PulseMind
AI-drived Behavioral assessment and Intervention for ADHD

Presented By:
24-25J-261

PulseMind:
AI-Driven Behavioural Assessment and Intervention for ADHD

SUPERVISOR DETAILS

Supervisor
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Co-Supervisor
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TEAM MEMBERS

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INTRODUCTION

ADHD (Attention-Deficit / Hyperactivity Disorder) is a neuro developmental disorder.[1]

Characterized by symptoms of

Inattention

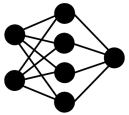
Hyperactivity

Impulsivity

ADHD can affect children’s academic performance, social skills, and emotional well-being. It may lead to long-term challenges in adulthood, such as low self-esteem and career difficulties[2]

OBJECTIVES

ADHD diagnosis and provides personalized intervention strategies for managing ADHD symptoms in children



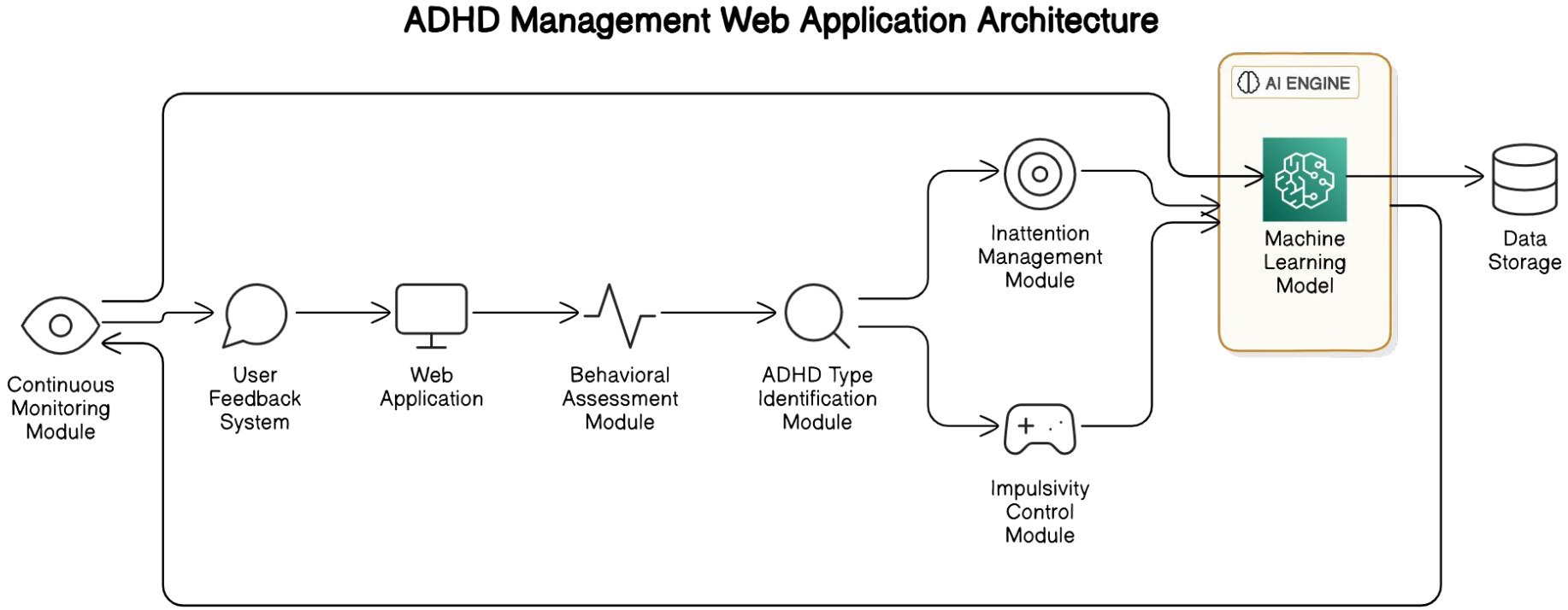
Assessing ADHD Symptoms

Enhance focus and organizational skills

Enhancing Impulse Control

Create Adaptive Learning with Predictions

OVERALL SYSTEM DIAGRAM



COMMERCIALIZATION PLAN

Basic Plan
Free

- ✔ ADHD symptom assessment through interactive questionnaires
- ✔ Basic inattention and hyperactivity tracking
- ✔ Limited progress reports available within the app

Suitable for individual users (parents or teachers) who need a basic assessment tool

Premium Plan
$10 /month

- ✔ Full ADHD assessment with symptom identification and subtype classification
- ✔ AI-driven personalized interventions and cognitive training exercises
- ✔ Advanced progress tracking with weekly and monthly reports
- ✔ 24/7 customer support

Ideal for families and schools seeking a comprehensive ADHD support tool

Group Plan
$150 /month

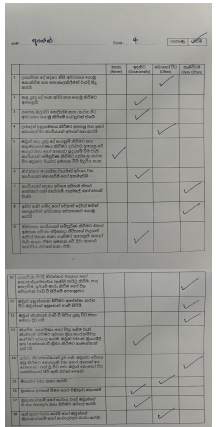
- ✔ All features from the Premium Plan
- ✔ Multi-user access for up to 25 students
- ✔ Ability to manage and monitor multiple classrooms or groups within a single dashboard

Best suited for schools, clinics needing to support multiple children

RISK MITIGRATION

Risk	Severity	Mitigation Measure
Privacy and ethical concerns when collecting and storing sensitive data about children	High	Completed the ethical clearance form, obtained permission from the education division and ensured anonymization of data to protect privacy
Some parents hesitated to give consent for their children to participate	Medium	Implement robust data anonymization and encryption protocols
Target users (parents, teachers, children) find the interface or activities difficult to use or unengaging	Medium	Conduct user testing with parents, teachers, and children during development
The system does not adequately address the cultural or linguistic context of Sri Lankan users.	High	Involve local psychologists, educators, and linguists in system design and content development.

DATA COLLECTION



REFERENCES

[1] J. J. S. Kooij, "ADHD: a Neurodevelopmental Disorder," *European Psychiatry*, vol. 30, Suppl. 1, p. 45, 2015, doi: 10.1016/S0924-9338(15)30036-5.

[2] T. E. Wilens and T. J. Spencer, "Understanding attention-deficit/hyperactivity disorder from childhood to adulthood," *Postgrad. Med.*, vol. 122, no. 5, pp. 97-109, Sep. 2010, doi: 10.3810/pgm.2010.09.2206.

AI-Driven Gamified ADHD Symptom Assessment for Children Aligned with DSM-5

IT21288326 | Dharmasena U.D.S.V.

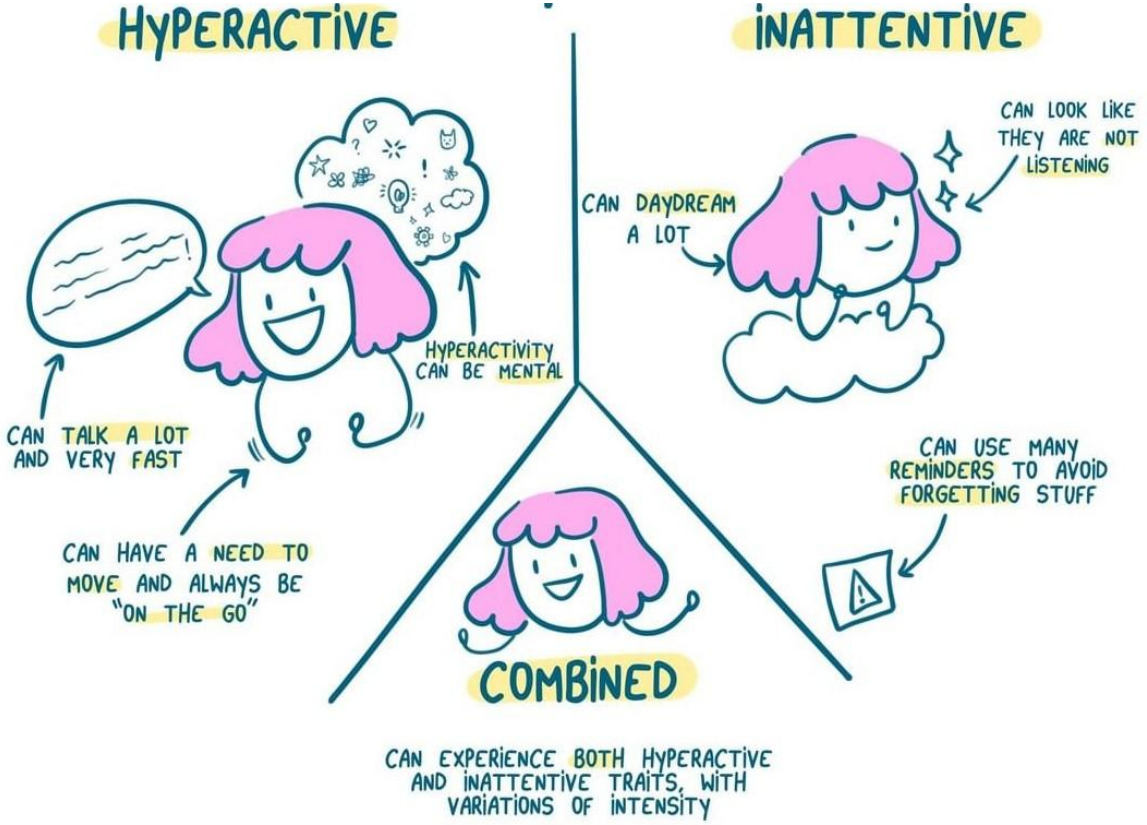
Specialization: Information technology

INTRODUCTION

Early diagnosis helps children with ADHD learn coping skills and get the right support, which can improve their success their overall quality of life.

ADHD subtypes

- Predominantly inattentive ADHD
- Hyperactive-impulsive ADHD
- Combined ADHD



Tools for assessing ADHD symptoms.

- Vanderbilt ADHD Diagnostic Parent Rating Scale
- Conners Rating Scale
- ADHD Self-Report Scale(for Adults)

RESEARCH GAP

Component	[3]	[4]	[5]	[6]	Proposed System
Use of digital tools for ADHD assessment	✓	✓	✗	✓	✓
Automated model training	✗	✗	✗	✗	✓
Tailored interventions for ADHD symptoms	✓	✗	✓	✓	✓
Accessibility and affordability of interventions	✗	✗	✓	✗	✓
Symptom assessment based on DSM-5	✓	✓	✓	✓	✓

[3] Jan. 2018, " **Evaluating Digital ADHD Assessment Tools for Children."**
[4] Apr. 2019, " **Understanding Cultural Factors in ADHD Diagnosis: A Global Perspective"**
[5] Jul. 2020, " **Evaluating Accessibility of ADHD Intervention Programs for Diverse Populations"**
[6] May. 2021," **Interactive Applications for DSM-5 Based ADHD Symptom Assessment"**

RESEARCH PROBLEM

How can we Assess ADHD Symptoms in Children age 5-10, through an AI-Driven Gamified Focus & Impulse Control Module Aligned with DSM-5 Criteria ?

OBJECTIVES

Assess ADHD Symptoms in Children Through an AI-Driven Gamified Focus & Impulse Control Module Aligned with DSM-5 Criteria

Assess cognitive functions through interactive activities.

Collect DSM-5 symptoms based on gamified behavioral performance.

Integrate behavioral and questionnaire data to classify ADHD symptoms.

PP1 to PP2 PROGRESS

Re-trained and dumped (save) a machine learning model to detect ADHD sub type

Enabled a function to process the real-time data and update the model correspondingly

Labeled the assessment criteria results to the corresponding sub type

Model prediction is given by analysing the sub type label that is taken from the assessment criteria & the results of the game (reaction time, score, no of missing attempts..etc.)

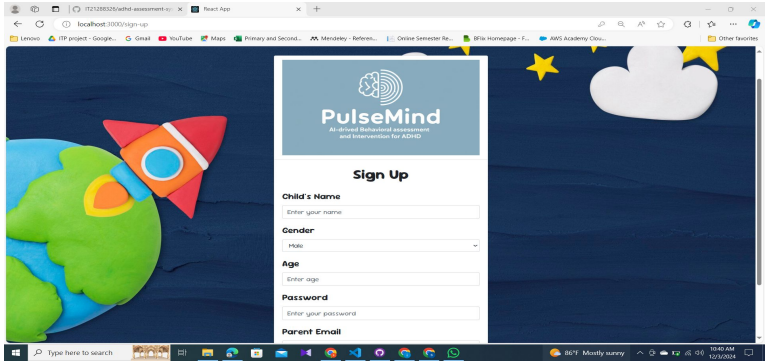
Created the dashboad to check the model health

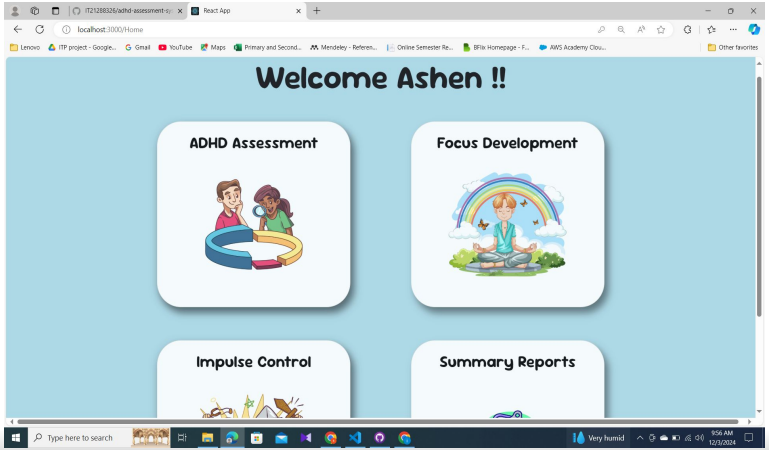
Created dashboads to show game result, child progress, insights and model prediction

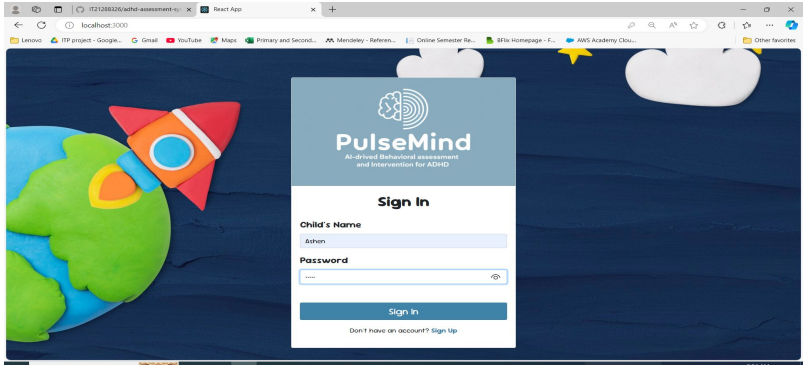
Create quiz results and generate report based on venderbilit ADHD assesment critiria

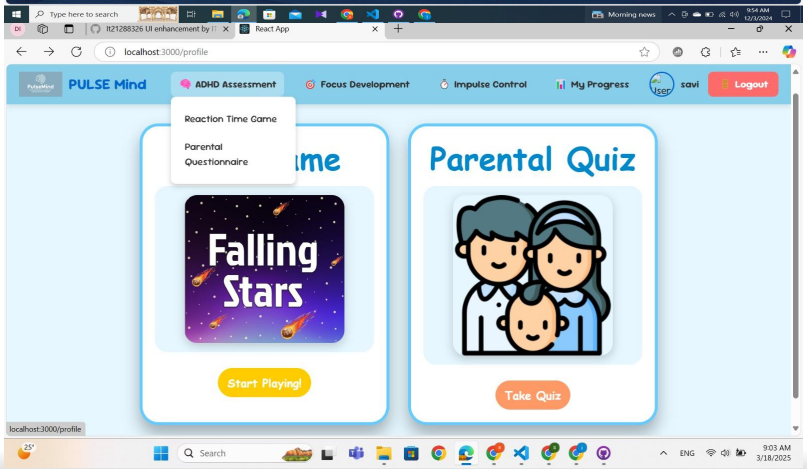
Create interfaces and save data in the database

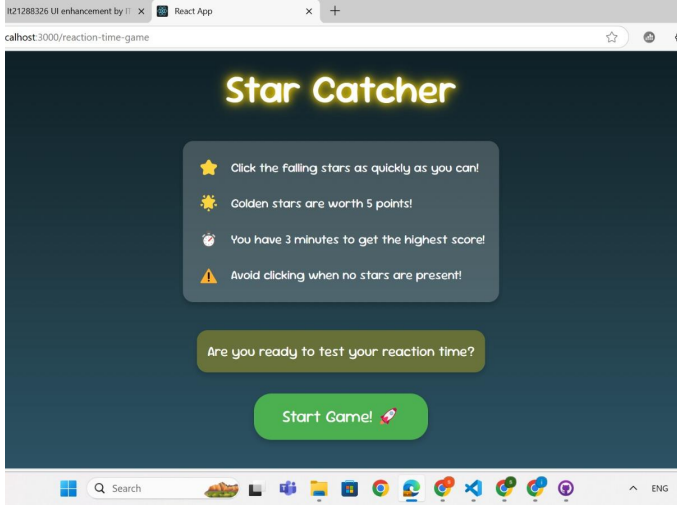
PROOF OF COMPLETION

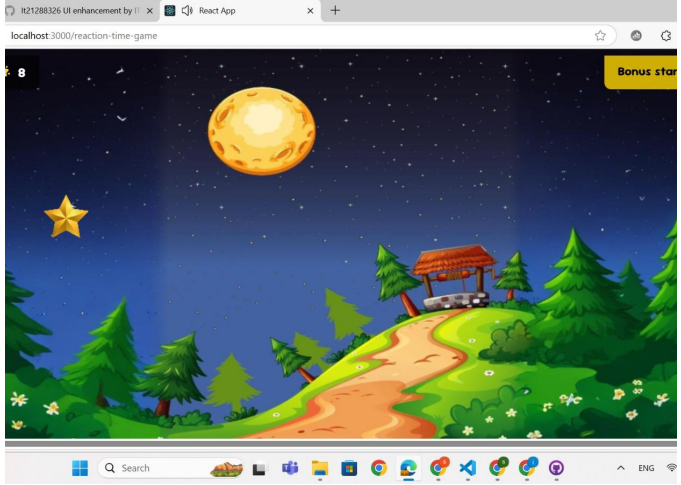


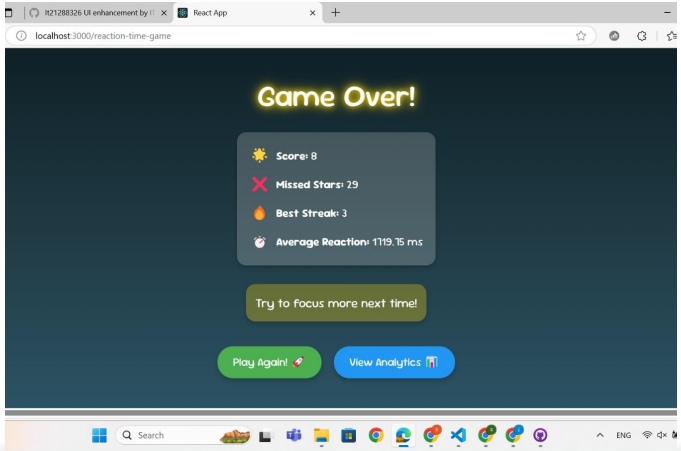


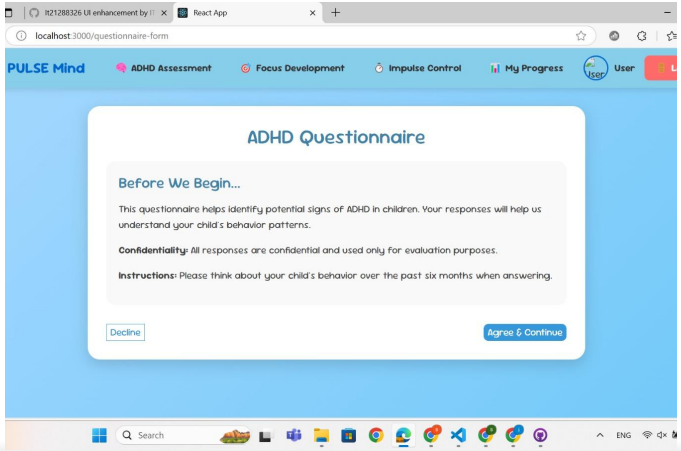


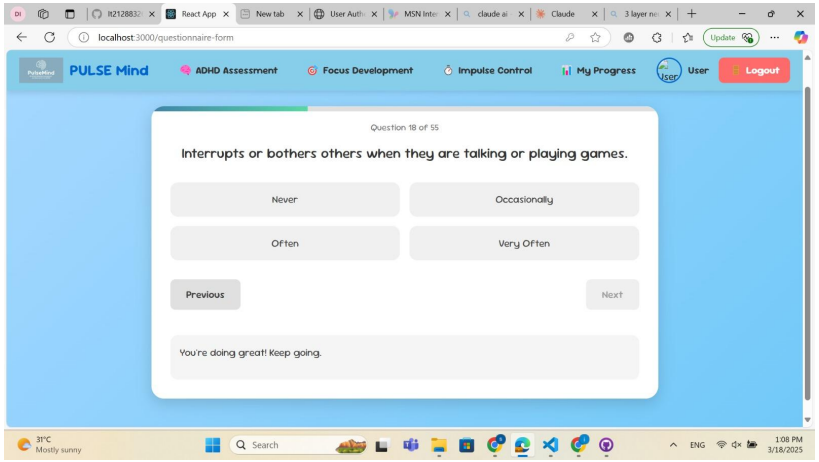


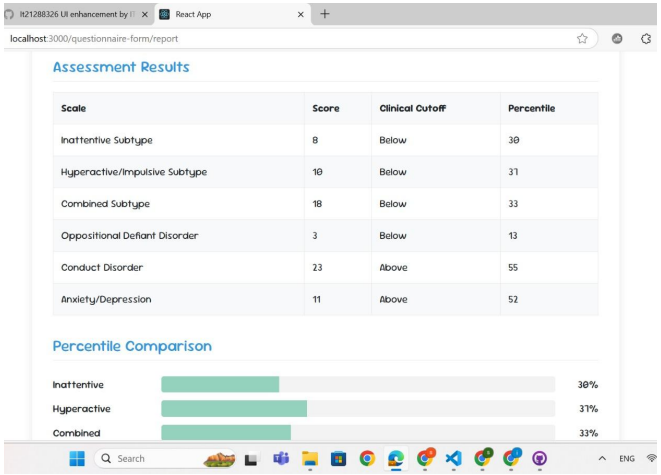

Star Catcher
Click the falling stars as quickly as you can!
Golden stars are worth 5 points!
You have 3 minutes to get the highest score!
Avoid clicking when no stars are present!
Are you ready to test your reaction time?
Start Game!

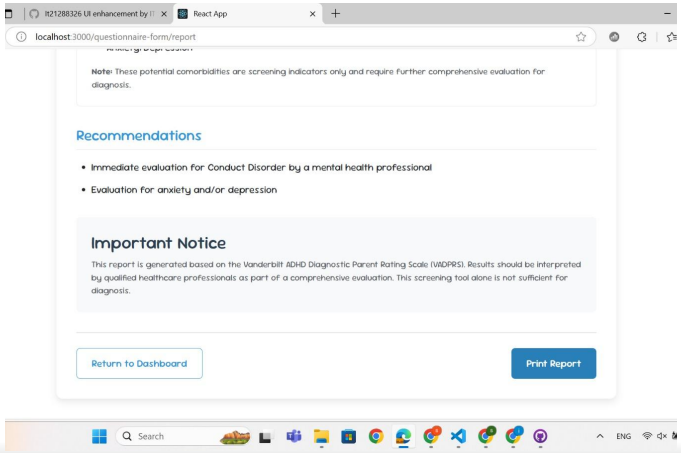

Bonus star

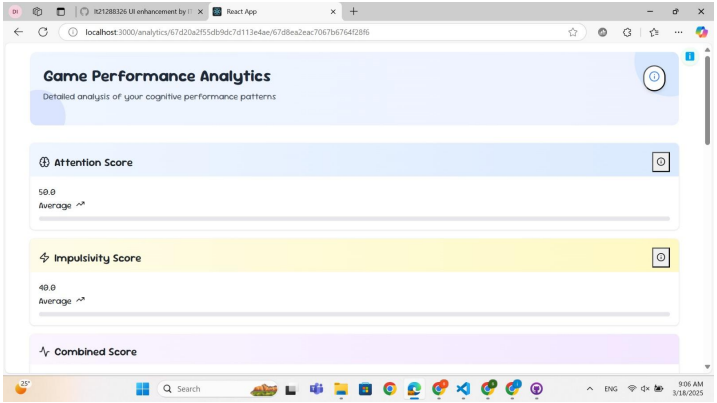

Game Over!
Score: 8
Missed Stars: 29
Best Streak: 3
Average Reaction: 1119.15 ms
Try to focus more next time!
Play Again!
View Analytics

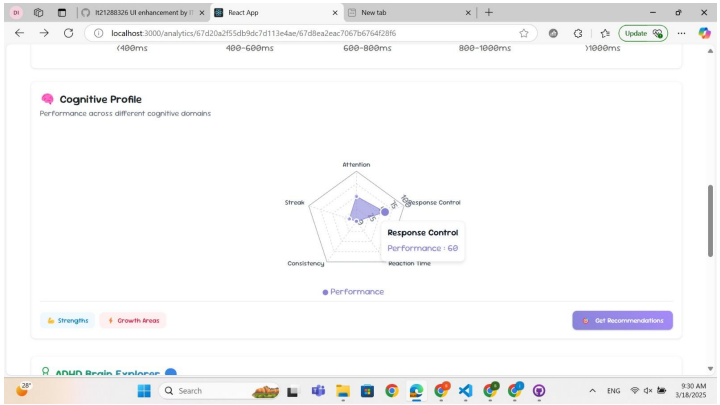

PULSE Mind
ADHD Assessment
Focus Development
Impulse Control
My Progress
User
ADHD Questionnaire
Before We Begin...
This questionnaire helps identify potential signs of ADHD in children. Your responses will help us understand your child's behavior patterns.
Confidentiality: All responses are confidential and used only for evaluation purposes.
Instructions: Please think about your child's behavior over the past six months when answering.
Decline
Agree & Continue

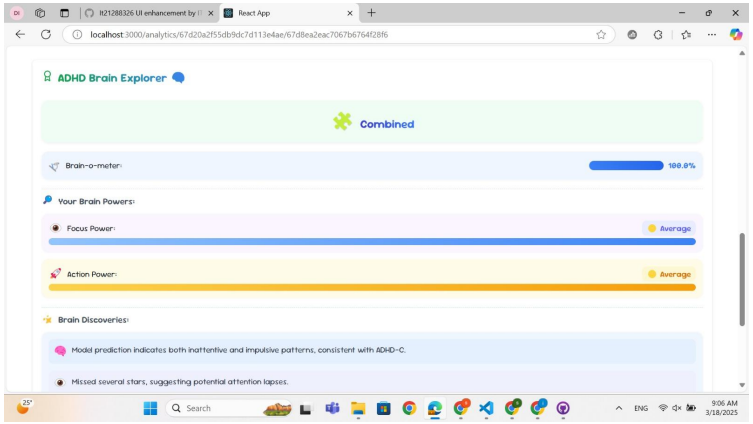

PULSE Mind
ADHD Assessment
Focus Development
Impulse Control
My Progress
User
Logout
Question 18 of 55
Interrupts or bothers others when they are talking or playing games.
Never
Occasionally
Often
Very Often
Previous
Next
You're doing great! Keep going.

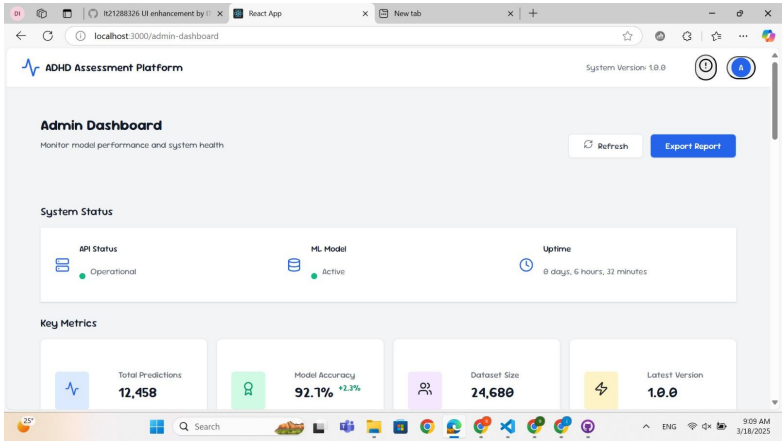

Assessment Results
Scale
Score
Clinical Cutoff
Percentile
Inattentive Subtype
8
Below
30
Hyperactive/Impulsive Subtype
10
Below
31
Combined Subtype
18
Below
33
Oppositional Defiant Disorder
3
Below
13
Conduct Disorder
23
Above
55
Anxiety/Depression
11
Above
52
Percentile Comparison
Inattentive
30%
Hyperactive
31%
Combined
33%

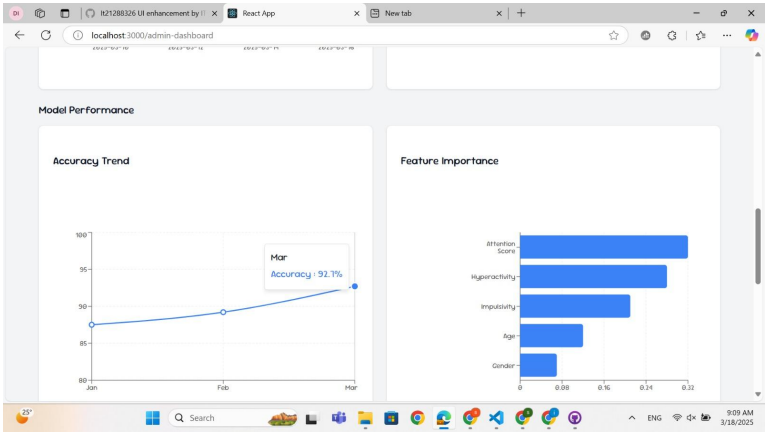

Note: These potential comorbidities are screening indicators only and require further comprehensive evaluation for diagnosis.
Recommendations
Immediate evaluation for Conduct Disorder by a mental health professional
Evaluation for anxiety and/or depression
Important Notice
This report is generated based on the Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS). Results should be interpreted by qualified healthcare professionals as part of a comprehensive evaluation. This screening tool alone is not sufficient for diagnosis.
Return to Dashboard
Print Report

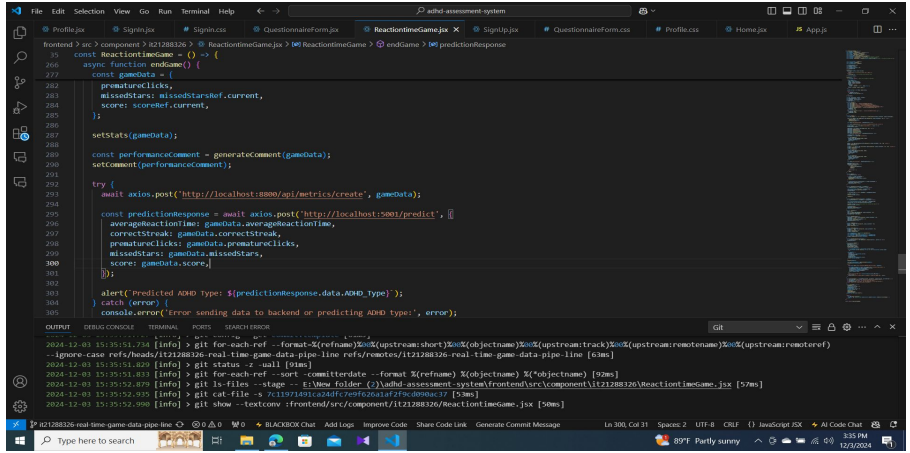

Game Performance Analytics
Detailed analysis of your cognitive performance patterns
Attention Score
50.0
Average
Impulsivity Score
40.0
Average
Combined Score

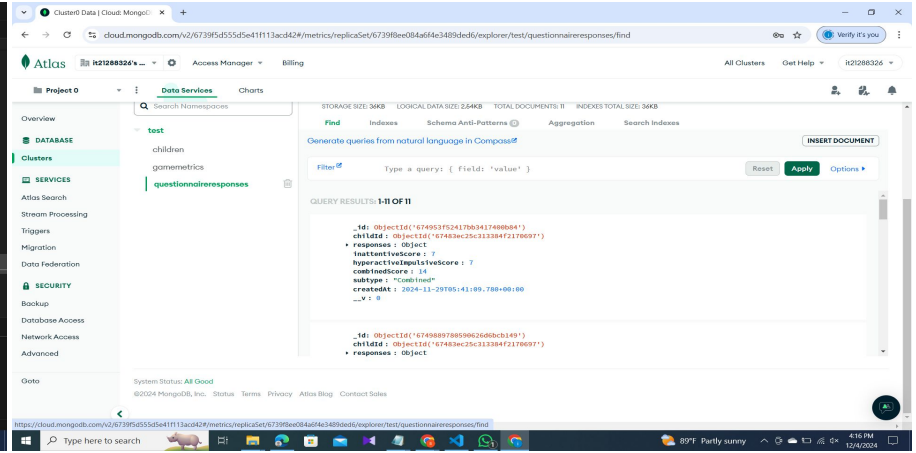

Cognitive Profile
Performance across different cognitive domains
Attention
Response Control
Reaction Time
Consistency
Streak
Response Control
Performance : 60
Performance
Strengths
Growth Areas
Get Recommendations
ADHD Brain Explorer

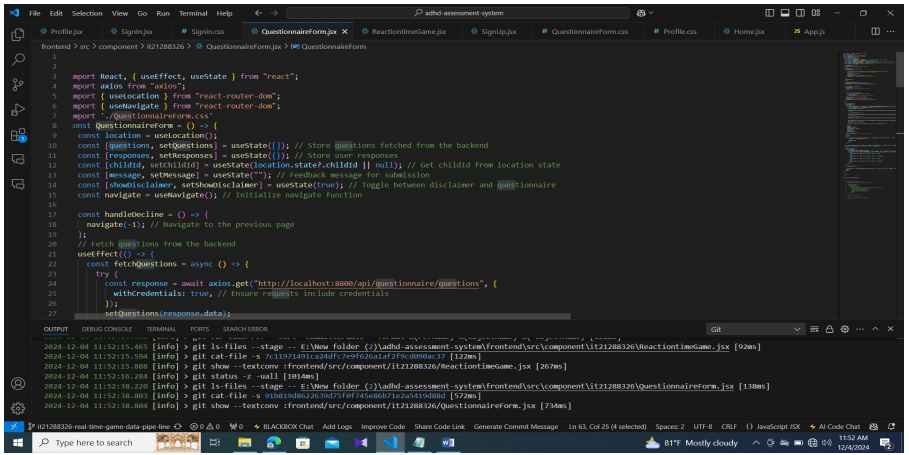

ADHD Brain Explorer
Combined
Brain-o-meter:
100.0%
Your Brain Powers:
Focus Power:
Average
Action Power:
Average
Brain Discoveries:
Model prediction indicates both inattentive and impulsive patterns, consistent with ADHD-C.
Missed several stars, suggesting potential attention lapses.

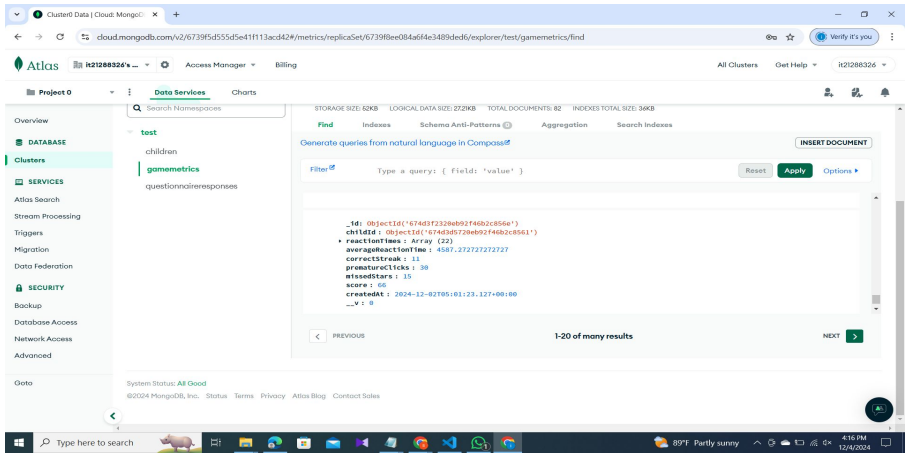

ADHD Assessment Platform
System Version: 1.0.0
Admin Dashboard
Monitor model performance and system health
Refresh
Export Report
System Status
API Status
Operational
ML Model
Active
Uptime
0 days, 6 hours, 32 minutes
Key Metrics
Total Predictions
12,458
Model Accuracy
92.7%
+2.3%
Dataset Size
24,680
Latest Version
1.0.0

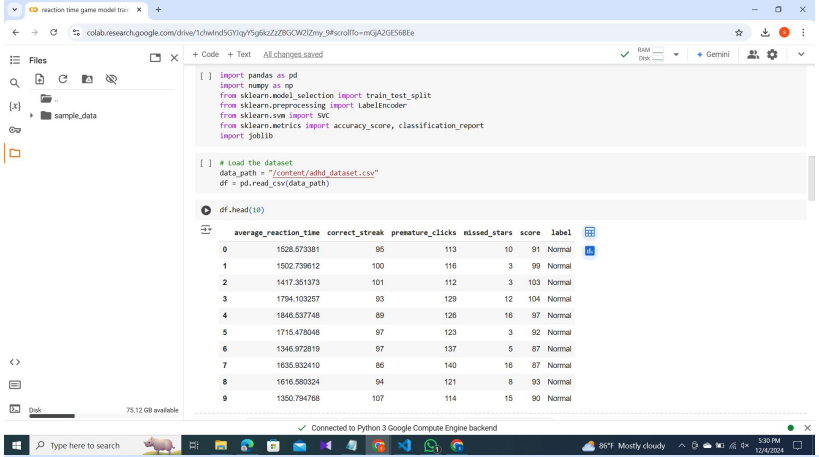

Model Performance
Accuracy Trend
Mar
Accuracy : 92.7%
Jan
Feb
Mar
Feature Importance
Attention Score
Hyperactivity
Impulsivity
Age
Gender



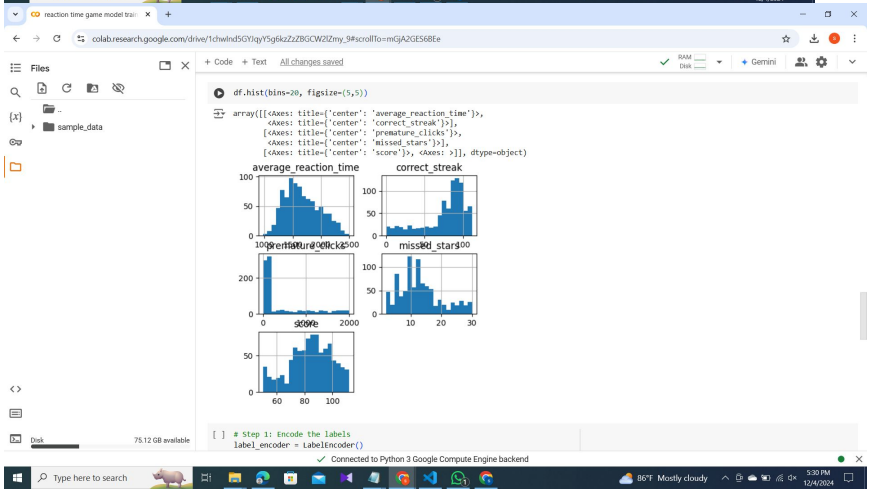




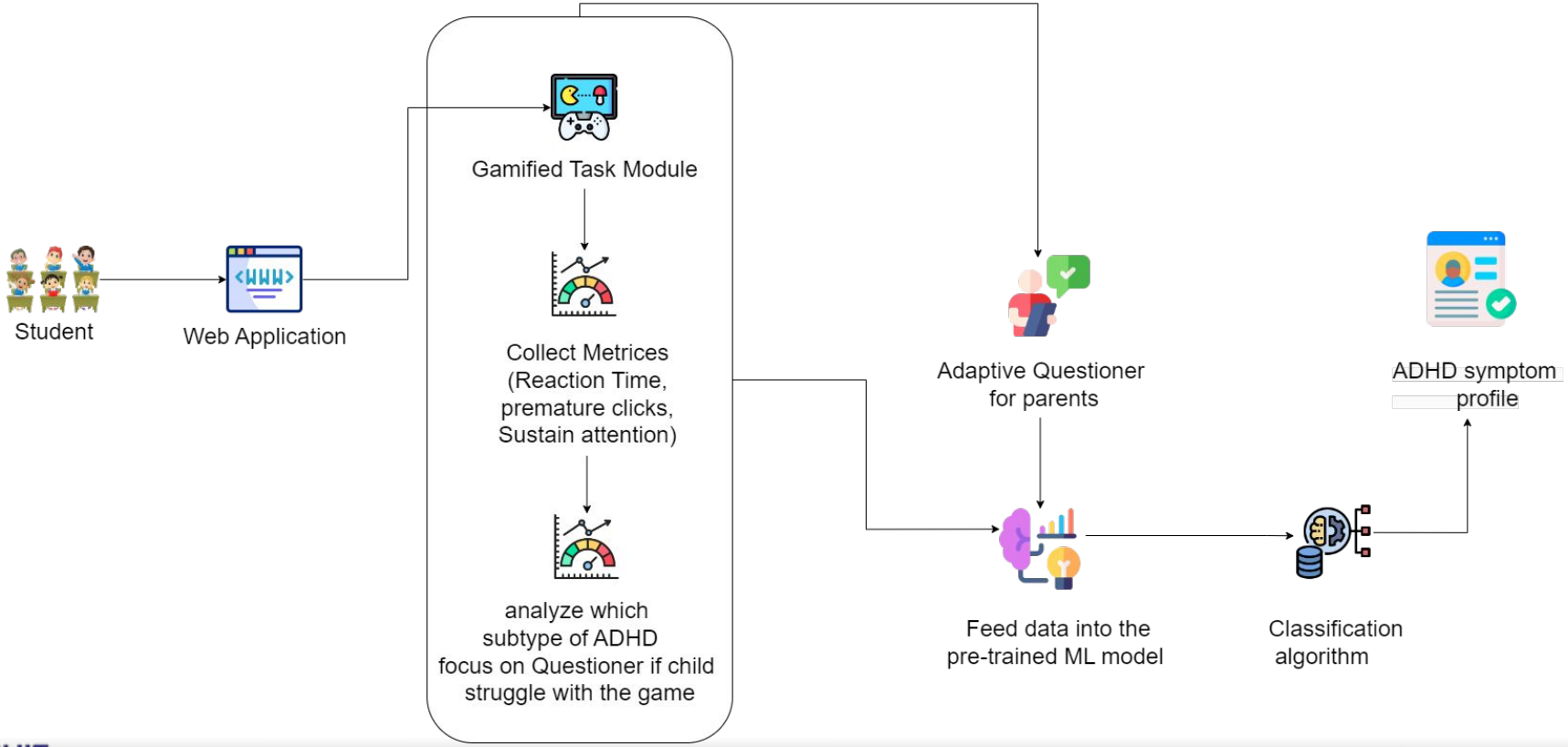



reaction time game model train
colab.research.google.com/drive/1chwInd5GYJqyY5g6kzZzZBGCW2lZmy_9#scrollTo=mGjA2GE56BEe
Files
sample_data
+ Code + Text All changes saved
Gemini
[ ] import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report
import joblib
[ ] # Load the dataset
data_path = "/content/adhd_dataset.csv"
df = pd.read_csv(data_path)
df.head(10)
average_reaction_time correct_streak premature_clicks missed_stars score label
0 1528.573381 95 113 10 91 Normal
1 1502.739612 100 116 3 99 Normal
2 1417.351373 101 112 3 103 Normal
3 1794.103257 93 129 12 104 Normal
4 1846.537748 89 126 16 97 Normal
5 1715.478048 97 123 3 92 Normal
6 1346.972819 97 137 5 87 Normal
7 1635.932410 86 140 16 87 Normal
8 1616.580324 94 121 8 93 Normal
9 1350.794768 107 114 15 90 Normal
Disk 75.12 GB available
Connected to Python 3 Google Compute Engine backend
Type here to search
86°F Mostly cloudy
5:30 PM
12/4/2024

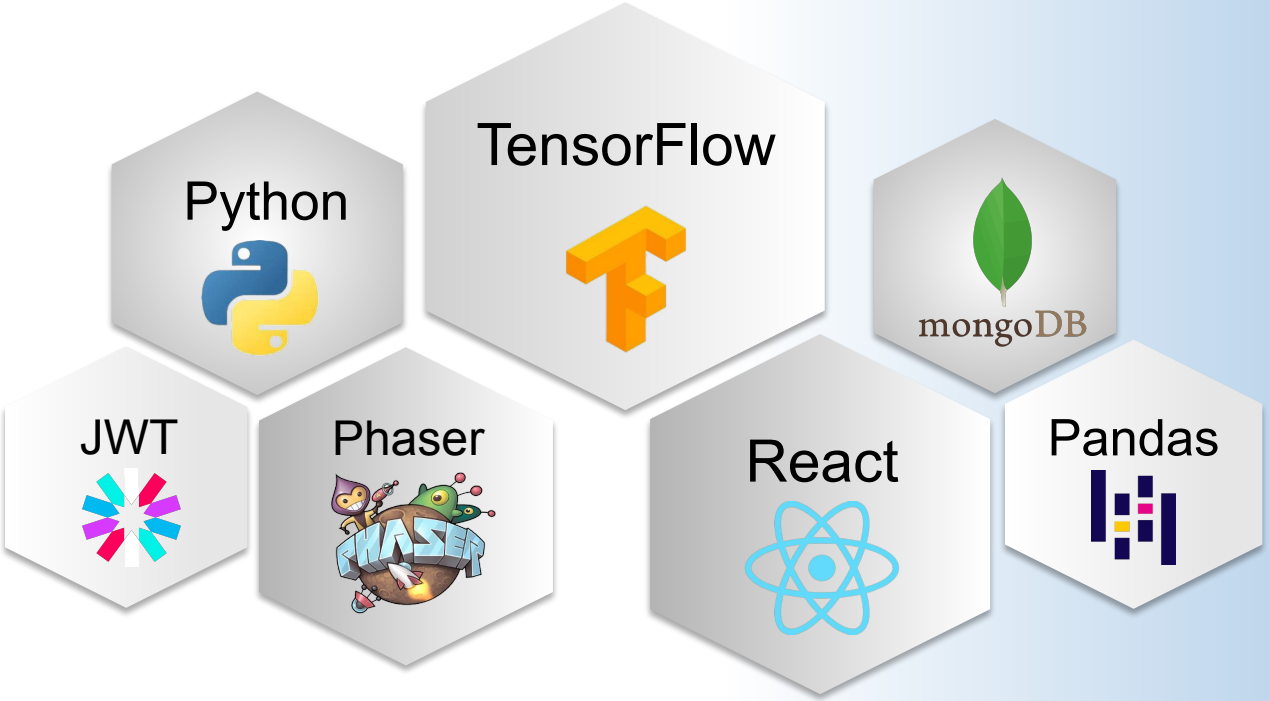

reaction time game model train
colab.research.google.com/drive/1chwInd5GYJqyY5g6kzZzZBGCW2lZmy_9#scrollTo=mGjA2GE56BEe
Files
sample_data
+ Code + Text All changes saved
Gemini
df.plot(subplots=True, layout=(len(df.columns),1), figsize=(4,10))
array([<Axes: >],
<Axes: >],
<Axes: >],
<Axes: >],
<Axes: >],
<Axes: >]], dtype=object)
average_reaction_time
correct_streak
premature_clicks
missed_stars
Disk 75.12 GB available
Connected to Python 3 Google Compute Engine backend
Type here to search
86°F Mostly cloudy
5:30 PM
12/4/2024


reaction time game model train
colab.research.google.com/drive/1chwInd5GYJqyY5g6kzZzZBGCW2lZmy_9#scrollTo=mGjA2GE56BEe
Files
sample_data
+ Code + Text All changes saved
Gemini
df.hist(bins=20, figsize=(5,5))
array([[<Axes: title={'center': 'average_reaction_time'}>,
<Axes: title={'center': 'correct_streak'}>],
[<Axes: title={'center': 'premature_clicks'}>,
<Axes: title={'center': 'missed_stars'}>],
[<Axes: title={'center': 'score'}>, <Axes: >]], dtype=object)
average_reaction_time
correct_streak
premature_clicks
missed_stars
score
[ ] # Step 1: Encode the labels
label_encoder = LabelEncoder()
Disk 75.12 GB available
Connected to Python 3 Google Compute Engine backend
Type here to search
86°F Mostly cloudy
5:30 PM
12/4/2024

SYSTEM DIAGRAM



TECHNOLOGIES

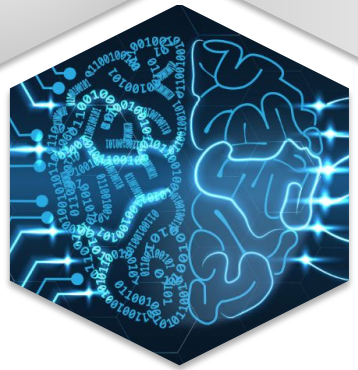


KEY PILLARS

UI/UX

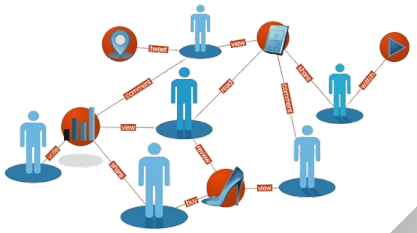
Machine learning

Game Development



Data Collection and Management

COMPONENT SPECIFIC REQUIREMENTS
Functional Requirement



Data Collection and Processing

Gamified Behavioral Task

Adaptive Questionnaire

User Interface

COMPONENT SPECIFIC REQUIREMENTS
Non-functional Requirement

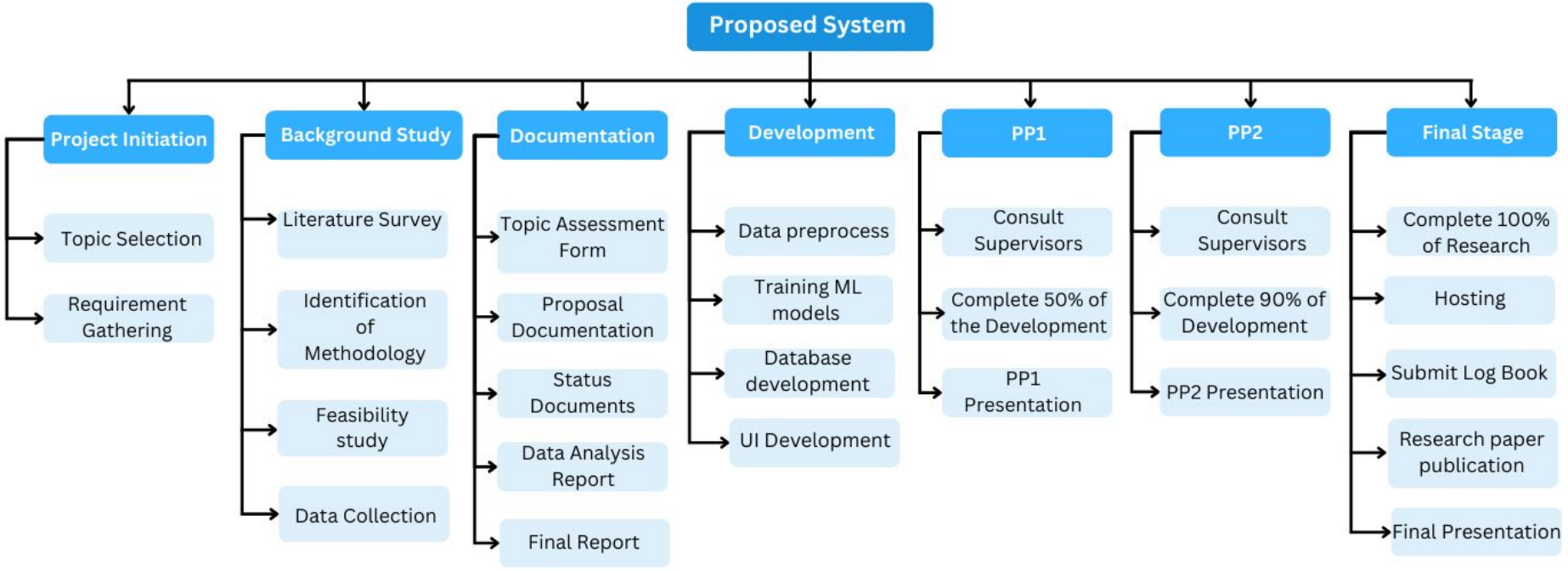
Performance

Reliability

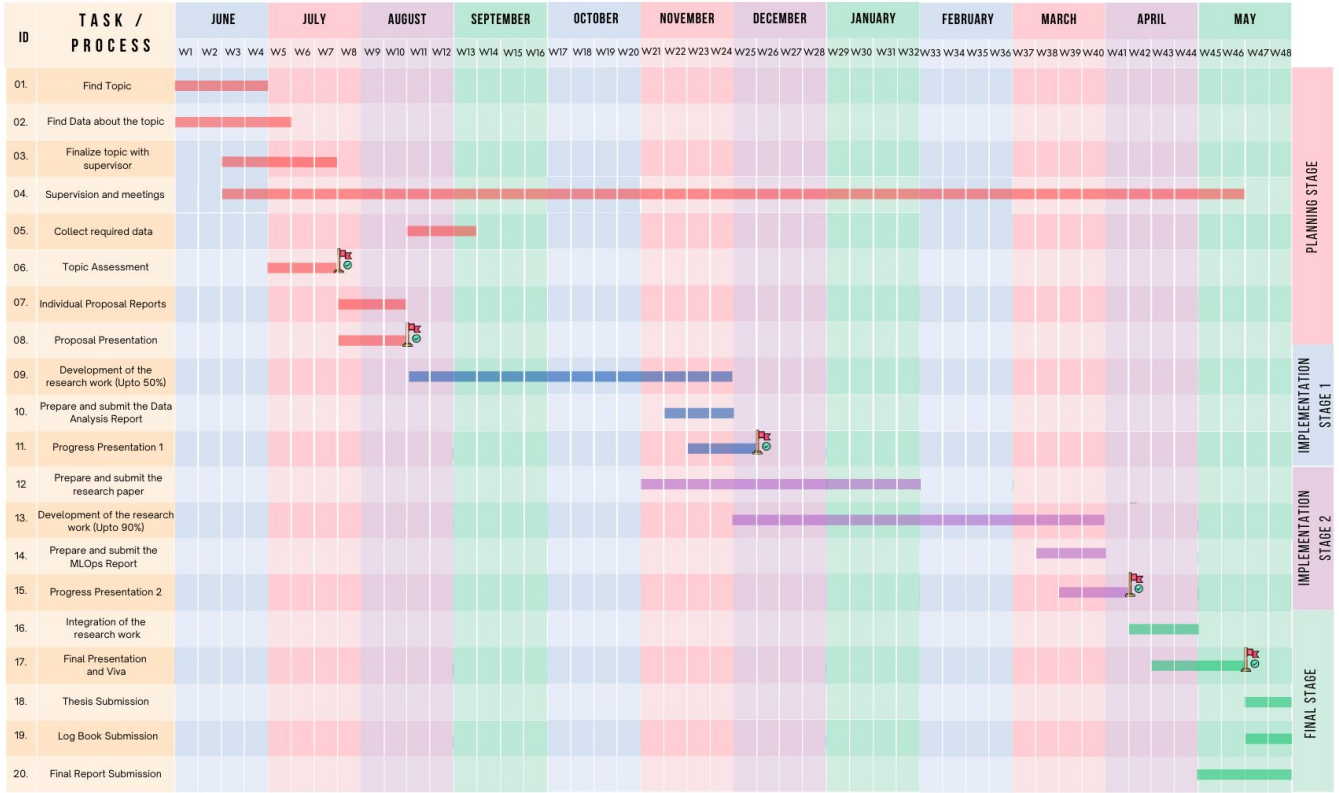
Usability

Security

WORK BREAKDOWN CHART



GANTT CHART


ID
TASK / PROCESS
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W23 W24 W25 W26 W27 W28 W29 W30 W31 W32 W33 W34 W35 W36 W37 W38 W39 W40 W41 W42 W43 W44 W45 W46 W47 W48
01. Find Topic
02. Find Data about the topic
03. Finalize topic with supervisor
04. Supervision and meetings
05. Collect required data
06. Topic Assessment
07. Individual Proposal Reports
08. Proposal Presentation
09. Development of the research work (Upto 50%)
10. Prepare and submit the Data Analysis Report
11. Progress Presentation 1
12 Prepare and submit the research paper
13. Development of the research work (Upto 90%)
14. Prepare and submit the MLOps Report
15. Progress Presentation 2
16. Integration of the research work
17. Final Presentation and Viva
18. Thesis Submission
19. Log Book Submission
20. Final Report Submission
PLANNING STAGE
IMPLEMENTATION STAGE 1
IMPLEMENTATION STAGE 2
FINAL STAGE

REFERENCES

[3]A. Smith, B. Johnson, and C. Lee, "Evaluating Digital ADHD Assessment Tools for Children: A Review," *IEEE Access*, vol. 6, pp. 12345-12353, Jan. 2018. doi: 10.1109/ACCESS.2018.2812345.

[4]K. Chen and M. Patel, "Understanding Cultural Factors in ADHD Diagnosis: A Global Perspective," *IEEE Transactions on Psychology*, vol. 12, no. 2, pp. 345-356, Apr. 2019. doi: 10.1109/TP.2019.1234567.

[5]L. Kumar and R. Thompson, "Evaluating Accessibility of ADHD Intervention Programs for Diverse Populations," *IEEE Journal of Public Health*, vol. 17, no. 4, pp. 567-579, Jul. 2020. doi: 10.1109/JPH.2020.2345678.

[6]M. Rogers, S. Chang, and D. Patel, "Interactive Applications for DSM-5 Based ADHD Symptom Assessment," *IEEE Software*, vol. 22, no. 3, pp. 78-85, May 2021. doi: 10.1109/IS.2021.1234567.

Creates specific tools and activities to help children with predominantly inattentive ADHD improve focus and stay organized.

IT21290992 | Manamperi R.S.

Specialization: Information technology

INTRODUCTION

Inattention is a core characteristic of ADHD that manifests as difficulty sustaining focus, organizing tasks, and following through on instructions. Individuals may struggle with maintaining attention in both academic and social settings.

How to Identify ?

- Difficulty paying attention to details, leading to careless mistakes
- Frequent forgetfulness in daily activities
- Challenges in organizing tasks and activities
- Avoidance of tasks requiring sustained mental effort
- Easily distracted by extraneous stimuli

Solution

- Games to Help Improve Focus
- Emotion-Based Activity Suggestion
- Personalized Game Flow
- Task Organization Tools
- Progress Tracking and Rewards
- Adaptive Learning Environment

Helping Children Grow Step by Step Towards Overcoming Their Challenges

RESEARCH GAP

Component	[7]	[8]	[9]	[10]	Proposed System
Gamified Learning Approaches	✓	✗	✗	✗	✓
Emotional and Behavioral Analysis Tools	✗	✗	✗	✗	✓
Adaptive Task Management Tools	✓	✗	✓	✗	✓
Tailored Activities for Focus Enhancement	✓	✓	✓	✓	✓
Support for Self-Regulation Skills	✗	✗	✓	✗	✓
Personalized Game Flow	✗	✗	✗	✗	✓

[7] April 2022, " **Mobile Application: A Serious Game Based in Gamification for Learning Mathematics in High School Students."**
[8] May 2024, " **Decreased impulsiveness and MEG normalization after AI-digital therapy in ADHD children: a RCT"**
[9]December 2021, "**Information and Communication Technologies Learning Methodologies for Children with ADHD"**
[10]October 2024, **"Provision of digital health interventions for young people with ADHD in primary care: findings from a survey and scoping review"**

RESEARCH PROBLEM

How can we use machine learning and real-time emotion detection to improve focus and organization in children with predominantly inattentiv ADHD, enhancing their learning and reducing behavioral issues?

OBJECTIVES

To create tools and activities that enhance focus, organizational skills, and attention span in children with predominantly inattentive ADHD, using adaptive learning and technology-assisted methods.

Create engaging and **personalized activities** that cater to the unique needs of children with ADHD, focusing on improving their attention and concentration.

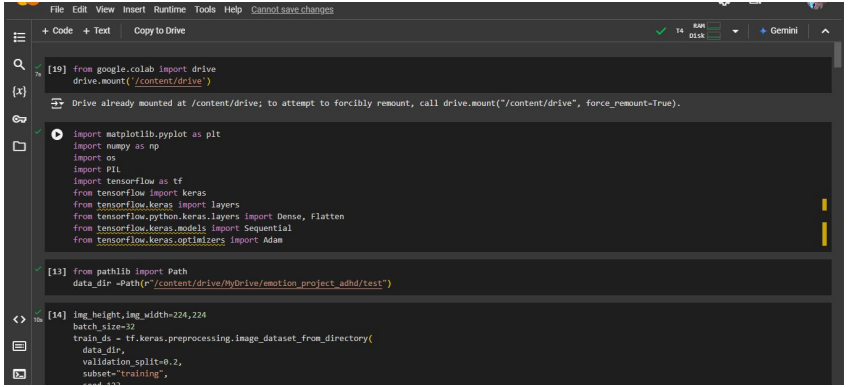
Implement **gamified elements** into learning methodologies to enhance motivation and engagement among children with ADHD.

Utilize technology to analyze **emotional and behavioral responses**, enabling personalized interventions that adapt to the child's emotional state.

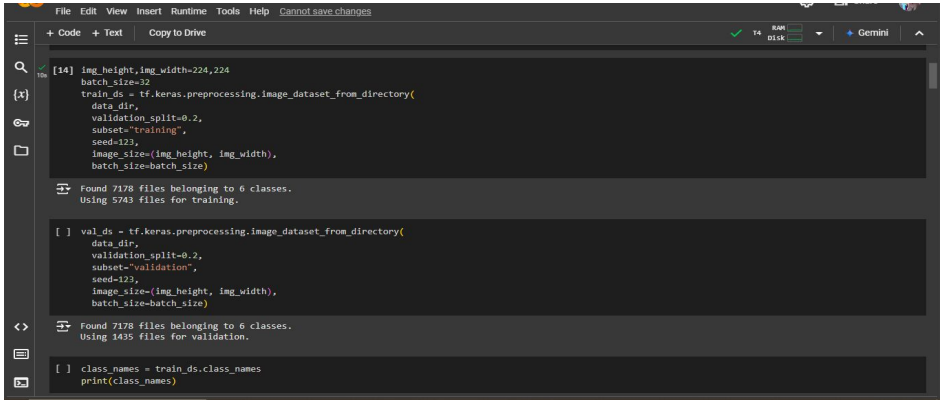
PP1 to PP2 PROGRESS

- [x] Design user interfaces.
- [x] Real time emotion capture and suggest activities
- [x] Suggest activities to improve emotion.
- [x] Developed Story based games
- [x] Personalized game flow
- [x] Detailed Reports (daily and full progress)
- [ ] Suggest activities according to the performance

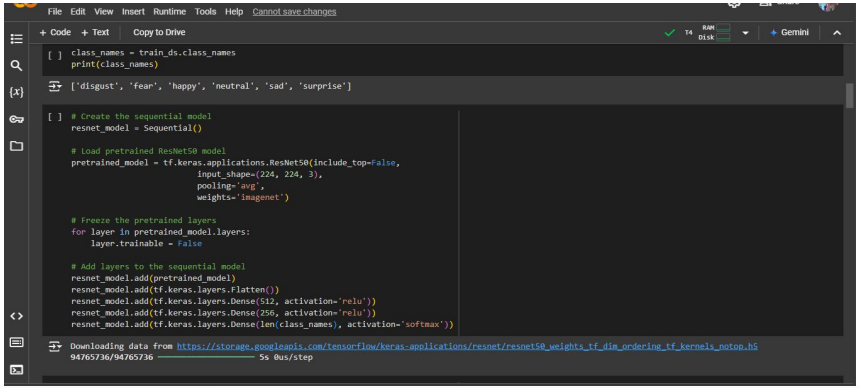
PROOF OF COMPLETION



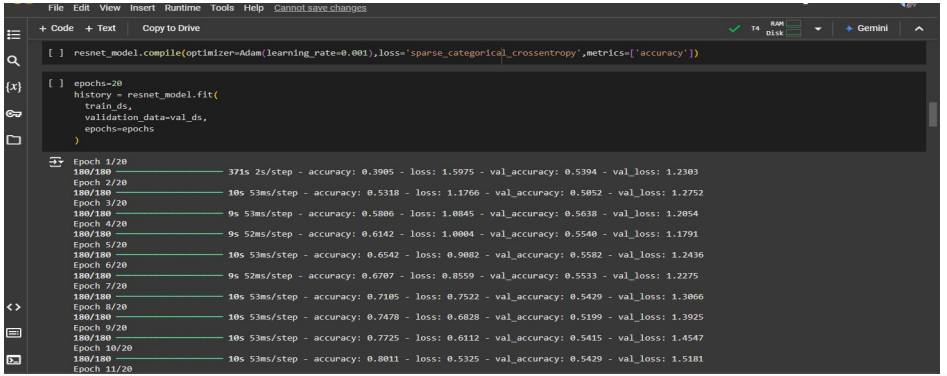
```
[19] from google.colab import drive
     drive.mount('/content/drive')

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

     import matplotlib.pyplot as plt
     import numpy as np
     import os
     import PIL
     import tensorflow as tf
     from tensorflow import keras
     from tensorflow.keras import layers
     from tensorflow.python.keras.layers import Dense, Flatten
     from tensorflow.keras.models import Sequential
     from tensorflow.keras.optimizers import Adam

[13] from pathlib import Path
     data_dir =Path(r"/content/drive/MyDrive/emotion_project_adhd/test")

[14] img_height,img_width=224,224
     batch_size=32
     train_ds = tf.keras.preprocessing.image_dataset_from_directory(
       data_dir,
       validation_split=0.2,
       subset="training",
```



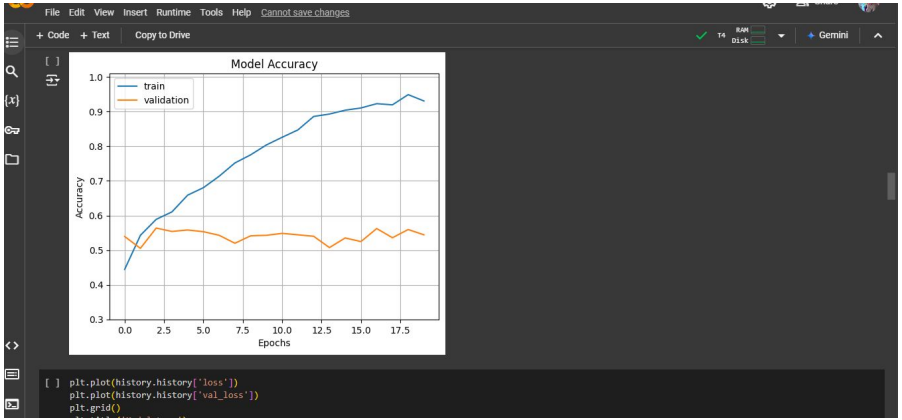
```
[14] img_height,img_width=224,224
     batch_size=32
     train_ds = tf.keras.preprocessing.image_dataset_from_directory(
       data_dir,
       validation_split=0.2,
       subset="training",
       seed=123,
       image_size=(img_height, img_width),
       batch_size=batch_size)

Found 7178 files belonging to 6 classes.
Using 5743 files for training.

[ ] val_ds = tf.keras.preprocessing.image_dataset_from_directory(
       data_dir,
       validation_split=0.2,
       subset="validation",
       seed=123,
       image_size=(img_height, img_width),
       batch_size=batch_size)

Found 7178 files belonging to 6 classes.
Using 1435 files for validation.

[ ] class_names = train_ds.class_names
    print(class_names)
```

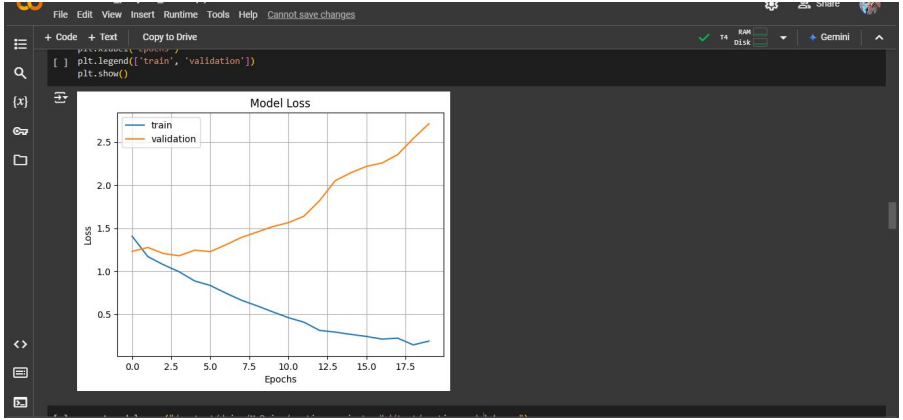


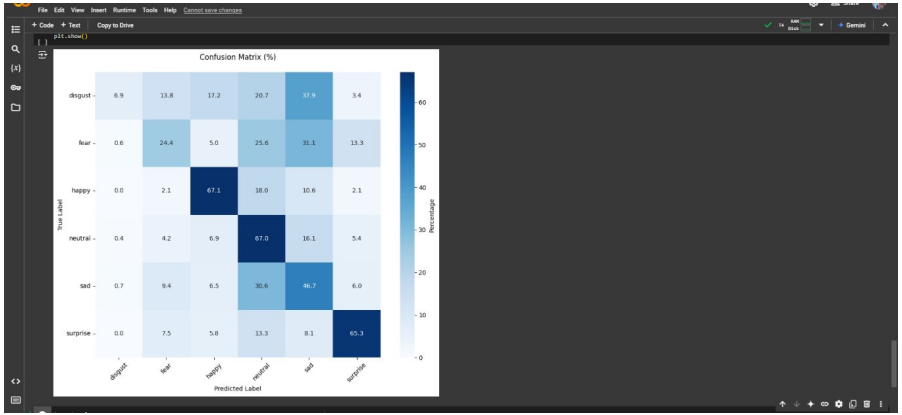
```
[ ] class_names = train_ds.class_names
    print(class_names)

['disgust', 'fear', 'happy', 'neutral', 'sad', 'surprise']

[ ] # Create the sequential model
    resnet_model = Sequential()

    # Load pretrained ResNet50 model
    pretrained_model = tf.keras.applications.ResNet50(include_top=False,
                       input_shape=(224, 224, 3),
                       pooling='avg',
                       weights='imagenet')

    # Freeze the pretrained layers
    for layer in pretrained_model.layers:
        layer.trainable = False

    # Add layers to the sequential model
    resnet_model.add(pretrained_model)
    resnet_model.add(tf.keras.layers.Flatten())
    resnet_model.add(tf.keras.layers.Dense(512, activation='relu'))
    resnet_model.add(tf.keras.layers.Dense(256, activation='relu'))
    resnet_model.add(tf.keras.layers.Dense(len(class_names), activation='softmax'))

Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/resnet/resnet50_weights_tf_dim_ordering_tf_kernels_notop.h5
94765736/94765736 ━━━━━━━━━━━━━━━━━━━━ 5s 0us/step
```

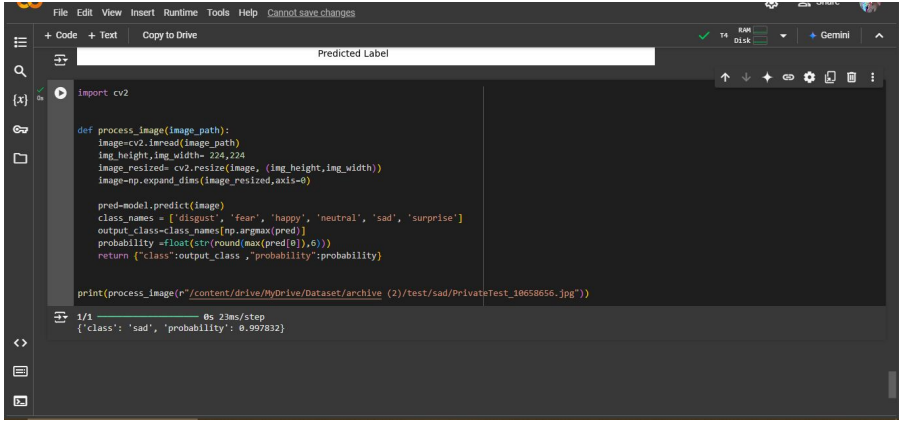


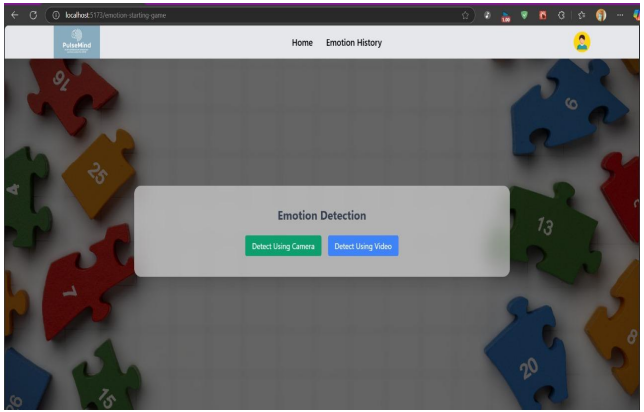
```
[ ] resnet_model.compile(optimizer=Adam(learning_rate=0.001),loss='sparse_categorical_crossentropy',metrics=['accuracy'])

[ ] epochs=20
    history = resnet_model.fit(
      train_ds,
      validation_data=val_ds,
      epochs=epochs
    )

Epoch 1/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 371s 2s/step - accuracy: 0.3905 - loss: 1.5975 - val_accuracy: 0.5394 - val_loss: 1.2303
Epoch 2/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.5318 - loss: 1.1766 - val_accuracy: 0.5052 - val_loss: 1.2752
Epoch 3/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 9s 53ms/step - accuracy: 0.5806 - loss: 1.0845 - val_accuracy: 0.5638 - val_loss: 1.2054
Epoch 4/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 9s 52ms/step - accuracy: 0.6142 - loss: 1.0004 - val_accuracy: 0.5540 - val_loss: 1.1791
Epoch 5/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.6542 - loss: 0.9082 - val_accuracy: 0.5582 - val_loss: 1.2436
Epoch 6/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 9s 52ms/step - accuracy: 0.6707 - loss: 0.8559 - val_accuracy: 0.5533 - val_loss: 1.2275
Epoch 7/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.7105 - loss: 0.7522 - val_accuracy: 0.5429 - val_loss: 1.3066
Epoch 8/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.7478 - loss: 0.6828 - val_accuracy: 0.5199 - val_loss: 1.3925
Epoch 9/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.7725 - loss: 0.6112 - val_accuracy: 0.5415 - val_loss: 1.4547
Epoch 10/20
180/180 ━━━━━━━━━━━━━━━━━━━━ 10s 53ms/step - accuracy: 0.8011 - loss: 0.5325 - val_accuracy: 0.5429 - val_loss: 1.5181
Epoch 11/20
```

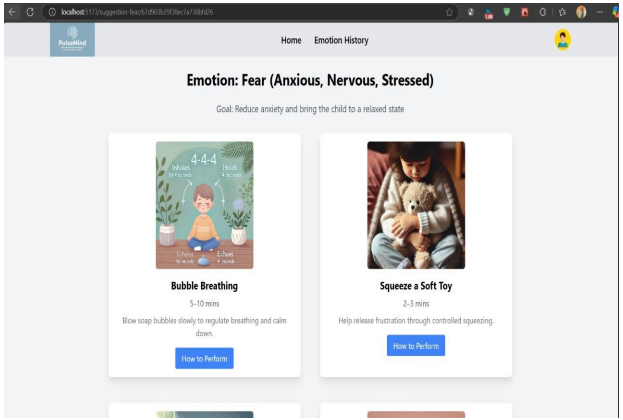

Model Accuracy
train
validation
Accuracy
Epochs
plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.grid()

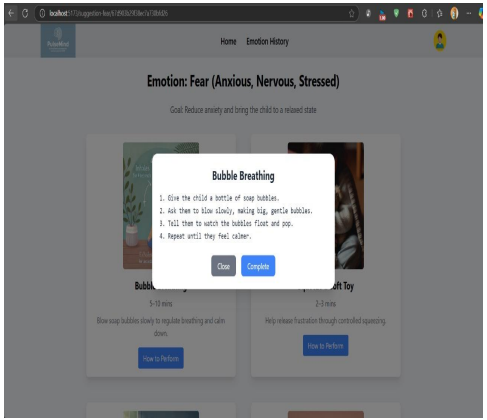

plt.legend(['train', 'validation'])
plt.show()
Model Loss
train
validation
Loss
Epochs

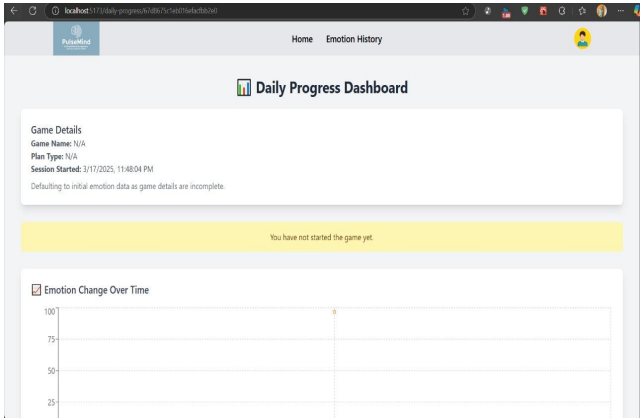

Confusion Matrix (%)
disgust
fear
happy
neutral
sad
surprise
True Label
Predicted Label
Percentage

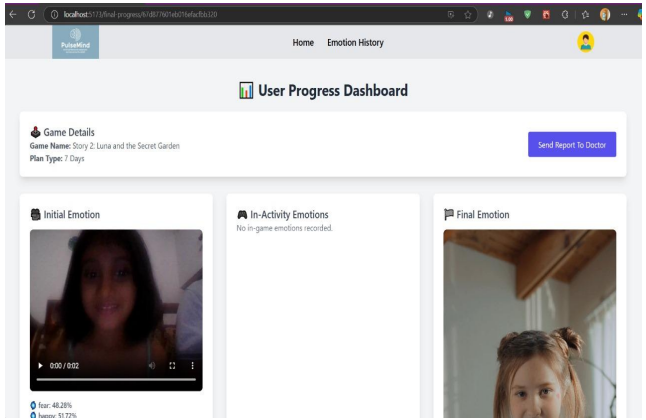

Predicted Label
import cv2
def process_image(image_path):
image=cv2.imread(image_path)
img_height,img_width= 224,224
image_resized= cv2.resize(image, (img_height,img_width))
image=np.expand_dims(image_resized,axis=0)
pred=model.predict(image)
class_names = ['disgust', 'fear', 'happy', 'neutral', 'sad', 'surprise']
output_class=class_names[np.argmax(pred)]
probability =float(str(round(max(pred[0]),6)))
return {"class":output_class ,"probability":probability}
print(process_image(r"/content/drive/MyDrive/Dataset/archive (2)/test/sad/PrivateTest_10658656.jpg"))
1/1 0s 23ms/step
{'class': 'sad', 'probability': 0.997832}

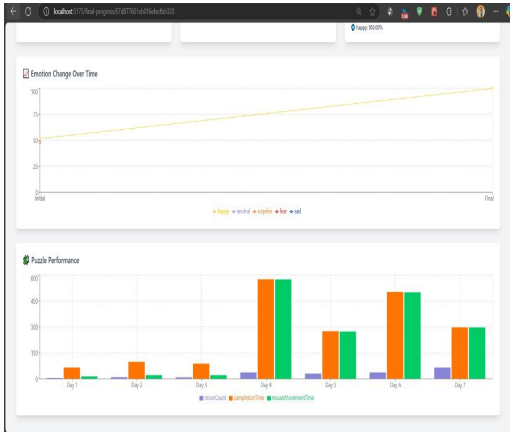

Home
Emotion History
Emotion Detection
Detect Using Camera
Detect Using Video

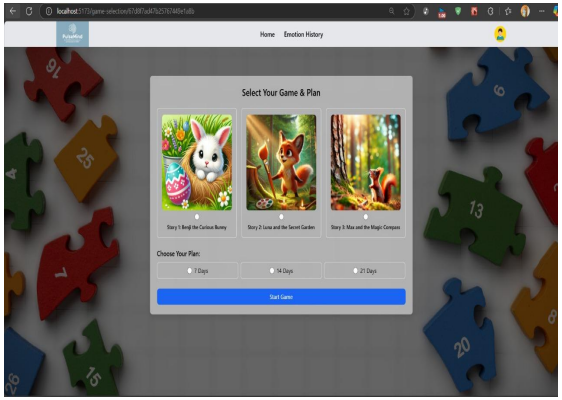

Home
Emotion History
Emotion: Fear (Anxious, Nervous, Stressed)
Goal: Reduce anxiety and bring the child to a relaxed state
4-4-4
Bubble Breathing
5–10 mins
Blow soap bubbles slowly to regulate breathing and calm down.
How to Perform
Squeeze a Soft Toy
2–3 mins
Help release frustration through controlled squeezing.
How to Perform

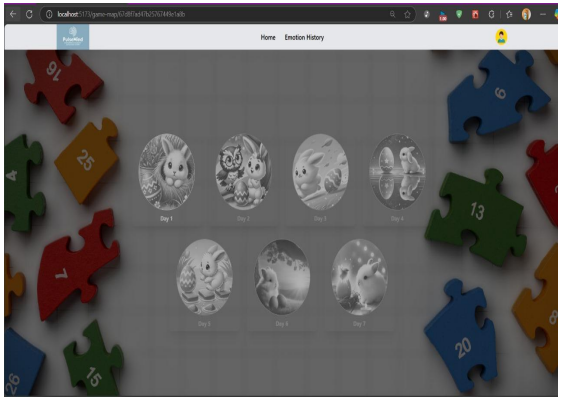

Home
Emotion History
Emotion: Fear (Anxious, Nervous, Stressed)
Goal: Reduce anxiety and bring the child to a relaxed state
Bubble Breathing
1. Give the child a bottle of soap bubbles.
2. Ask them to blow slowly, making big, gentle bubbles.
3. Tell them to watch the bubbles float and pop.
4. Repeat until they feel calmer.
Close
Complete

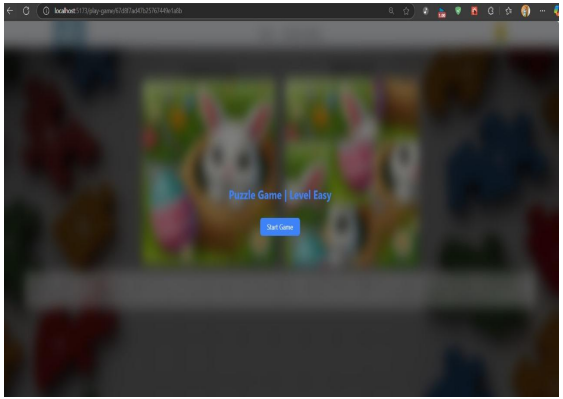

Home
Emotion History
Daily Progress Dashboard
Game Details
Game Name: N/A
Plan Type: N/A
Session Started: 3/17/2025, 11:48:04 PM
Defaulting to initial emotion data as game details are incomplete.
You have not started the game yet.
Emotion Change Over Time

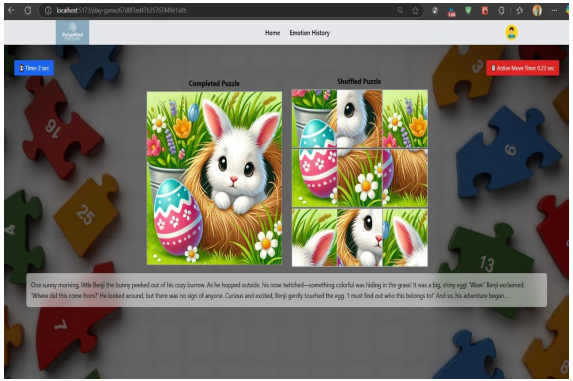

Home
Emotion History
User Progress Dashboard
Game Details
Game Name: Story 2: Luna and the Secret Garden
Plan Type: 7 Days
Send Report To Doctor
Initial Emotion
0:00 / 0:02
In-Activity Emotions
No in-game emotions recorded.
Final Emotion

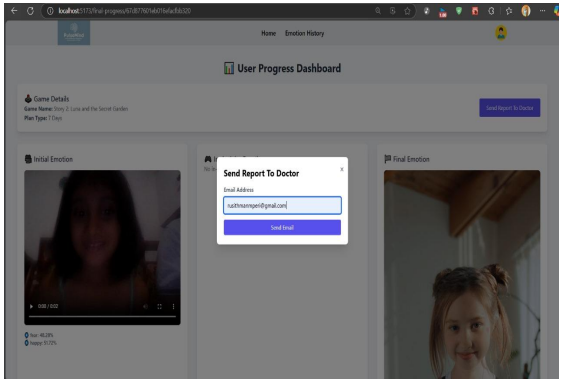

Emotion Change Over Time
Puzzle Performance

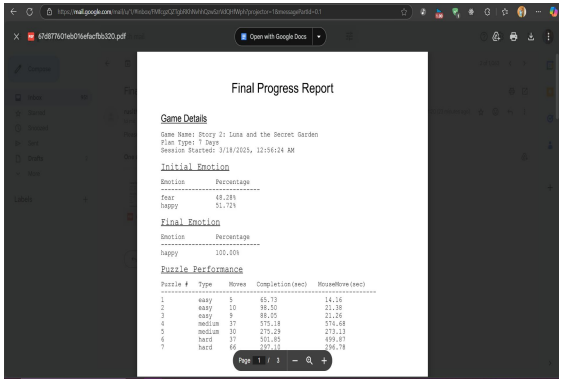

Home
Emotion History
Select Your Game & Plan
Choose Your Plan:
Start Game


Home
Emotion History

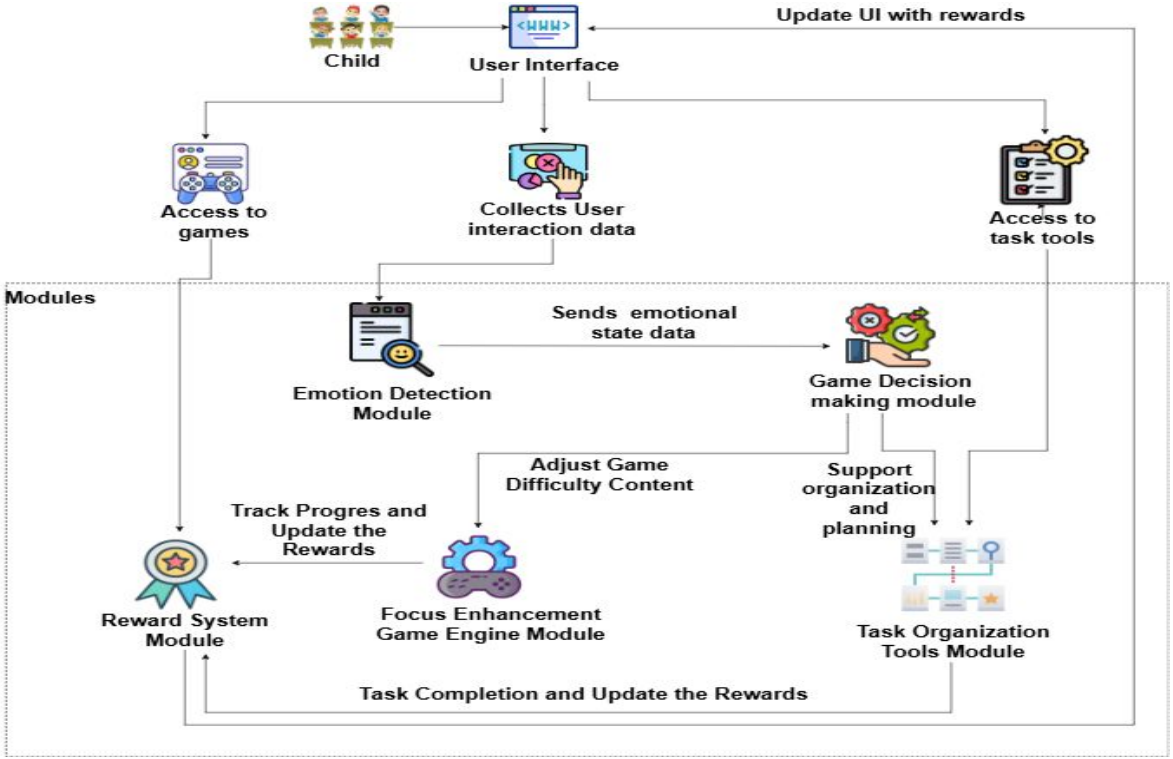

Puzzle Game | Level Easy
Start Game


Home
Emotion History
Completed Puzzle
Shuffled Puzzle

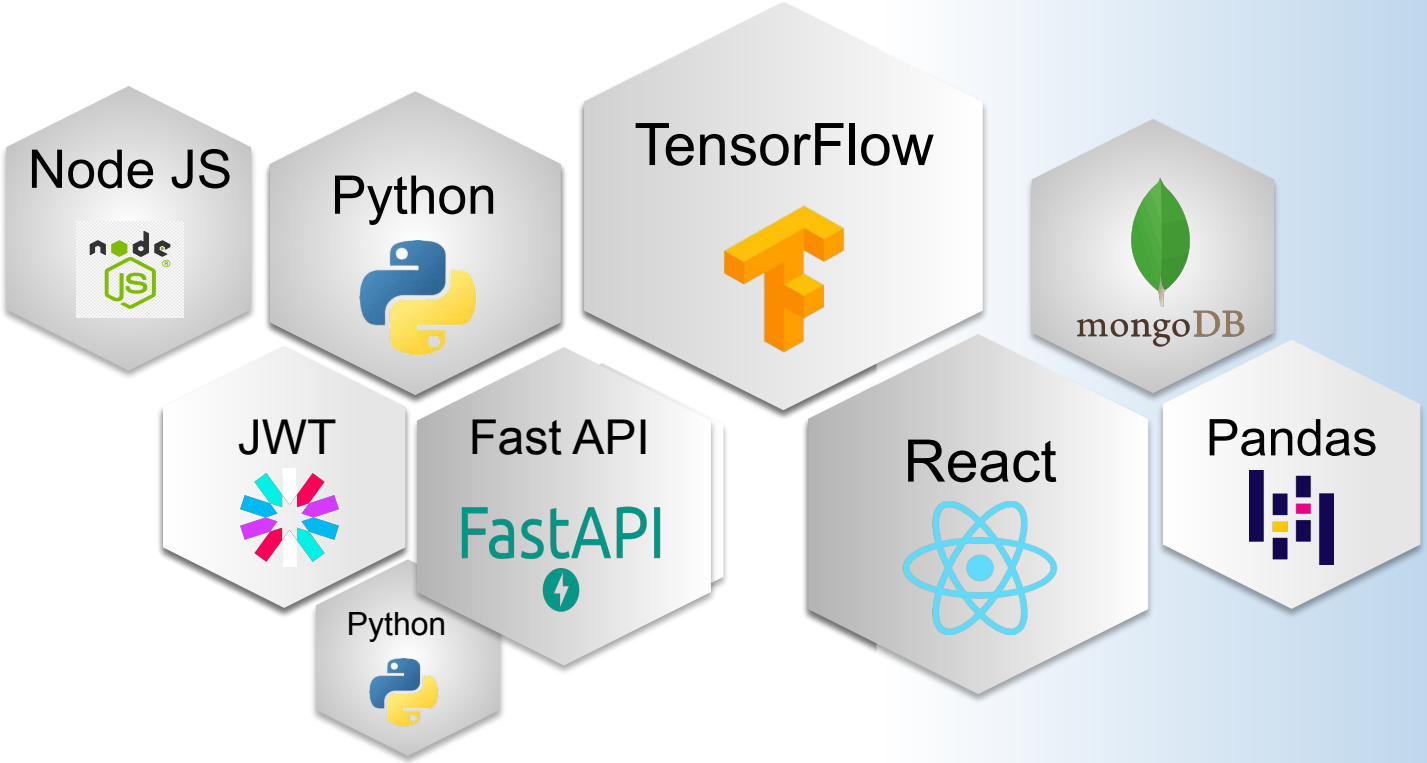

Home
Emotion History
User Progress Dashboard
Send Report To Doctor
Email Address
Send Email
Initial Emotion
Final Emotion


Open with Google Docs
Final Progress Report
Game Details
Initial Emotion
Final Emotion
Puzzle Performance

SYSTEM DIAGRAM



TECHNOLOGIES



KEY PILLARS

Machine learning

Games Development

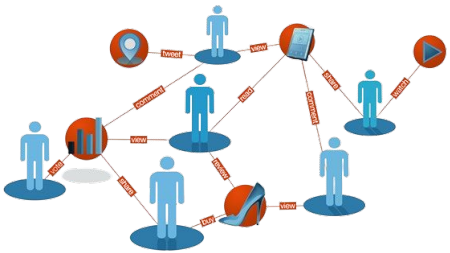
Image Processing

COMPONENT SPECIFIC REQUIREMENTS
Functional Requirement

Identifying a child's behaviors through facial expressions

Performance and emotional analysis

Image Preprocessing



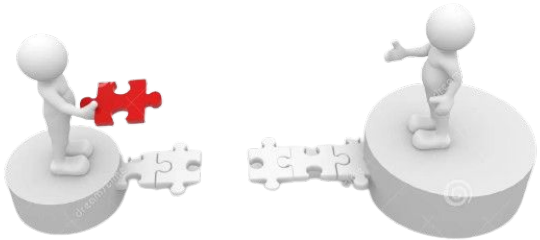
Personalized Game Flow

COMPONENT SPECIFIC REQUIREMENTS
Non-functional Requirement

Performance

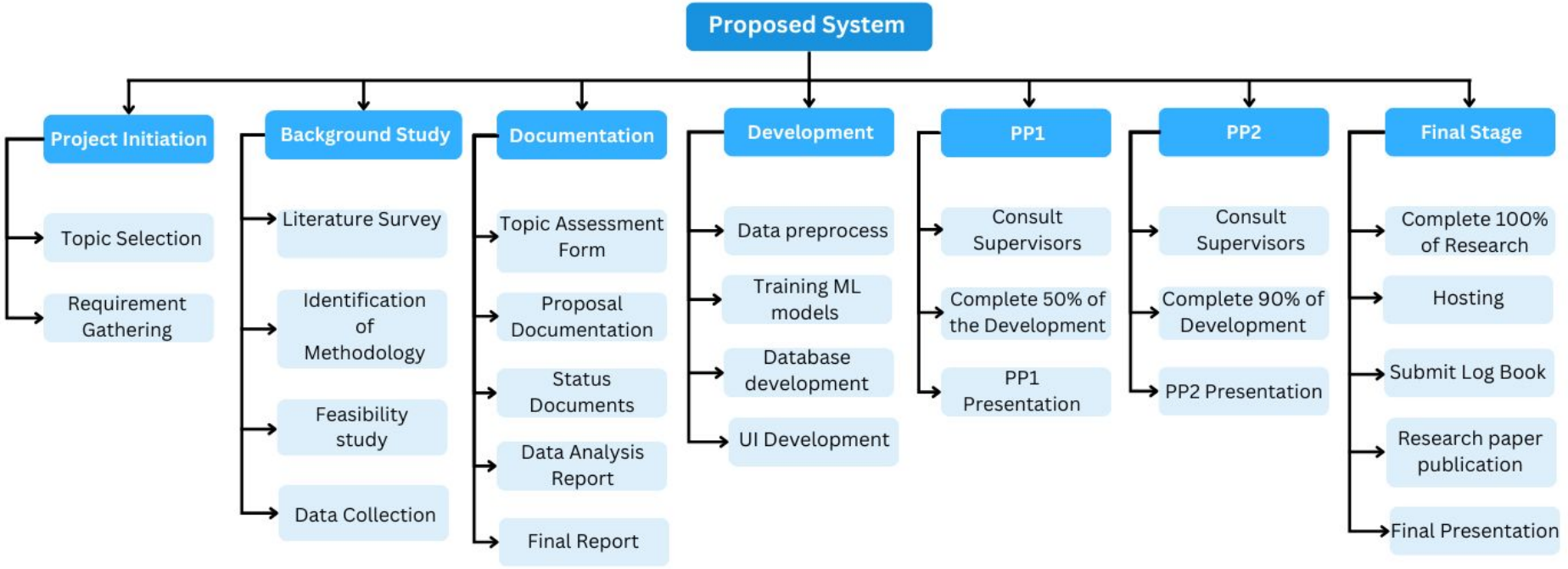
Scalability

Usability

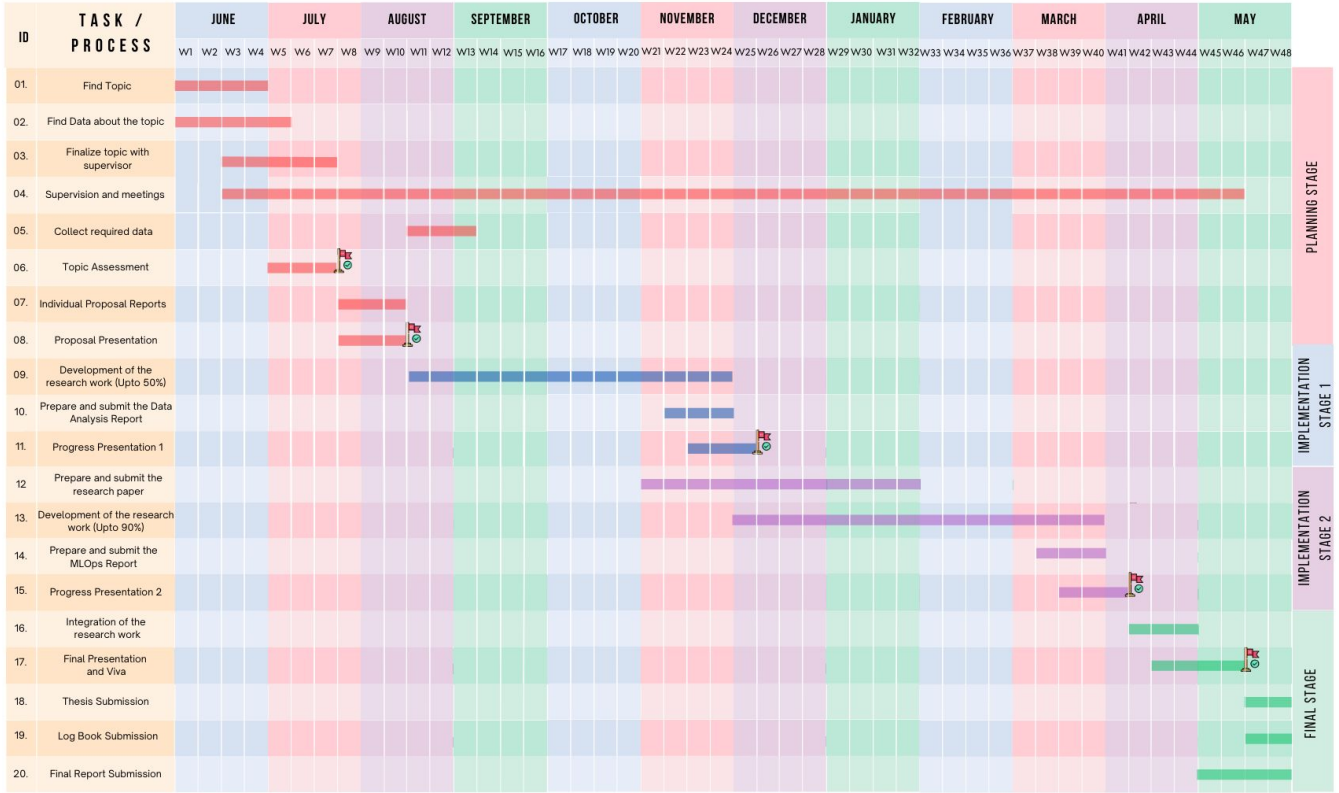


Reliability

WORK BREAKDOWN CHART



GANTT CHART


ID
TASK / PROCESS
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W23 W24 W25 W26 W27 W28 W29 W30 W31 W32 W33 W34 W35 W36 W37 W38 W39 W40 W41 W42 W43 W44 W45 W46 W47 W48
01. Find Topic
02. Find Data about the topic
03. Finalize topic with supervisor
04. Supervision and meetings
05. Collect required data
06. Topic Assessment
07. Individual Proposal Reports
08. Proposal Presentation
09. Development of the research work (Upto 50%)
10. Prepare and submit the Data Analysis Report
11. Progress Presentation 1
12 Prepare and submit the research paper
13. Development of the research work (Upto 90%)
14. Prepare and submit the MLOps Report
15. Progress Presentation 2
16. Integration of the research work
17. Final Presentation and Viva
18. Thesis Submission
19. Log Book Submission
20. Final Report Submission
PLANNING STAGE
IMPLEMENTATION STAGE 1
IMPLEMENTATION STAGE 2
FINAL STAGE

REFERENCES

[7]W. Ortiz, D. Castillo and L. Wong, "Mobile Application: A Serious Game Based in Gamification for Learning Mathematics in High School Students," 2022 31st Conference of Open Innovations Association (FRUCT), Helsinki, Finland, 2022, pp. 220-228, doi: 10.23919/FRUCT54823.2022.9770917. keywords: {Technological innovation;Avatars;User experience;Mobile handsets;Mathematics;Serious games;Mobile applications},

[8]Danylyna Shpakivska Bilan, Irene Alice Chicchi Giglioli, Pablo Cuesta et al. Decreased impulsiveness and MEG normalization after AI- digital therapy in ADHD children: a RCT, 02 May 2024, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-4329802/v1]

[9]Andrade, Luis Javier Serpa, Roberto Agustin Garcia Velez, and Graciela Del Serpa Andrade. "Information and Communication Technologies Learning Methodologies for Children with Adhd." *AHFE 2022 Conference on Applied Human Factors and Ergonomics International*. 2022.

[10]Gudka, R., Becker, K., Newlove-Delgado, T. *et al.* Provision of digital health interventions for young people with ADHD in primary care: findings from a survey and scoping review. *BMC Digit Health* **2**, 71 (2024). https://doi.org/10.1186/s44247-024-00129-1

Enhancing Impulse Control in ADHD Students Through Structured Timetables

IT21379574 | Dilshani H.T.D.P.

Specialization: Information technology

INTRODUCTION

The system for children with hyperactive-impulsive ADHD offers personalized timetables and physical activities, empowering caregivers with tailored solutions for effective symptom management and improved impulse control.

RESEARCH GAP

Component	[11]	[12]	[13]	Proposed System
Current Approaches	✓	✗	✗	✓
Limited Integration of Activities	✓	✗	✗	✓
Lack of Personalization	✗	✓	✓	✓
Engagement and Enjoyment	✓	✓	✗	✓
Need for Structured Timetables	✗	✗	✗	✓

[11] August 2024-The effectiveness of parent training programs for children with ADHD aged 6-11 years: A systematic
[12] August 2021-Characterizing neuroanatomic heterogeneity in people with and without ADHD based on subcortical brain volumes
[13] June 2019:Development and Standardization of an Impulse Control Scale for Adolescents

RESEARCH PROBLEM

How can personalized, structured activities, including physical exercises and impulsivity level predictions, help children with hyperactive-impulsive ADHD improve impulse control and manage their energy effectively through tailored timetables?

OBJECTIVES

The project aims to create a personalized app that aids children with ADHD by offering structured activities like physical exercises and mindfulness techniques.

Develop five pre-designed schedules with activities to address different impulsive behaviors in children with ADHD.

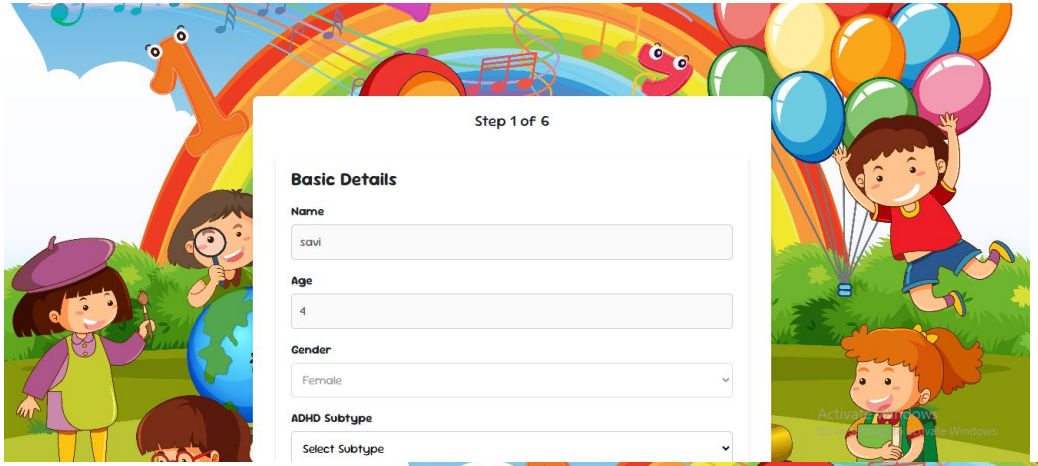
Allow teachers/caregivers to customize and modify timetables, ensuring the activities are engaging and fit the specific needs of each child.

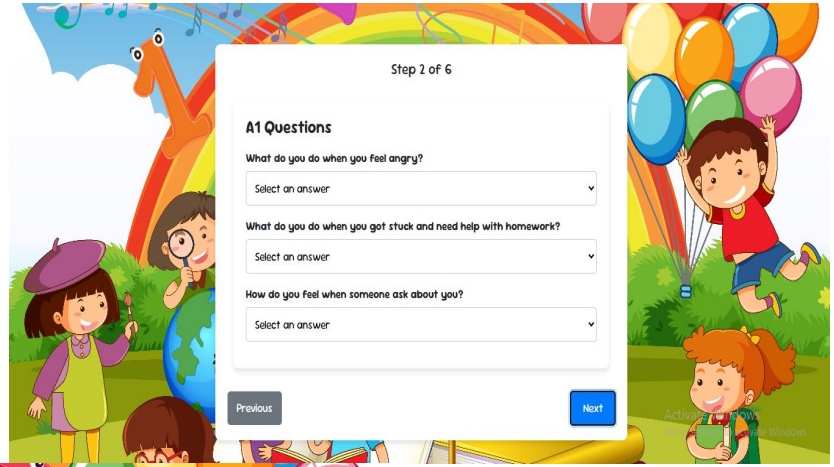
This will provide a personalized, structured routine for each child, helping them manage their energy, improve impulse control, and develop self-regulation through engaging, enjoyable activities

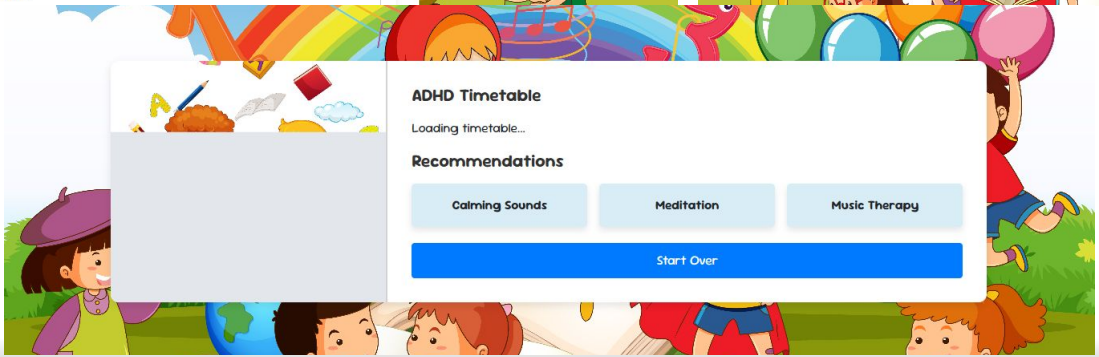
PP1 to PP2 PROGRESS

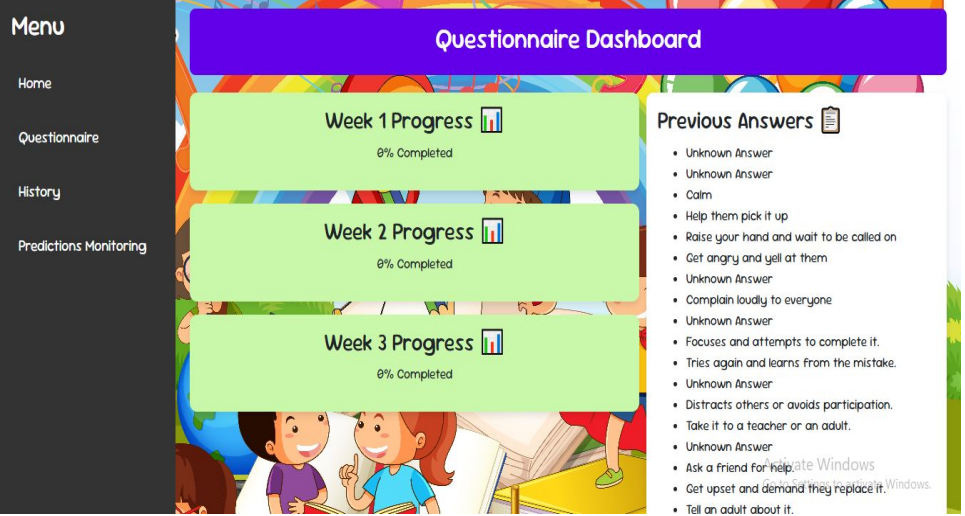
- [x] Implement frontend and backend
- [x] Collect data and generate dataset
- [x] Train a model to identify children's impulsivity level
- [x] Implement the recommended physical activities
- [x] Implement the questioner dashboard
- [x] Improve the model and make customized time tables
- [ ] Develop the progress level and recommendations.

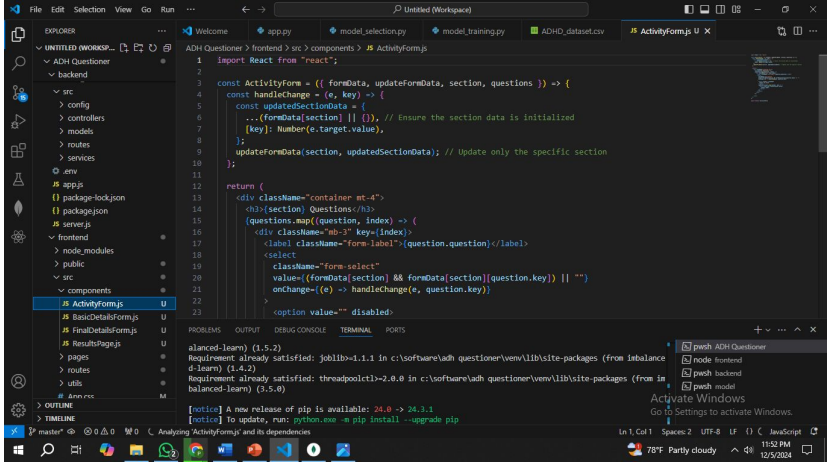
PROOF OF COMPLETION

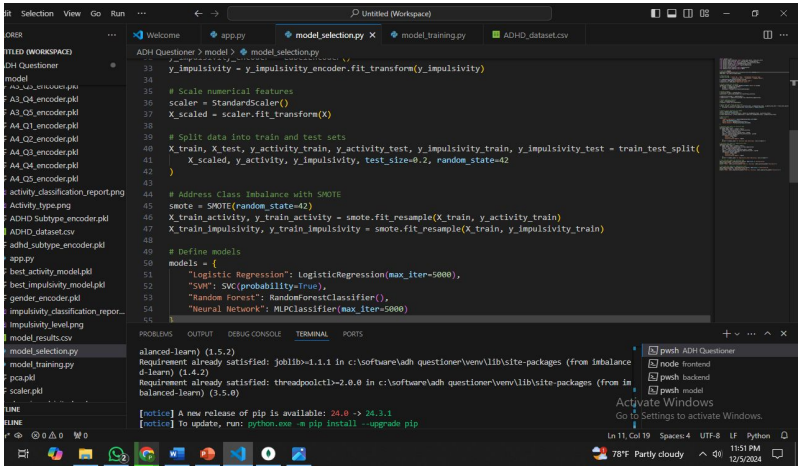


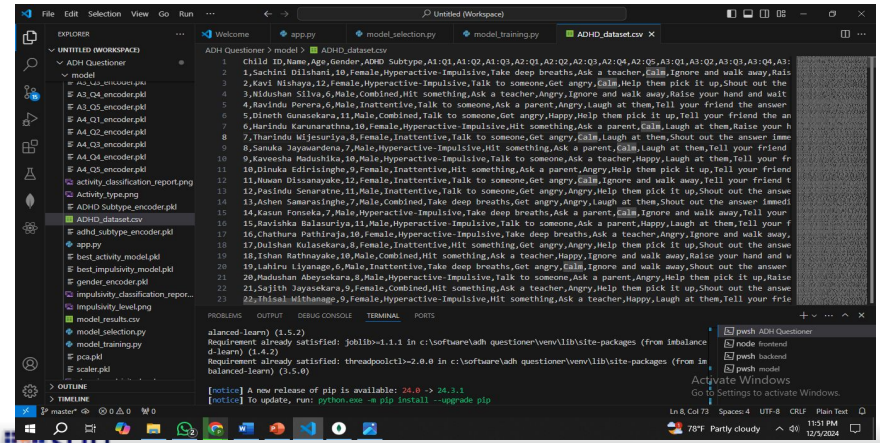




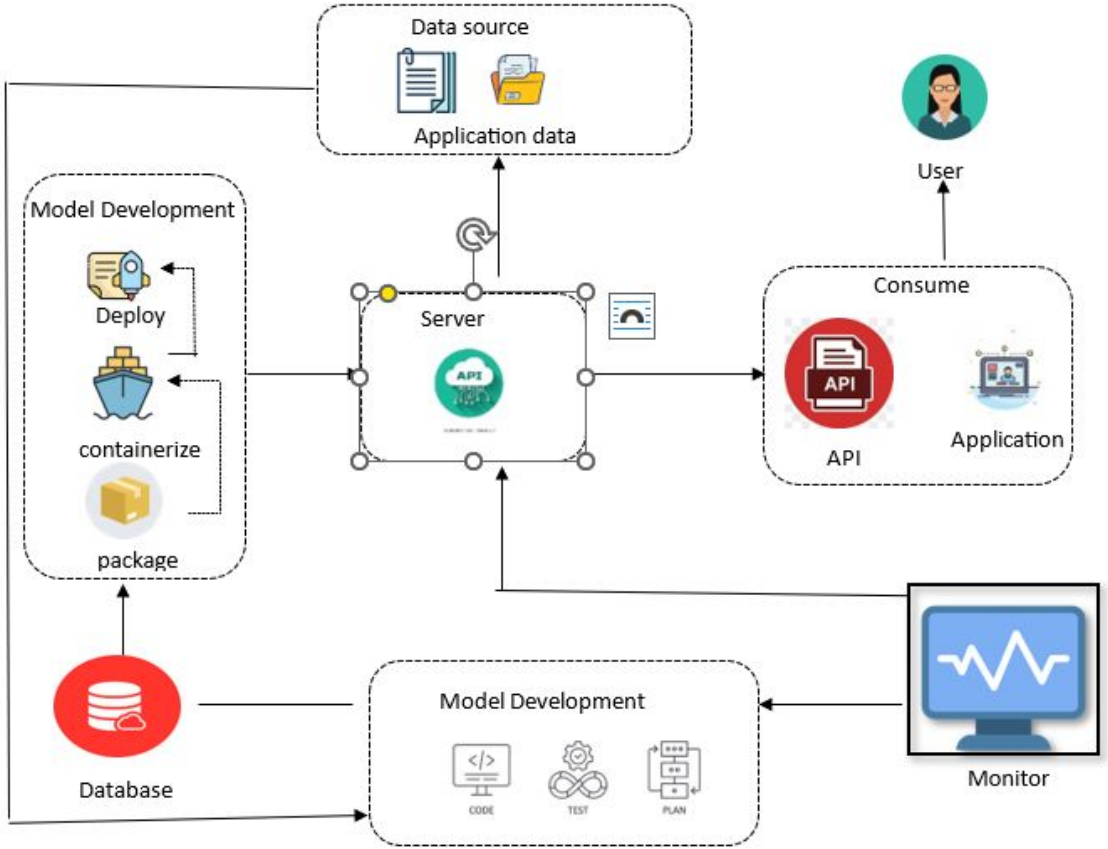

Menu
Home
Questionnaire
History
Predictions Monitoring
Questionnaire Dashboard
Week 1 Progress
0% Completed
Week 2 Progress
0% Completed
Week 3 Progress
0% Completed
Previous Answers
Unknown Answer
Unknown Answer
Calm
Help them pick it up
Raise your hand and wait to be called on
Get angry and yell at them
Unknown Answer
Complain loudly to everyone
Unknown Answer
Focuses and attempts to complete it.
Tries again and learns from the mistake.
Unknown Answer
Distracts others or avoids participation.
Take it to a teacher or an adult.
Unknown Answer
Ask a friend for help.
Get upset and demand they replace it.
Tell an adult about it.



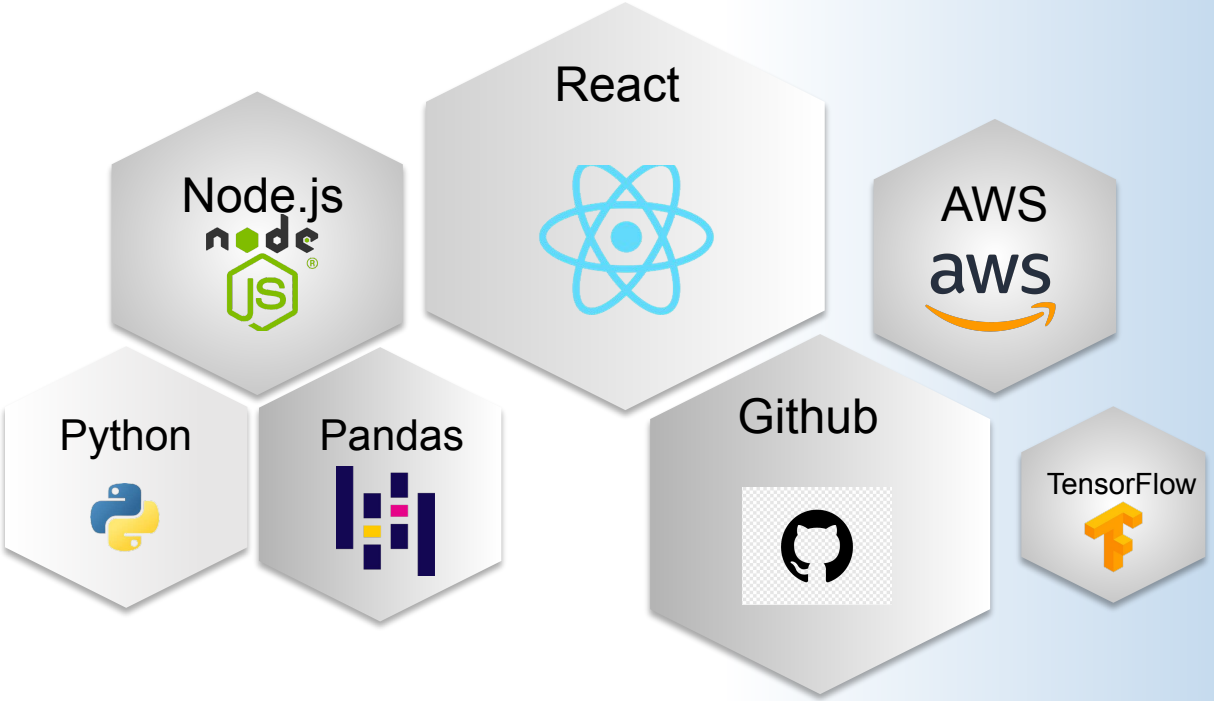




SYSTEM DIAGRAM

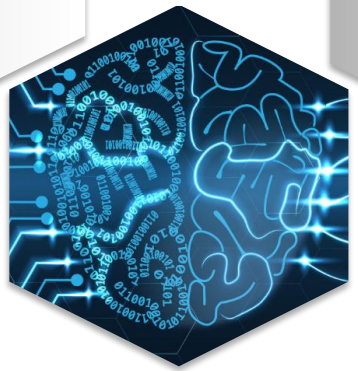


TECHNOLOGIES



KEY PILLARS

Machine learning

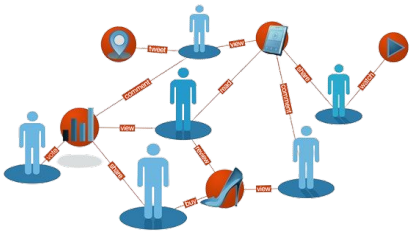


Cloud computing

COMPONENT SPECIFIC REQUIREMENTS
Functional Requirement

Customizable Timetables

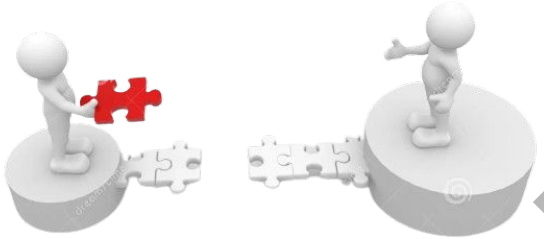
Activity Integration



Tracking and Feedback

Notifications and Reminders

COMPONENT SPECIFIC REQUIREMENTS
Non-functional Requirement



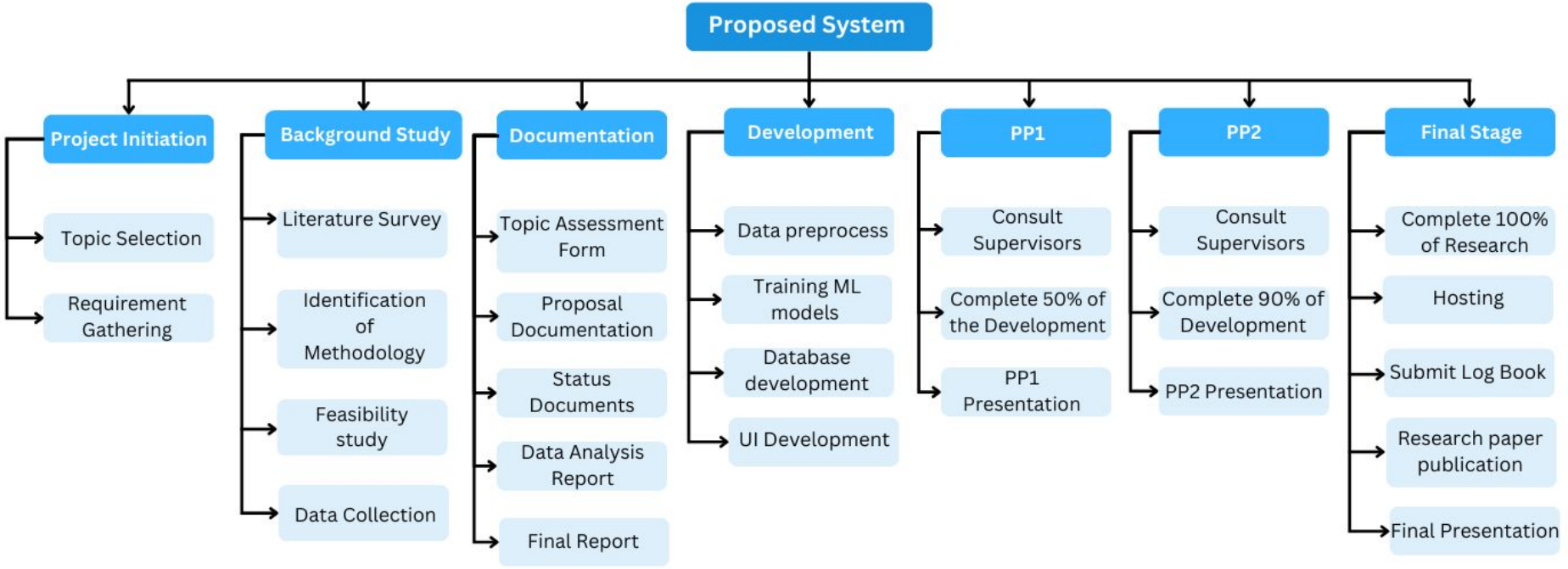
Performance

Reliability

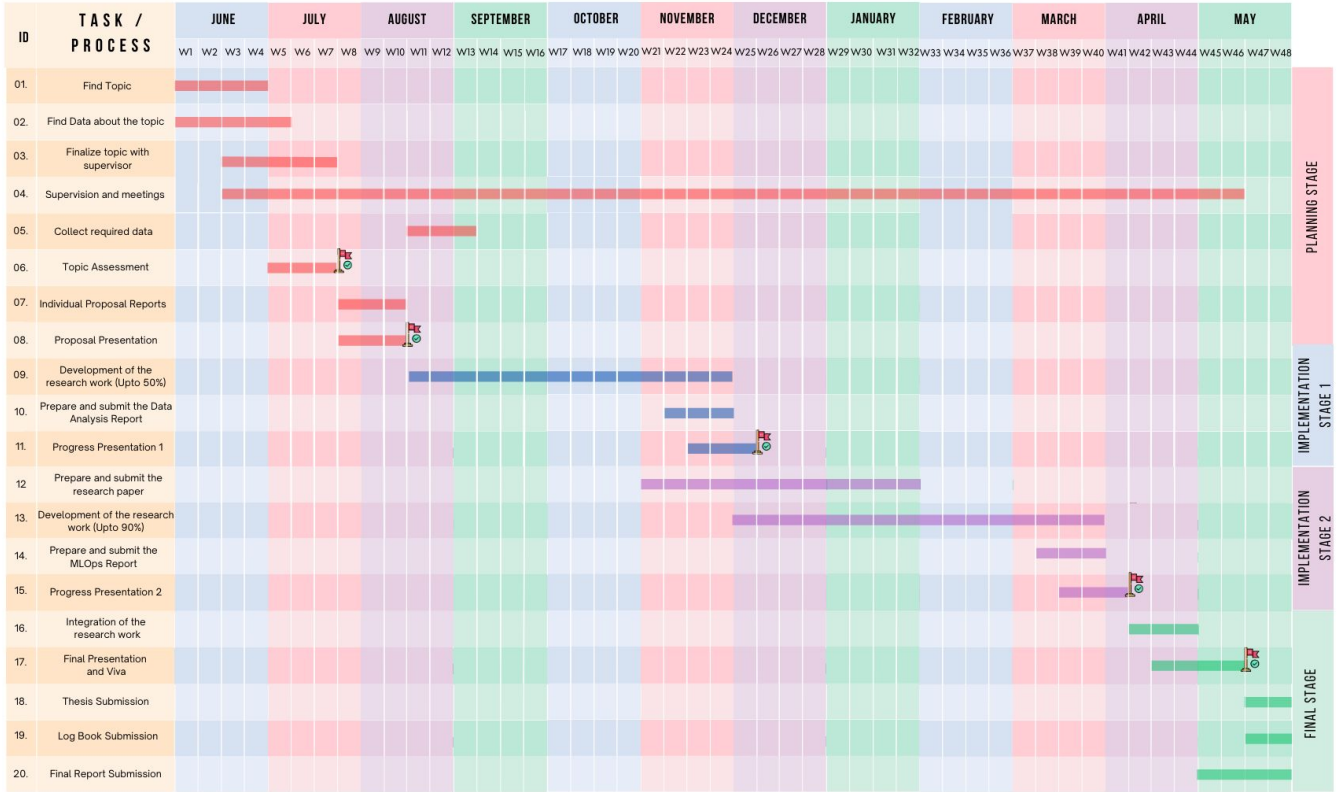
Usability

Availability

WORK BREAKDOWN CHART



GANTT CHART


ID
TASK / PROCESS
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W23 W24 W25 W26 W27 W28 W29 W30 W31 W32 W33 W34 W35 W36 W37 W38 W39 W40 W41 W42 W43 W44 W45 W46 W47 W48
01. Find Topic
02. Find Data about the topic
03. Finalize topic with supervisor
04. Supervision and meetings
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06. Topic Assessment
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08. Proposal Presentation
09. Development of the research work (Upto 50%)
10. Prepare and submit the Data Analysis Report
11. Progress Presentation 1
12 Prepare and submit the research paper
13. Development of the research work (Upto 90%)
14. Prepare and submit the MLOps Report
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18. Thesis Submission
19. Log Book Submission
20. Final Report Submission
PLANNING STAGE
IMPLEMENTATION STAGE 1
IMPLEMENTATION STAGE 2
FINAL STAGE

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[12] https://www.researchgate.net/publication/354311415_
Characterizing neuroanatomic heterogeneity in people with and without ADHD based on subcortical brain volumes

[13]S. K. Beura, A. R. Panigrahi, and P. Yadav, "Development and Standardization of an Impulse Control Scale for Adolescents," *Published Online*, Jun. 12, 2019. Available: https://www.researchgate.net/publication/360385680

AI-Driven Adaptive Learning and Intervention System with future predictions for Personalized ADHD Management in Children

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Specialization: Information technology

INTRODUCTION

The research aims to develop an intelligent system for data analysis, pattern recognition, **future challenge prediction** and **prevention mechanisms prediction** that dynamically adapts intervention strategies based on a child's interactions to provide personalized and effective support over time.

What we can predict?

- Progress in academic or learning tasks - **Academic Struggles**
- Attention span and focus duration - **Increased risk of anxiety**
- Impulsivity levels during tasks - **Increased or decreased impulsivity**
- Social interaction patterns and responses - **Social Challenges**

RESEARCH GAP

Component	[14]	[15]	[16]	Proposed System
Monitoring Child's interactions	✓	✓	✓	✓
Personalized Feedbacks	✗	✓	✓	✓
User Dashboard	✓	✗	✓	✓
Future Predictive Insights	✗	✗	✗	✓
AI-Driven Recommendations	✗	✗	✗	✓
Alert and Notifications	✓	✓	✗	✓

[14] January 2022 - An Overview of Predicting the Prevalence of ADHD
[15]June 2023 - Diagnosing attention-deficit hyperactivity disorder (ADHD) using artificial intelligence: a clinical study in the UK
[16] April 2020 - Machine-Learning prediction of comorbid substance use disorders in ADHD youth using Swedish registry data

RESEARCH PROBLEM

Current ADHD management methods are unable to adapt to individual needs, leading to inconsistent outcomes.An AI-driven system is needed to provide dynamic, personalized strategies and proactive solutions for better ADHD management.

OBJECTIVES

Monitor the child's interactions with the application and Collect data on key indicators such as response times, completion rates, attention span, and behavioral trends to assess the child's progress.

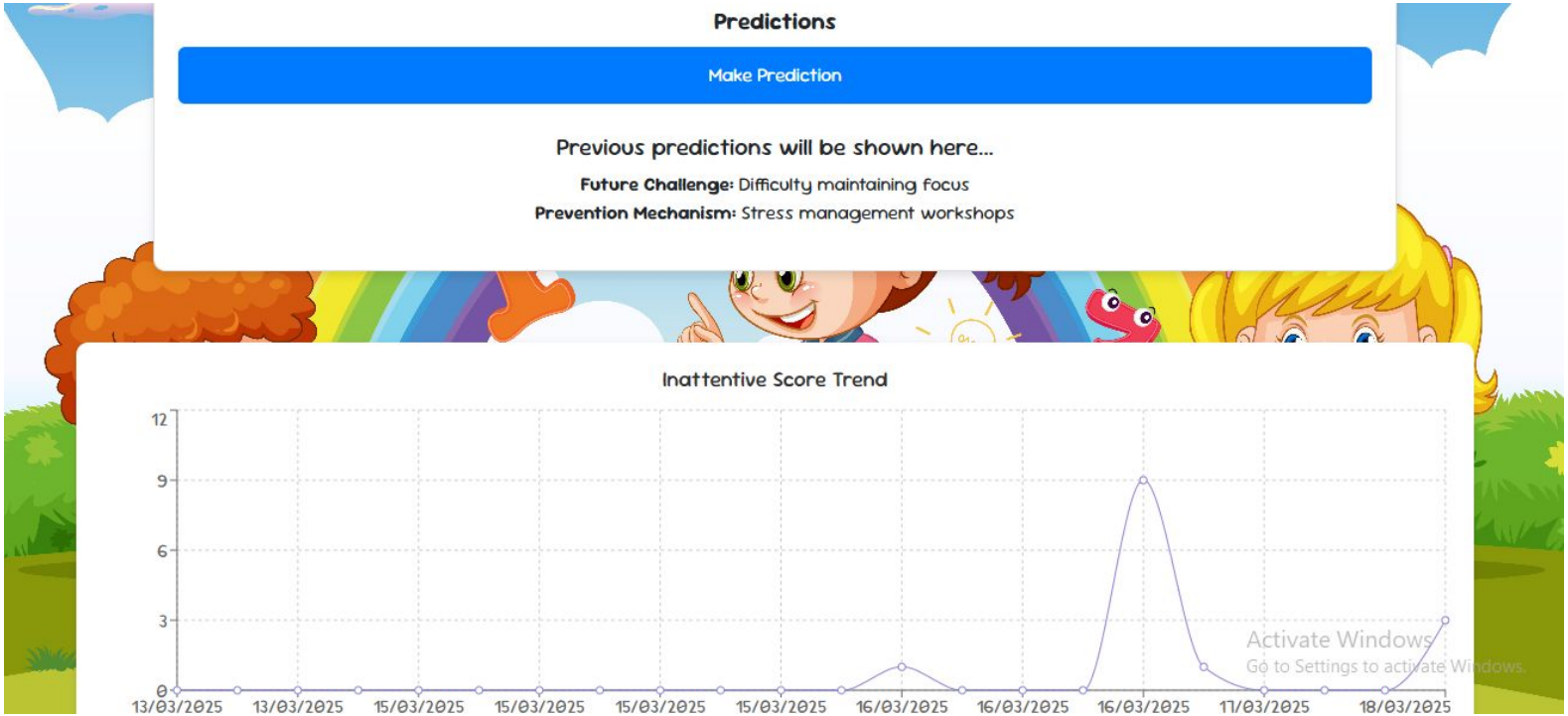
Develop a user-friendly interface for educators and caregivers to easily track progress, view key achievements, and identify areas that need further attention.

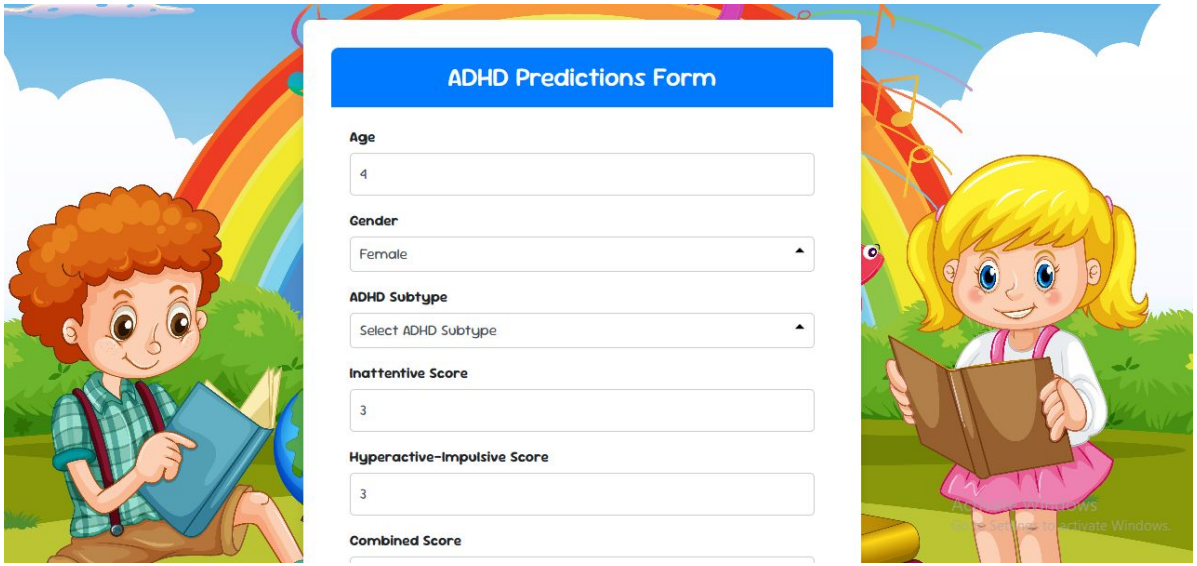
Leverage AI to predict potential challenges the child may face in the future based on current and historical performance data.

Deliver tailored feedback to both the child and caregivers, offering insights into strengths, areas for improvement, and specific intervention strategies.

- [x] Implement frontend and backend
- [x] Collect and generate dataset
- [x] Train a future predictive machine learning model
- [x] Implement user-friendly dashboard for monitoring
- [x] Validate and improve model
- [ ] Implement user-friendly dashboard for monitoring
- [ ] Integrate dashboard with components to monitoring

PROOF OF COMPLETION

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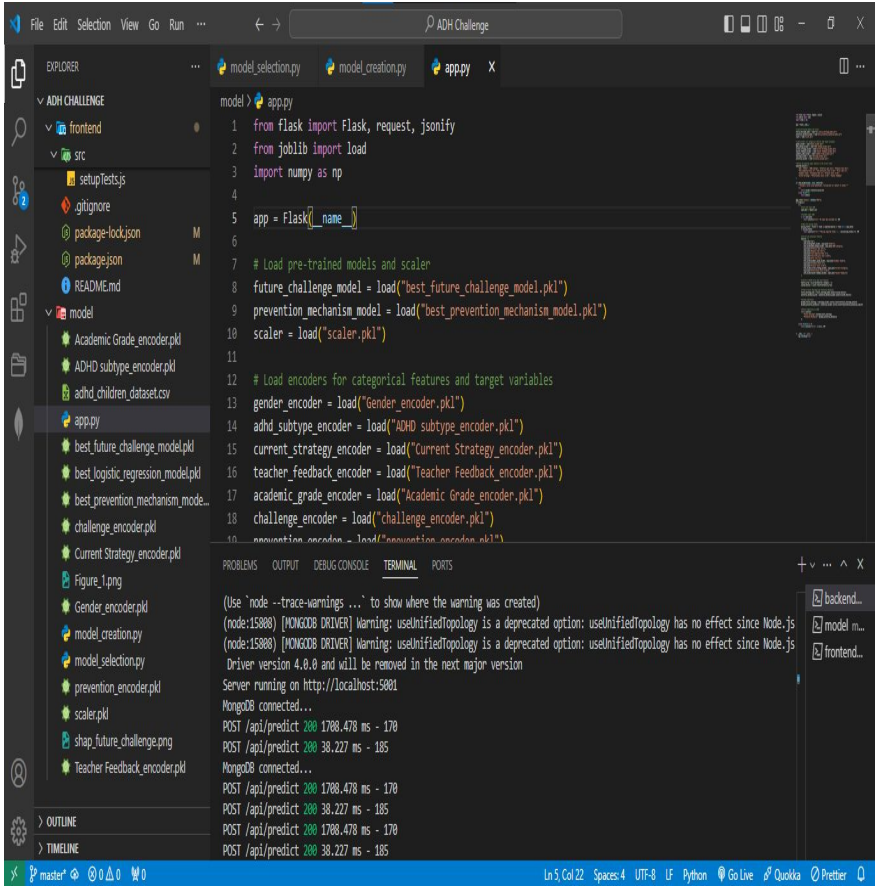
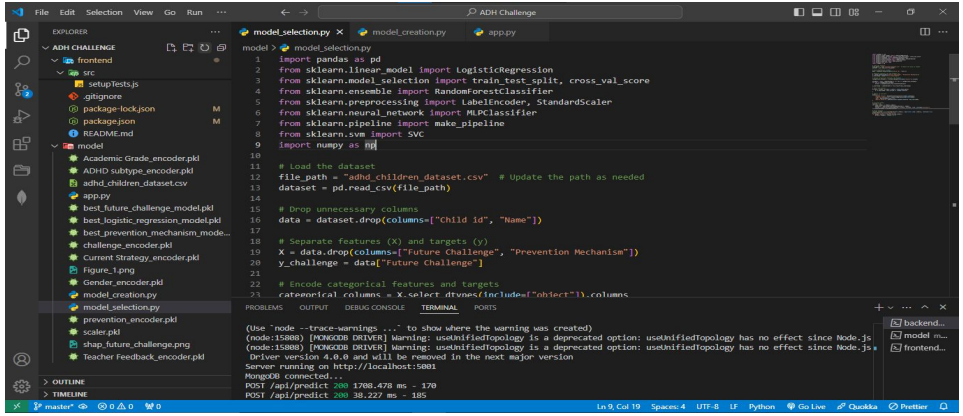
Gender
Female
ADHD Subtype
Select ADHD Subtype
Inattentive Score
3
Hyperactive-Impulsive Score
3
Combined Score


app.py
from flask import Flask, request, jsonify
from joblib import load
import numpy as np
app = Flask(__name__)
# Load pre-trained models and scaler
future_challenge_model = load("best_future_challenge_model.pkl")
prevention_mechanism_model = load("best_prevention_mechanism_model.pkl")
scaler = load("scaler.pkl")
# Load encoders for categorical features and target variables
gender_encoder = load("Gender_encoder.pkl")
adhd_subtype_encoder = load("ADHD subtype_encoder.pkl")
current_strategy_encoder = load("Current Strategy_encoder.pkl")
teacher_feedback_encoder = load("Teacher Feedback_encoder.pkl")
academic_grade_encoder = load("Academic Grade_encoder.pkl")
challenge_encoder = load("challenge_encoder.pkl")
(Use `node --trace-warnings ...` to show where the warning was created)
(node:15808) [MONGODB DRIVER] Warning: useUnifiedTopology is a deprecated option: useUnifiedTopology has no effect since Node.js
(node:15808) [MONGODB DRIVER] Warning: useUnifiedTopology is a deprecated option: useUnifiedTopology has no effect since Node.js
Driver version 4.0.0 and will be removed in the next major version
Server running on http://localhost:5001
MongoDB connected...
POST /api/predict 200 1708.478 ms - 170
POST /api/predict 200 38.227 ms - 185
MongoDB connected...
POST /api/predict 200 1708.478 ms - 170
POST /api/predict 200 38.227 ms - 185
POST /api/predict 200 1708.478 ms - 170
POST /api/predict 200 38.227 ms - 185


model_selection.py
import pandas as pd
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.ensemble import RandomForestClassifier
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn.neural_network import MLPClassifier
from sklearn.pipeline import make_pipeline
from sklearn.svm import SVC
import numpy as np
# Load the dataset
file_path = "adhd_children_dataset.csv" # Update the path as needed
dataset = pd.read_csv(file_path)
# Drop unnecessary columns
data = dataset.drop(columns=["Child id", "Name"])
# Separate features (X) and targets (y)
X = data.drop(columns=["Future Challenge", "Prevention Mechanism"])
y_challenge = data["Future Challenge"]
# Encode categorical features and targets
(Use `node --trace-warnings ...` to show where the warning was created)
(node:15808) [MONGODB DRIVER] Warning: useUnifiedTopology is a deprecated option: useUnifiedTopology has no effect since Node.js
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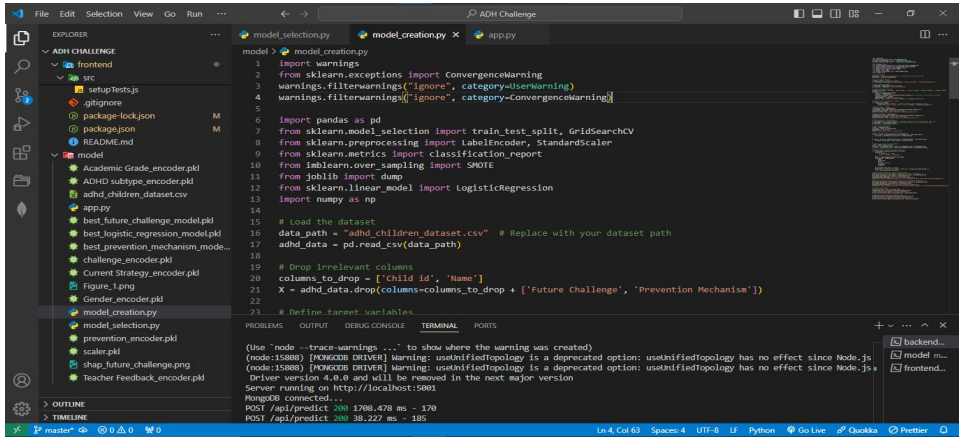
POST /api/predict 200 1708.478 ms - 170
POST /api/predict 200 38.227 ms - 185


model_creation.py
import warnings
from sklearn.exceptions import ConvergenceWarning
warnings.filterwarnings("ignore", category=UserWarning)
warnings.filterwarnings("ignore", category=ConvergenceWarning)
import pandas as pd
from sklearn.model_selection import train_test_split, GridSearchCV
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn.metrics import classification_report
from imblearn.over_sampling import SMOTE
from joblib import dump
from sklearn.linear_model import LogisticRegression
import numpy as np
# Load the dataset
data_path = "adhd_children_dataset.csv" # Replace with your dataset path
adhd_data = pd.read_csv(data_path)
# Drop irrelevant columns
columns_to_drop = ['Child id', 'Name']
X = adhd_data.drop(columns=columns_to_drop + ['Future Challenge', 'Prevention Mechanism'])
# Define target variables
(Use `node --trace-warnings ...` to show where the warning was created)
(node:15808) [MONGODB DRIVER] Warning: useUnifiedTopology is a deprecated option: useUnifiedTopology has no effect since Node.js
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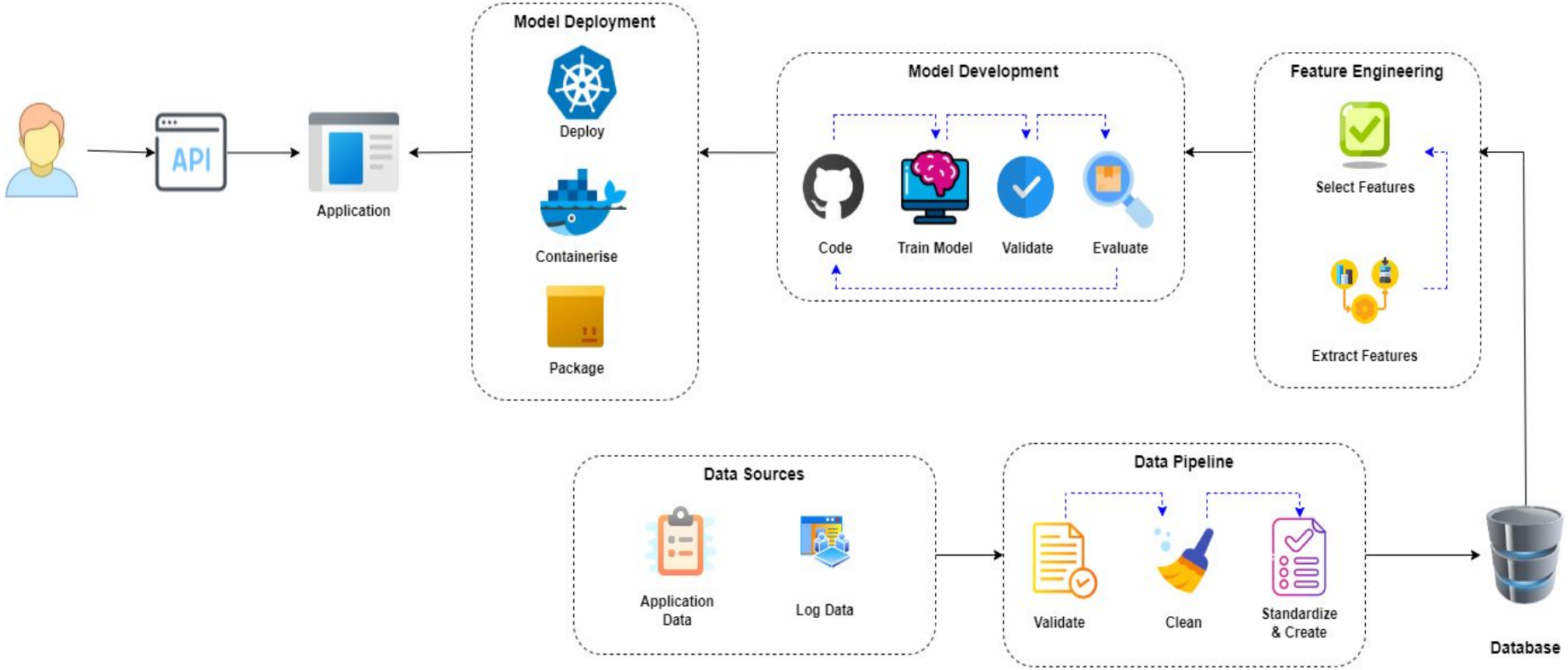
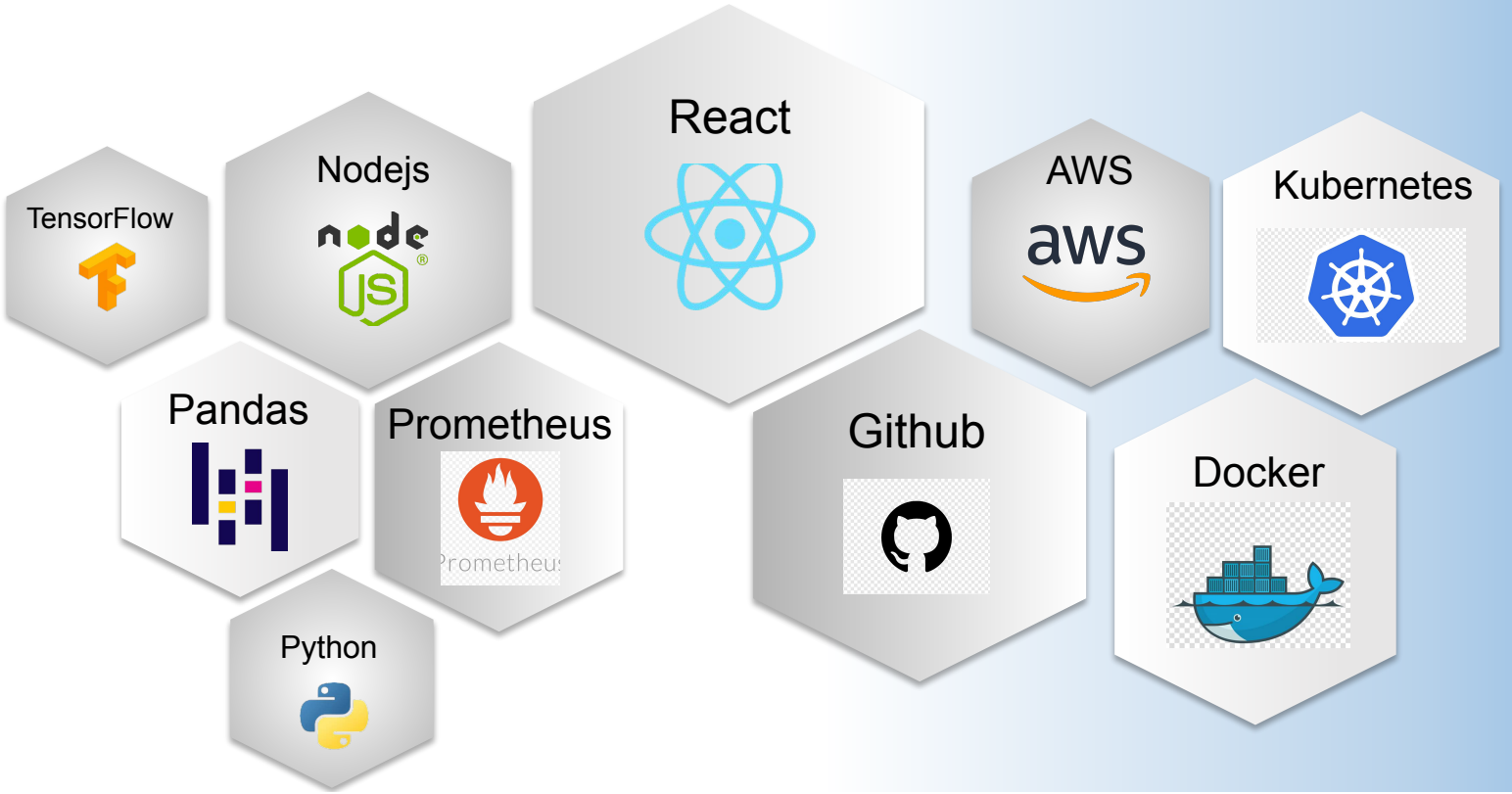
Server running on http://localhost:5001
MongoDB connected...
POST /api/predict 200 1708.478 ms - 170
POST /api/predict 200 38.227 ms - 185

SYSTEM DIAGRAM



TECHNOLOGIES



KEY PILLARS

Cloud Computing

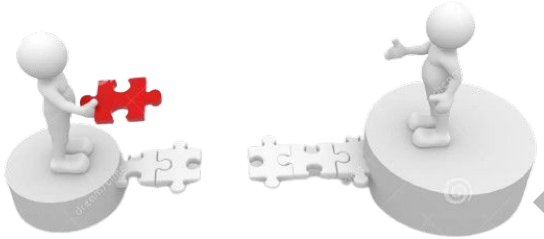
Adaptive Monitoring

Machine Learning

COMPONENT SPECIFIC REQUIREMENTS
Functional Requirement

- Data collection and feature engineering
- User-friendly Dashboard
- Future Predictions and Risk Identification
- Personalized Feedback and Alerts

COMPONENT SPECIFIC REQUIREMENTS
Non-functional Requirement



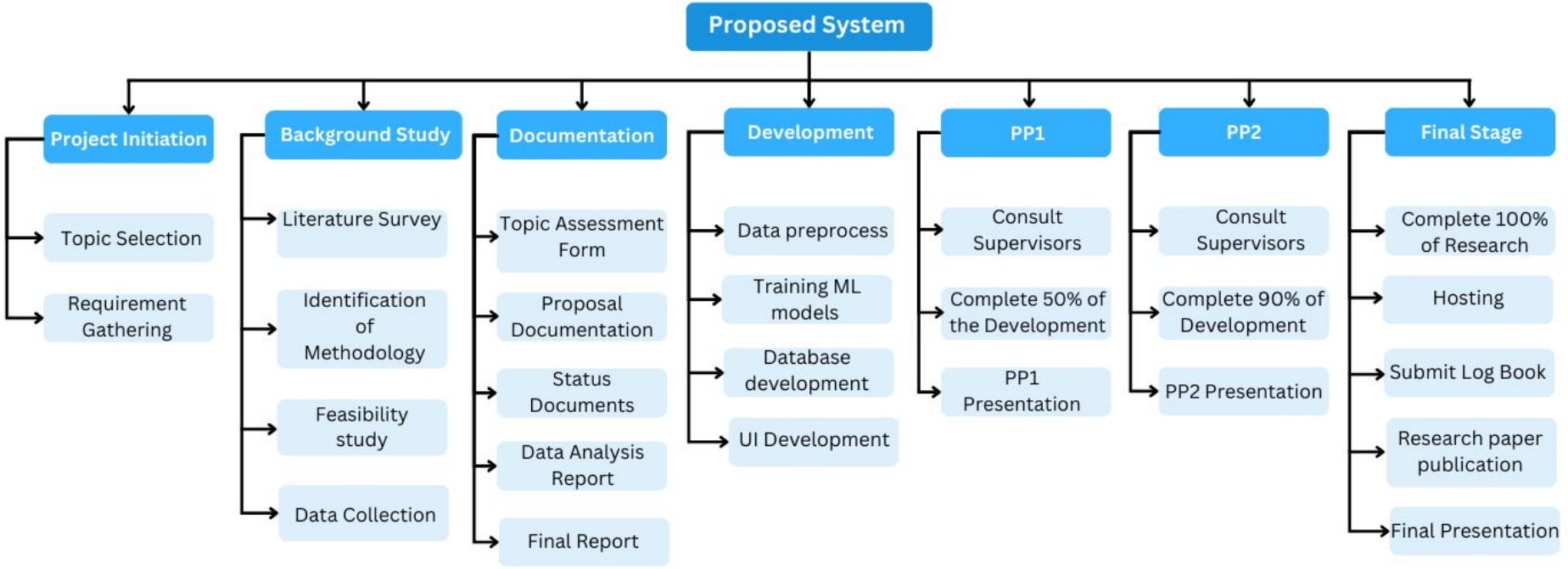
Performance

Reliability

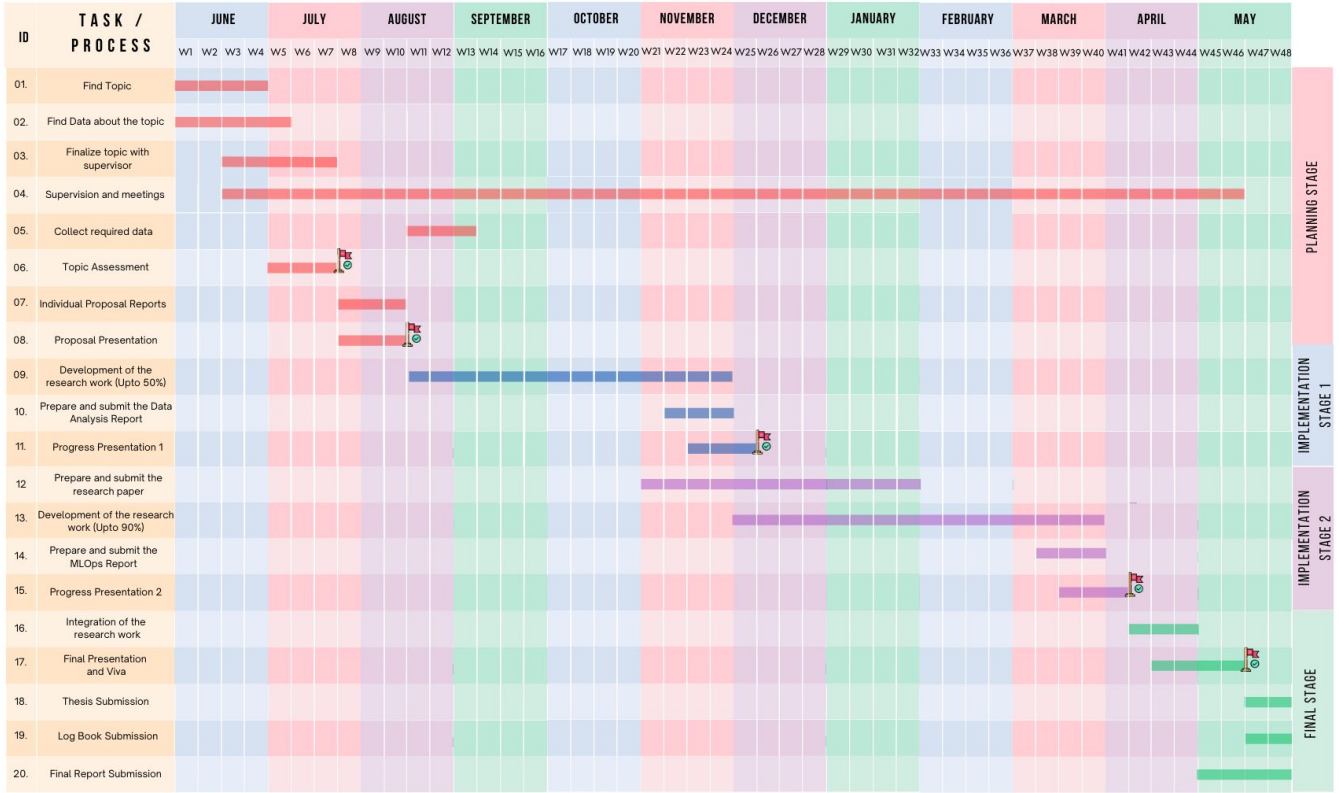
Usability

Availability

WORK BREAKDOWN CHART



GANTT CHART


ID
TASK / PROCESS
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
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18. Thesis Submission
19. Log Book Submission
20. Final Report Submission
PLANNING STAGE
IMPLEMENTATION STAGE 1
IMPLEMENTATION STAGE 2
FINAL STAGE

REFERENCES

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THANK YOU