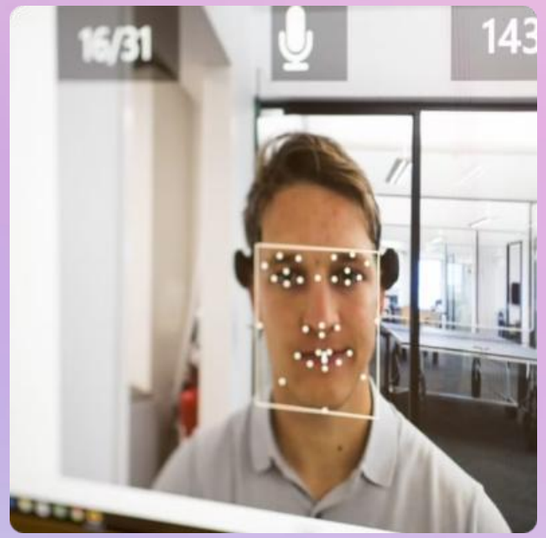
G161

PROJECT: Expression Tracker - Sentiment Analysis for Dyslexic Kids During Gameplay

Project Components

Image Capture & Processing Module

Focusing on capturing their facial expressions.



Facial Expression Recognition (FER) System

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

Sentiment Analysis

Classified facial expressions are mapped to corresponding emotional states.

Data Structures

server.js | 1729464576633-capture.png | Untitled-1 | 1727417559256-screenshot.png | 1727417548846-screenshot.png

schema.js > ...

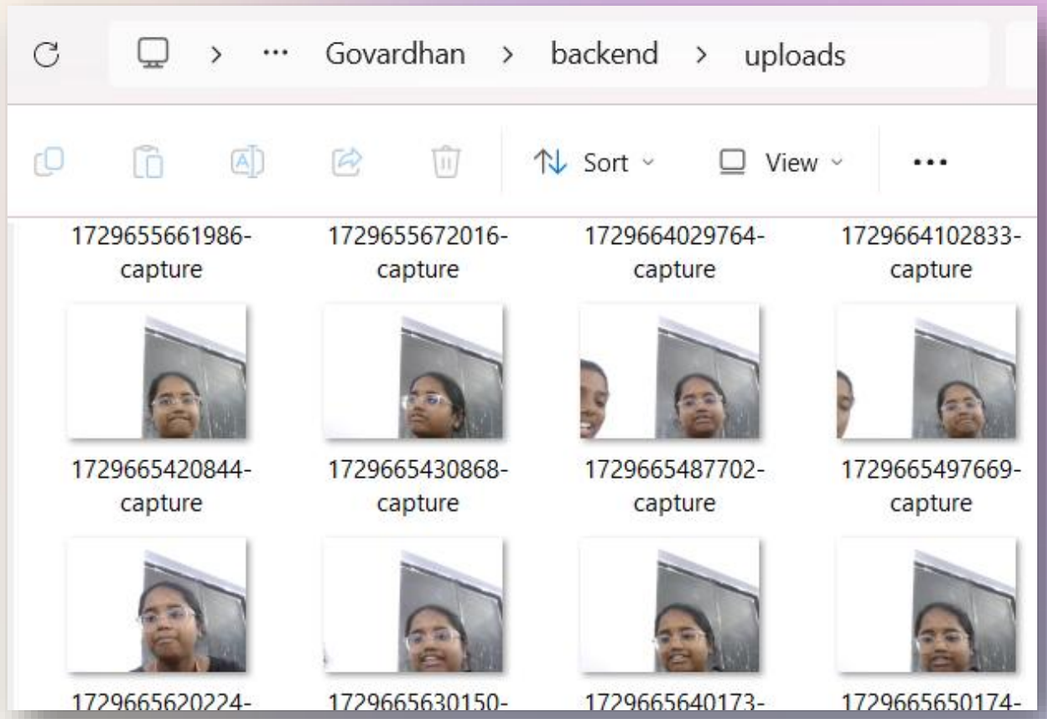
```
1  const mongoose = require('mongoose');
2
3  // Define a schema for session data
4  const sessionSchema = new mongoose.Schema({
5    sessionId: { type: String, required: true },
6    sessionName: { type: String, required: true },  // Add sessionName to store player name
7    imagePaths: [String],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

SCHEMA.JS

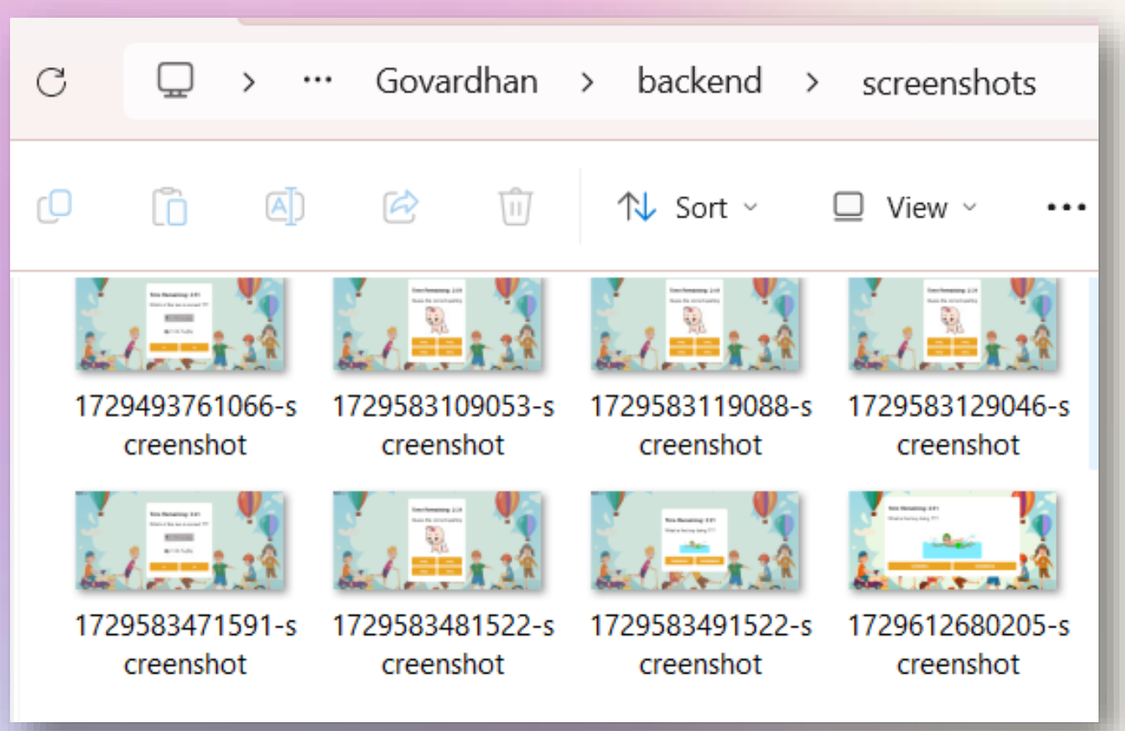
MONGODB DATA STRUCTURE

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



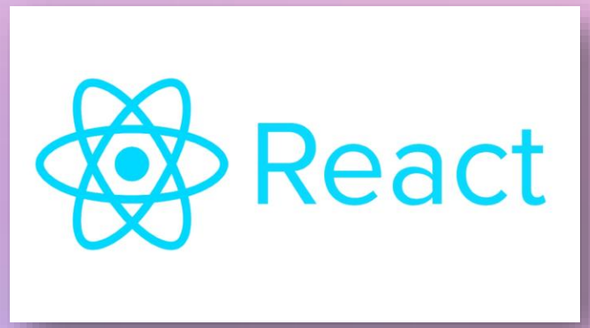
Screenshots of the game in screenshots folder

Tech Stack (MERN)

1

Frontend

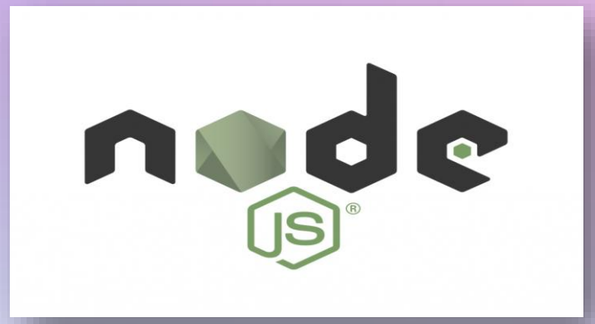
1. React
2. CSS (with Bootstrap)



2

Backend/middleware

1. Node.js (Middleware)
2. Express (Middleware)
3. MongoDB (Backend)

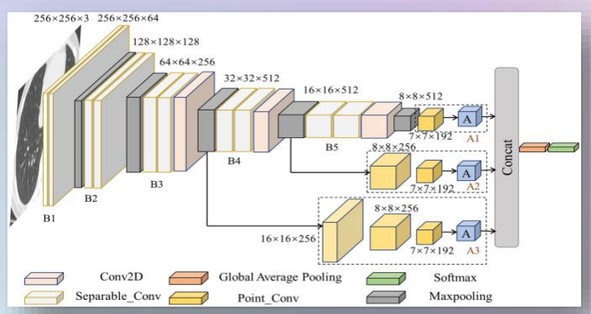


3

Deep Learning (DL) Model

Convolutional Neural Network i.e.

CNN (for facial recognition)



Hugging Face’s vit-face-expression

- The model provides an API to analyse 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

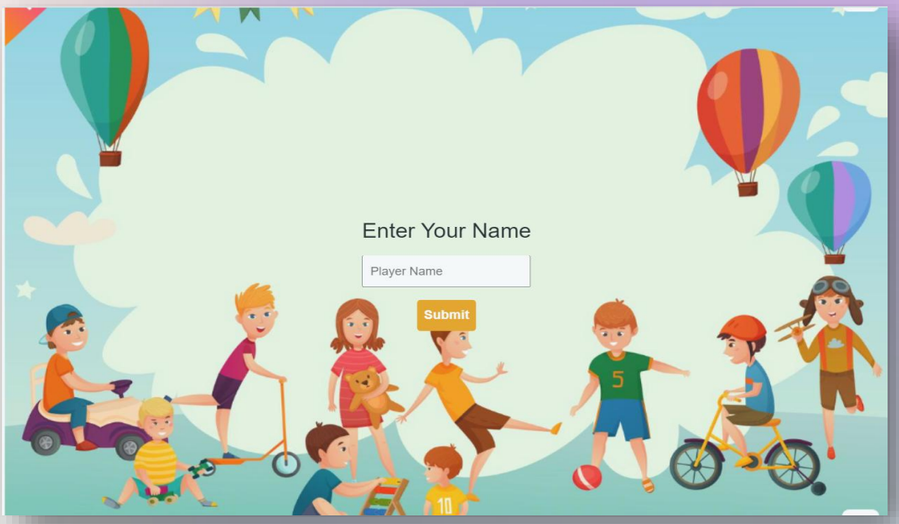

```
{
    "label": "happy",
    "score": 0.997902512550354
},
{
    "label": "neutral",
    "score": 0.5727202296257019
},
{
    "label": "surprise",
    "score": 0.4737154543399811
},
{
    "label": "disgust",
    "score": 0.1775815039873123 2
},
{
    "label": "sad",
    "score": 0.16293424367904663
}
```


Model Response

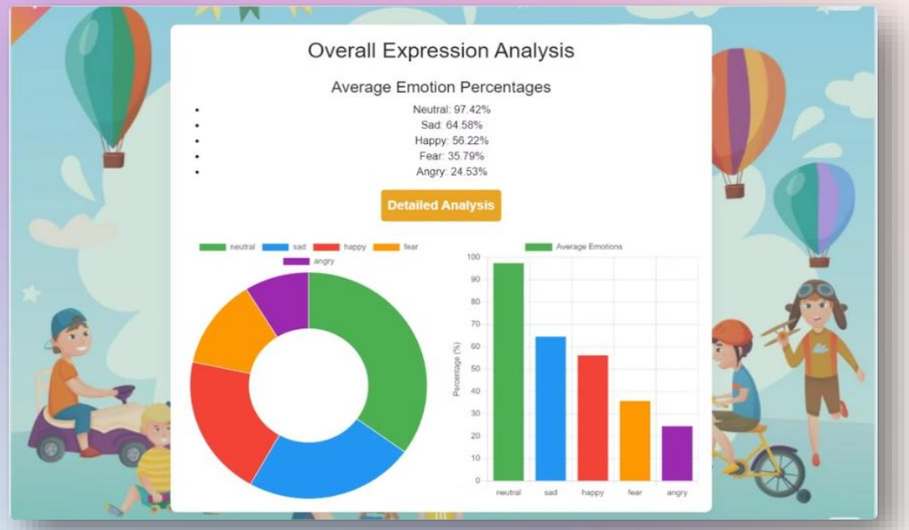
User Roles and Application Interfaces

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

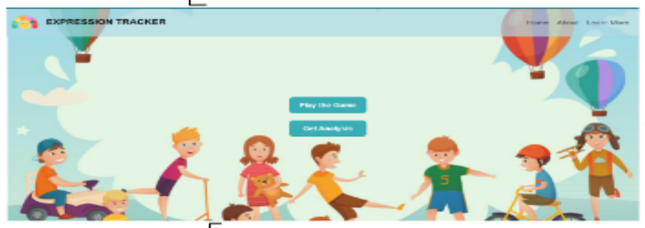
Frontend
react.js

Middleware
Express.js/Node.js

Model
Hugging Face

Database
MongoDb

CHILD
INTERFACE



Images are
captured during
gameplay

images captured during
gameplay are sent to
server

Webcam images are stored
in uploads and screenshots
in screenshots folder

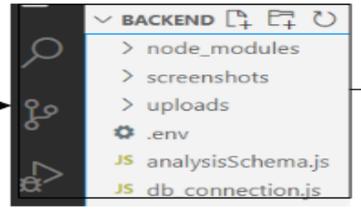
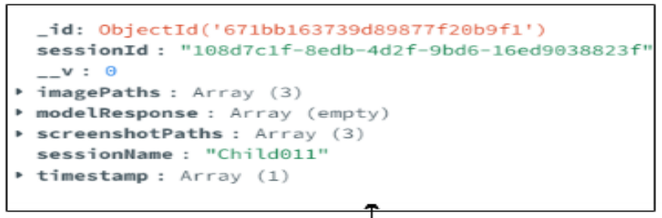


Image paths and screenshot
paths are sent to the
database

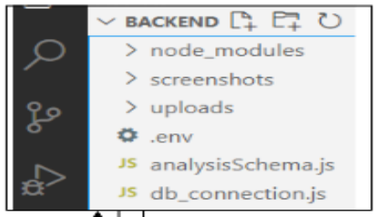
Image and Screenshot
paths are stored to db



ADMIN
INTERFACE

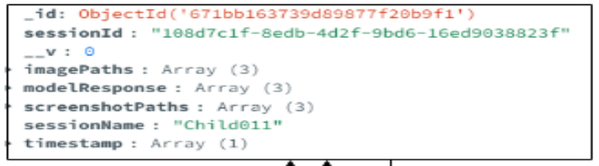
Admin requests for
analysis

if analysis is not done



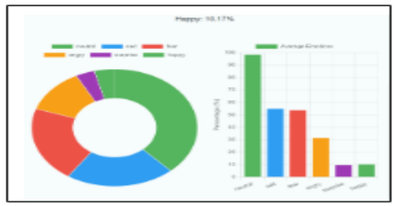
Send images via api call

Stores analysis in db



Sends the Analysis

if analysis is already done



Prepares
Data

retrieve analysis from database

Displays the data prepared

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!