Designing and Implementing an emotion monitoring system for children under age 10.

TMP-2023-24-113

Overall Project Description

There are only 40 children in one classroom as the existing educational facilities in Sri Lanka are limited.

Among these children, some children receive love and care well in the family environment and have a well-balanced mentality.

But the situation of some children is much different than this. They are mentally unstable due to lack of love or care of their parents in the family environment or due to some other social or problem. There is no proper mechanism to identify such children at an early age and it is caused by human resources. We will introduce an application to avoid the problems.

Objective

Automating the instruction and methodology issuing procedure to teachers for children under 10 years old with mental health problems.

Sub Objectives

- Create a system to take behavioral tracking data of children under 10 years' old who have started gaining any type of education.
- Build a model to identify and analyze the data gained by behavioral tracking methods.
- Instructions and procedures issuing to the teachers.
- Keep tracking the children for a recommended time period.

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Bachelor of Science (Hons) in Information Technology
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Contents

On medical recommendation and proven to be effective in relation to child psychology, special activities for children are provided here.

- Introduction to the topic
- Background
- Research Problem
- Research Gap
- Main objective
- Sub-objective
- Methodology

Introduction and Background

Little children, especially during their early developmental years, face various personality and mentality matters that can significantly impact their emotional and psychological well-being. Identifying children's mental health problems can be a complex process that requires the involvement of various professionals and careful observation of the child's behavior and emotions. Here are some common activities and methods used in the process of identifying children's mental health issues. By our research we are trying to identifying those issues by using a virtual method.

We create Activities for the Childrens and going to identifying their issues by according to their results just after they complete the activities. These Activities are create to identifying the problems in the areas of

- Fear and Anxiety
- Attention and focus
- Children’s memory matters.

Research Gap

- None of the apps that have been designed to identify the mental nature of little children have used a technology to capture their mental problems through the activities that are given to do.

- In Sri Lanka's school system, there are only 40 children in a classroom, and there is no program to improve the mental health of each child by capturing their mental level.

Feature	Research 1	Research 2	Research 3	Research 4	Proposed Solution
Create a virtual story teller and check the memory level of the child by asking some questions from the story.	✗	✗	✗	✗	✓
Create a game for the child to identifying whether they have proper attention and focus.	✓	✗	✗	✗	✓
Giving to doing some new tasks to identifying whether they are suffering by fear and anxiety.	✗	✗	✗	✗	✓
A selection of engaging activities that toddlers can do quickly and easily without much effort	✓	✗	✓	✗	✓

Research Problem

- What are the most accurate activities that should be given to identify the child's mental nature and mental problems by correctly identifying the relevant problem?

Specific Objectives

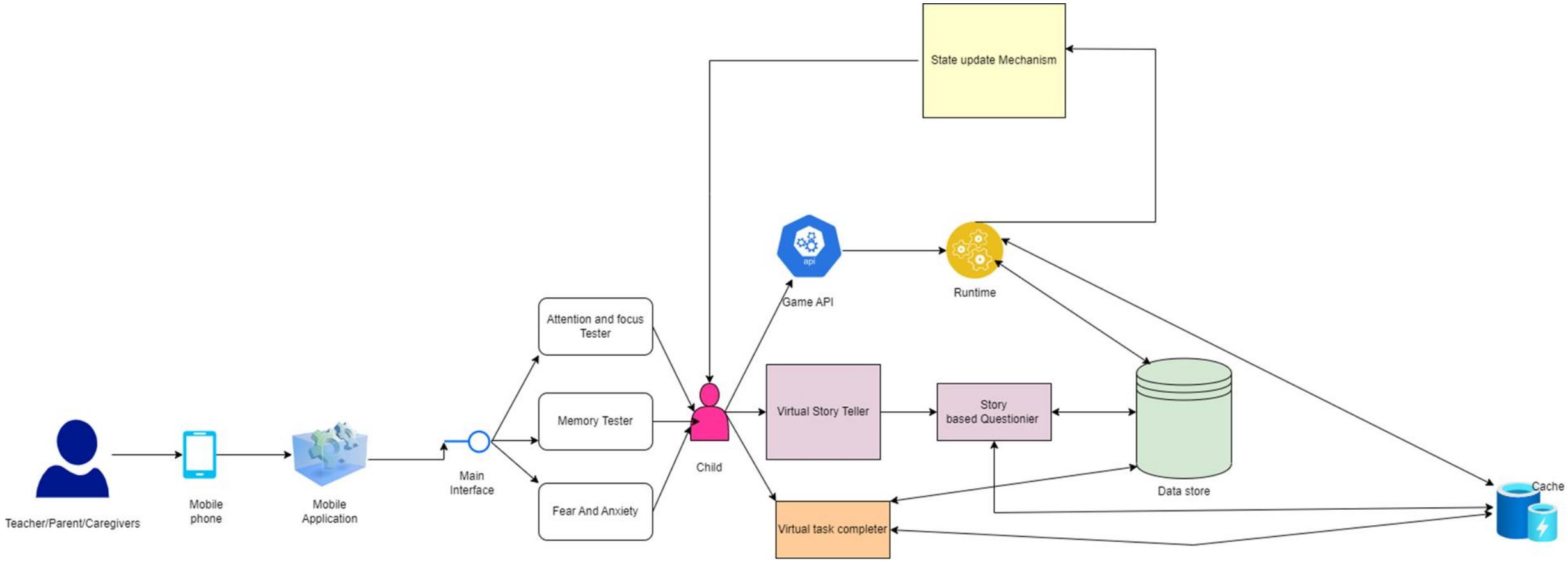
- This function should fulfill all the requirements of identifying emotional expressions, Emotional Recognition, Attention and focus, Mindfulness practices, feedback mechanism like an implementing a non-intrusive feedback system that provides insights to parents or caregivers about the child's performance and areas of focus.

Sub Objectives

- Creating games for the age group of the children that we are targeting and should be designed to be enjoyable and interactive.
- Keep the gameplay engaging and varied to maintain children's interest throughout the experience. Additionally, consider incorporating elements of gamification, such as levels, achievements, and challenges, to enhance motivation and engagement.
- Regularly gather feedback from children, parents, or caregivers during the development process to ensure the game meets its objectives effectively and is enjoyable for its target audience.
- Creating short games that can be completed in less time when creating games Using children's favorite colors and characters in creating games.
- Creating an interface that is attractive to children so that little children are motivated to use it with passion.

Methodology

System Architecture



Technologies

- **Programming Languages**:
- Java script
- Java

- **Building model :** Visual Studio Code
-

- **Tools:** Labeling images - LabelImg tool Building the CNN model –Tensorflow and Keras Google Colab,Visual Studio Code

- **Technology stack:**Version controlling-GitLab

- **Algorithm:** Apriori algorithmCollaborative filtering algorithmK-Nearest Neighbors (KNN)

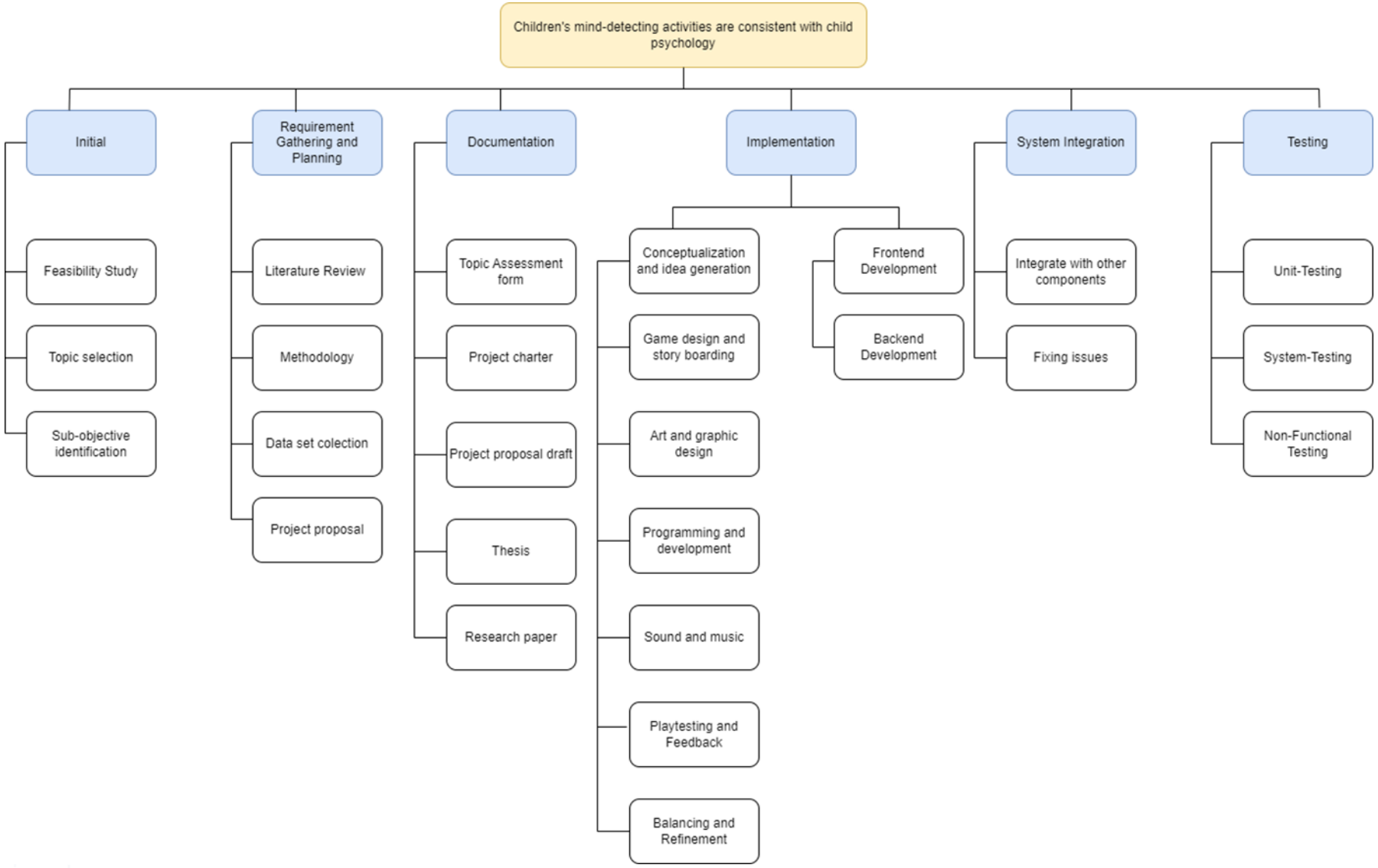
Functional Requirements

- Data Collection
- Data Preprocessing
- Feature Engineering
- User Interfaces
- Scalability and Efficiency

Non-Functional Requirements

- Scalability
- User Friendliness
- Reliability
- Accuracy
- Availability

Work breakdown structure



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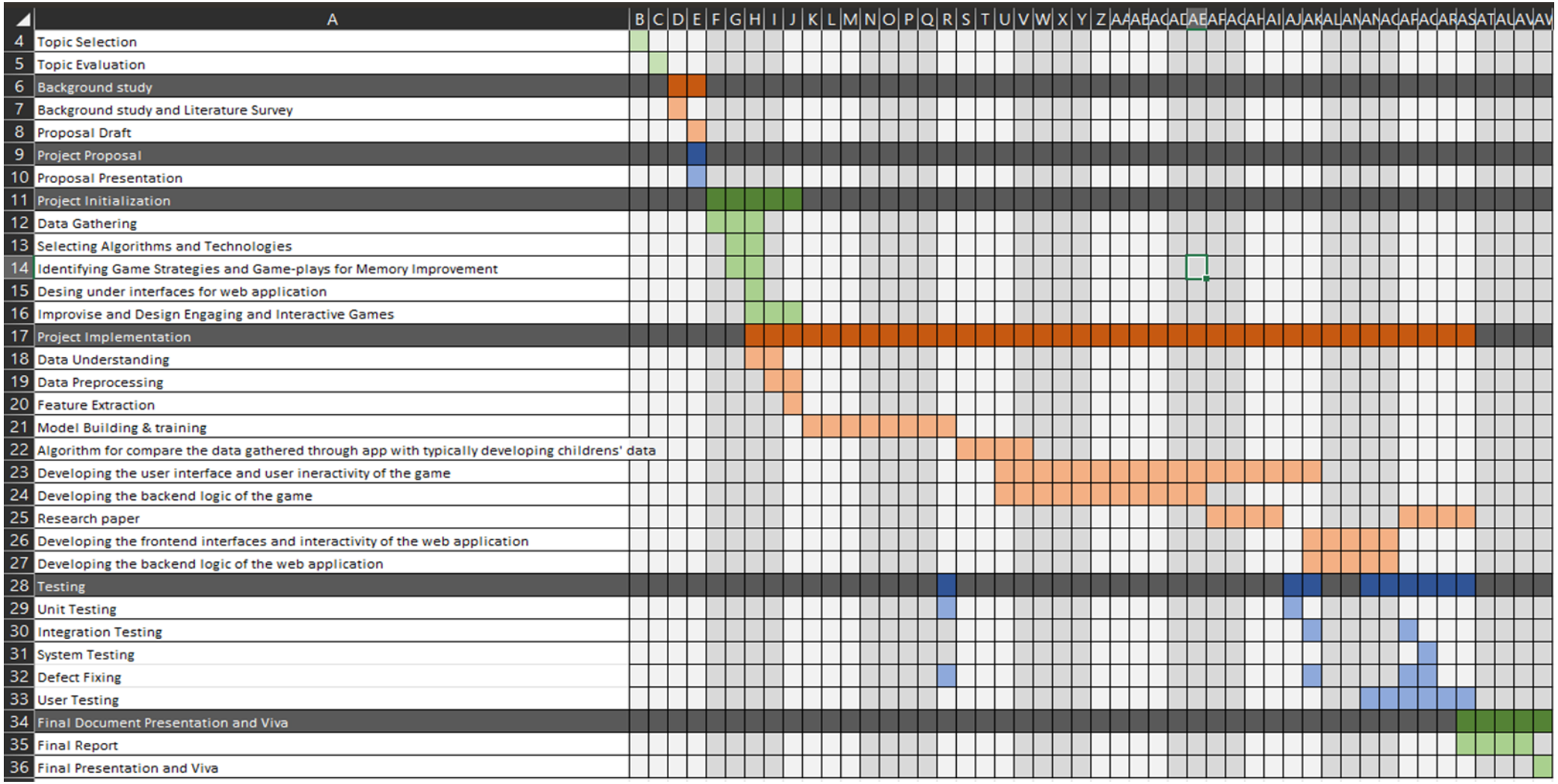
4 Topic Selection
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7 Background study and Literature Survey
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12 Data Gathering
13 Selecting Algorithms and Technologies
14 Identifying Game Strategies and Game-plays for Memory Improvement
15 Desing under interfaces for web application
16 Improvise and Design Engaging and Interactive Games
17 Project Implementation
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22 Algorithm for compare the data gathered through app with typically developing childrens' data
23 Developing the user interface and user ineractivity of the game
24 Developing the backend logic of the game
25 Research paper
26 Developing the frontend interfaces and interactivity of the web application
27 Developing the backend logic of the web application
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31 System Testing
32 Defect Fixing
33 User Testing
34 Final Document Presentation and Viva
35 Final Report
36 Final Presentation and Viva

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Introduction and Background

- How exactly does a child behavior monitor work?

- ***Sensors and Data Collection***
- ***Connectivity***
- ***Data Processing and Analysis***
- ***Alerts and Notifications***
- ***User Interface***
- ***Privacy and Security***
- ***Parental Controls***

- How to gather accurate information together with the teachers of a selected school in Sri Lanka? Using existing technology,
- How to keep teachers and children close to the phone app in a specific time frame?

Research Gap

Many existing apps and systems fail to accurately diagnose mental illness in children. The main reason for that is that the instructions to be given to the responsible party are not given in the right framework. This application always gives notifications. Teachers have the ability to act on the answers given to the mental questions of the children at any time.

Feature	Research A [13]	Research B [14]	Research C [15]	Research D [16]	Proposed Solution
Follow-up of the child after the examination	✓	✗	✓	✗	✓
Giving advice to teachers.	✓	✗	✓	✗	✓
Notification that the child will be re-examined at a certain interval	✗	✓	✗	✗	✓
Ability to respond to and provide opportunities to report changes in the child with the treatment provided	✗	✗	✗	✗	✓

Research Problem

Monitoring the child's behavior from a trial period each time to see if the child is being treated properly under the teacher's supervision for a period of one month.

Specific Objectives

- The specific objectives of a "Child Behavior Monitor" system could vary based on its intended use, target audience, and context. Generally, the main objectives of a Child Behavior Monitor are to accurately observe, record, and analyze a child's behavior to gain insights into their development, emotional well-being, and social interactions.

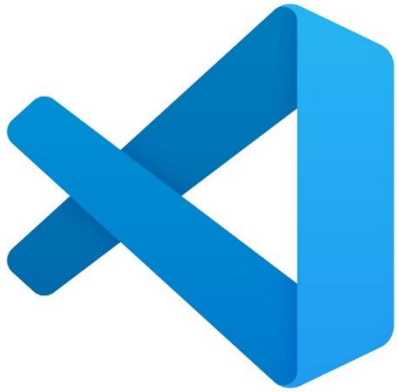
Sub Objectives

- ***Behavioral Assessment**: To provide a comprehensive assessment of a child's behavior, identifying both positive and challenging behaviors. This can help parents, teachers, or caregivers better understand the child's strengths and areas for improvement.*
- ***Early Intervention**: To detect early signs of developmental delays or behavioral issues, enabling timely intervention and support to address potential challenges.*
- ***Progress Tracking**: To monitor changes in a child's behavior over time, tracking their developmental progress and the effectiveness of any intervention strategies implemented.*
- ***Individualized Support**: To tailor interventions and support based on the child's specific needs and behavioral patterns, ensuring a personalized approach to their development.*

Methodology

Technologies

- **Tools and Technologies for App Developm**



A. Visual Studio code
B. Version Control
C. Flutter
D. Firebase
E. OpenCv

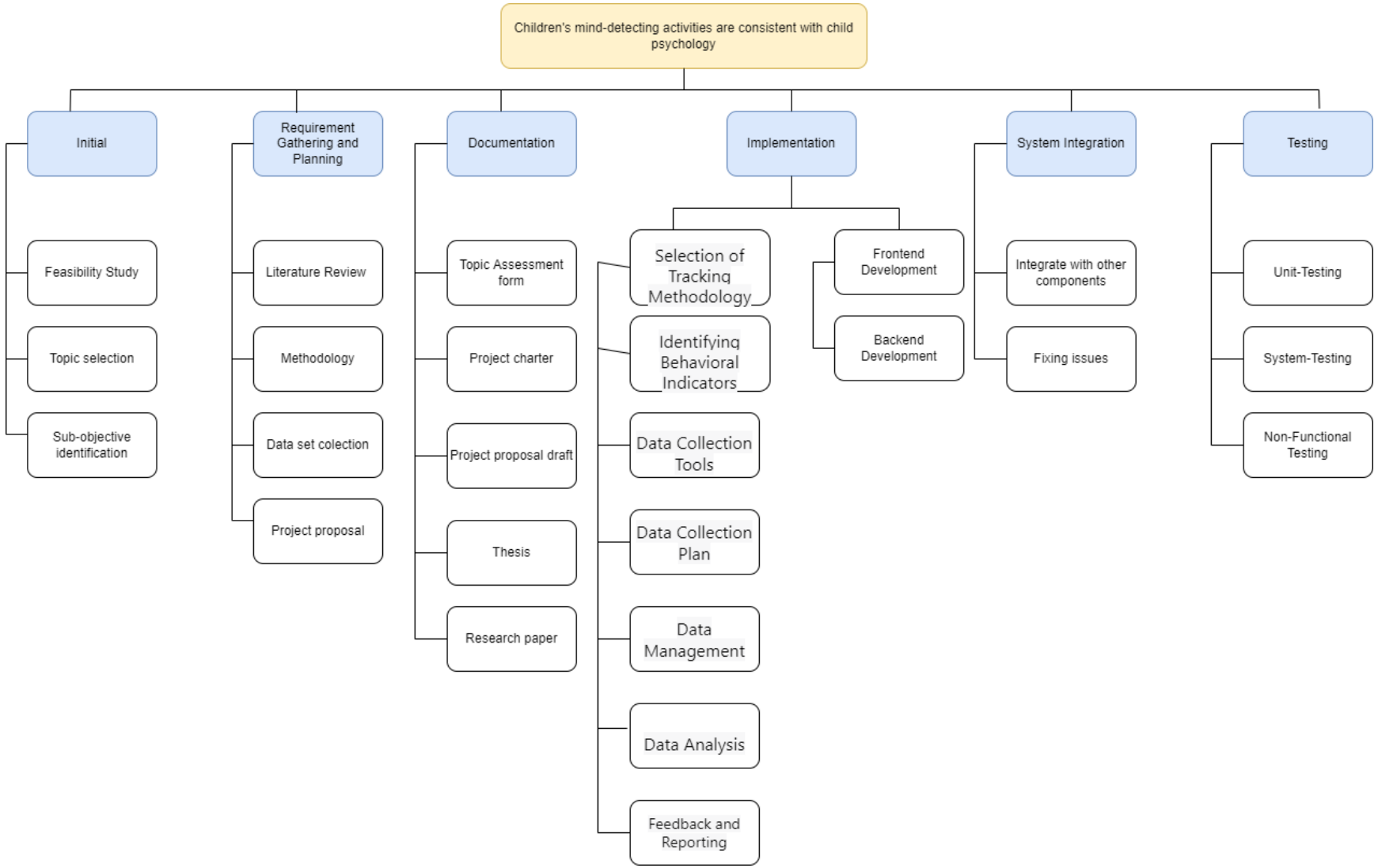
Functional Requirements

- ✓Use Cases/Functionalities
- ✓Input/Output Behavior
- ✓Data Handling
- ✓User Interfaces (UI)
- ✓Error Handling
- ✓Regulatory Compliance
- ✓Compatibility

Non-Functional Requirements

- Scalability
- User friendliness
- Reliability
- Accuracy
- Availability

Work Breakdown Chart



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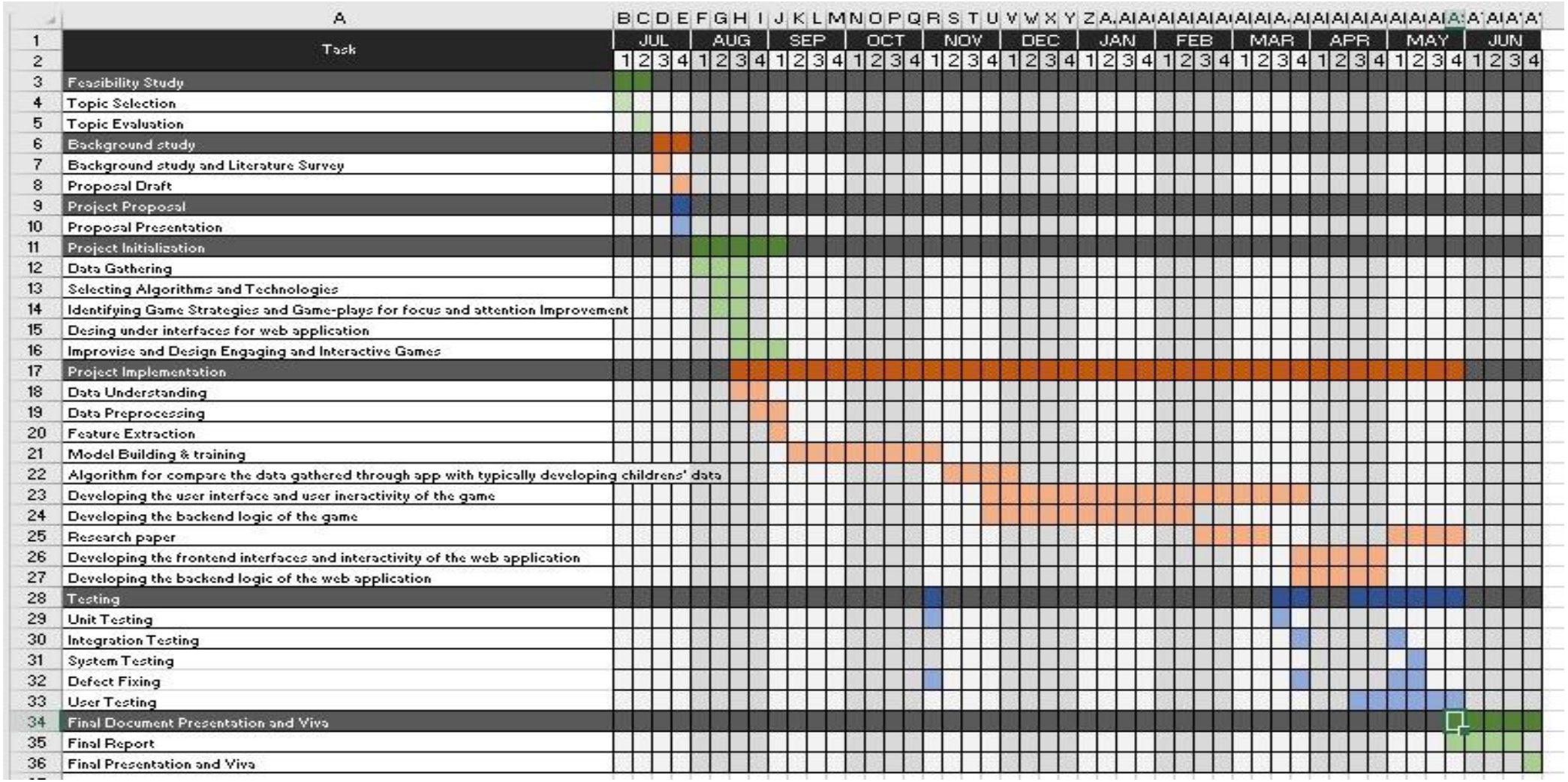

Task	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Feasibility Study												
Topic Selection												
Topic Evaluation												
Background study												
Background study and Literature Survey												
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Bachelor of Science (Hons) in Information Technology
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INTRODUCTION AND BACKGROUND

- Why is the automated system needed when it comes to the data in behavioral analysis process?
- What are the drawbacks of the existing automated system in the data in behavioral analysis process?
- Importance of the for an automated system in data in behavioral analysis process

Research Gap

- Building an automated algorithm system using data and conclusion obtained according to the certified psychological and socio-psychological factors for behavioral analyse.

System :	Research 1 Collaborative filtering (CF)	Research 2 Content-based	Research 3 CF + Association Rule Mining(ARM)	Research 3 Content-based + CF + ARM	Proposed Solution
With reliable recommendations	✓	✓	✓	✓	✓
Pair-wise (collaboration) recommendations	✗	✗	✗	✗	✓
Handles cold-start problem (new user)	✗	✓	✗	✗	✓
With personalized recommendations	✓	✗	✓	✓	✓
Captures user preferences and behavioral patterns	✓	✗	✓	✓	✓
Transparent recommendations	✗	✓	✗	✗	✓

Research Problem

How to Increase the transparency between the entered data and behavioral analysis while replacing the accessor with an automated system?

Specific Objectives

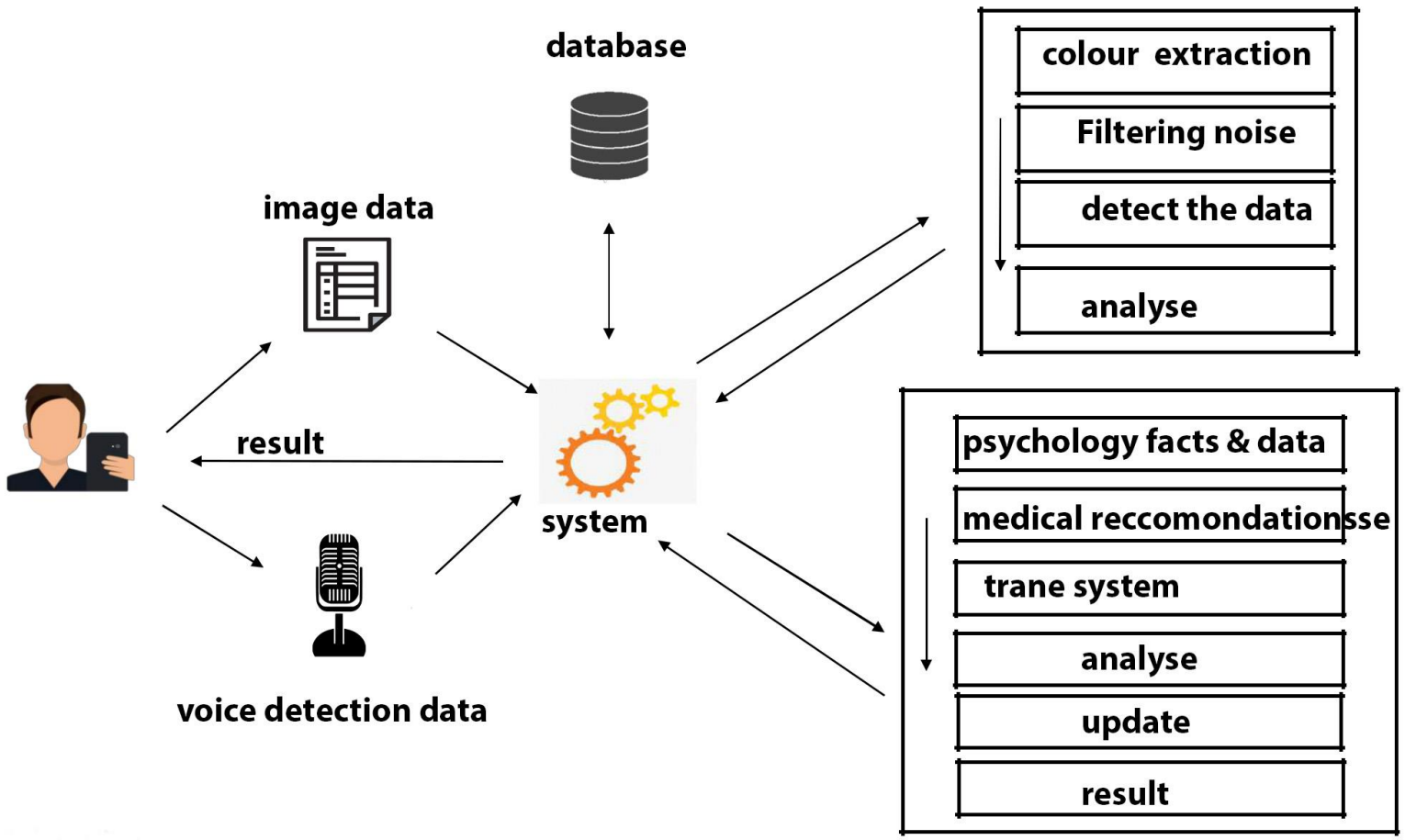
Building a reliable analysis system that recommends and analyse mediator's situation according to the given psychology facts and psychology-related data.

Sub Objectives

- Develop an intuitive and automated analysis system for analyse view and interact with.
- Identify and extract informative features from the data that can be used for psychology recommendations.
- Evaluate the performance of the recommendation system using appropriate metrics like accuracy, precision, recall, and user satisfaction.

Methodology

System Architecture



Tools and Technologies and algorithms

Technologies

- Development – Java, Python, js
- Building model - Visual Studio Code

Technology stack:

- Version controlling – GitLab,Github

Algorithm:

- Apriori algorithm
- Collaborative filtering algorithm
- K-Nearest Neighbors (KNN)

Functional Requirements

- Data Collection
- Data Preprocessing
- Feature Engineering
- Scalability and Efficiency

Non-Functional Requirements

- Scalability
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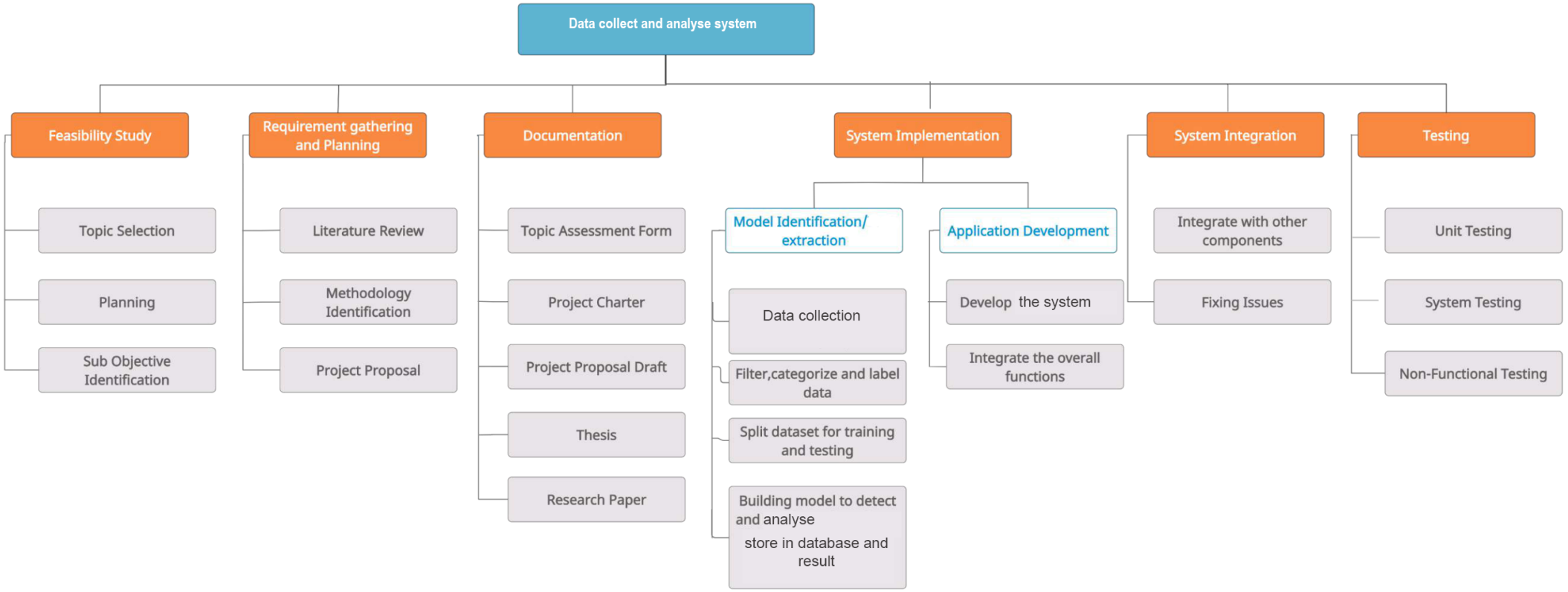

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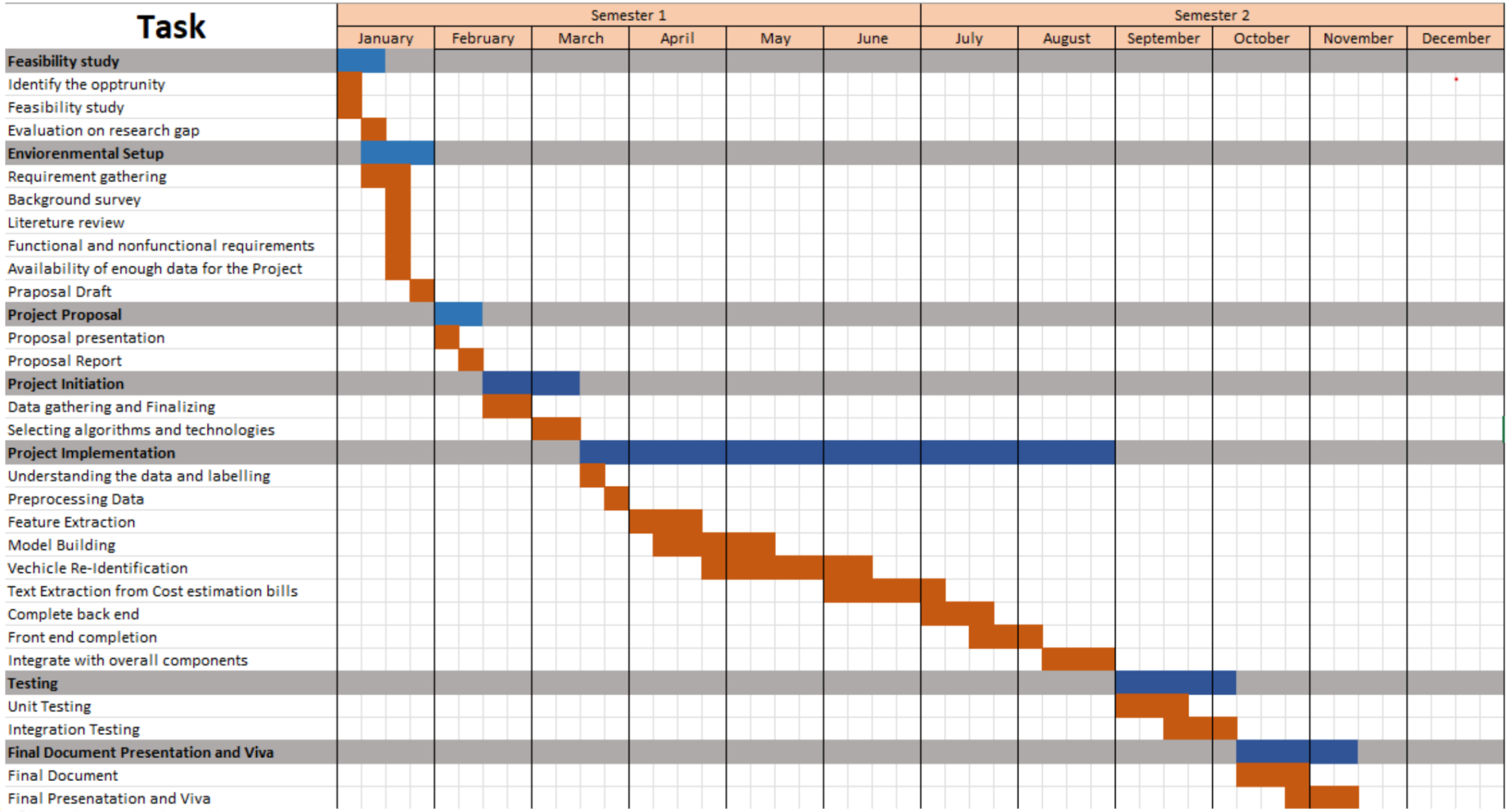
Task
Semester 1
Semester 2
January
February
March
April
May
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September
October
November
December
Feasibility study
Identify the opptrunity
Feasibility study
Evaluation on research gap
Enviorenmental Setup
Requirement gathering
Background survey
Litereture review
Functional and nonfunctional requirements
Availability of enough data for the Project
Praposal Draft
Project Proposal
Proposal presentation
Proposal Report
Project Initiation
Data gathering and Finalizing
Selecting algorithms and technologies
Project Implementation
Understanding the data and labelling
Preprocessing Data
Feature Extraction
Model Building
Vechicle Re-Identification
Text Extraction from Cost estimation bills
Complete back end
Front end completion
Integrate with overall components
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Unit Testing
Integration Testing
Final Document Presentation and Viva
Final Document
Final Presenatation and Viva

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- Parent – Child Interaction Theropy.

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Bachelor of Science (Hons) in Information Technology
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Introduction and Background

- What is Potential guidance & Resources?
- What happens in the traditional child development processes in Sri Lanka?
- Drawbacks of the manual methods of finding and executing child mental health development procedures.

Research Gap

- There are so many apps and systems for child mental health development procedures but most of the existing systems do not take into consideration of children’s deep mental issues and they are not providing instructions to the responsible parties. So that adding a section in the app to provide educational resources, articles, or manuals on child psychology and procedures in order to encourage kids‘ mental health.

Feature	Research A [11]	Research B [12]	Research C [13]	Research D [14]	Proposed Solution
Provides instructions and methodologies to teachers who engaged with children under 10 years old.	✗	✗	✓	✓	✓
Provides specific therapy methods filtered according to the relevant mental condition.	✓	✗	✓	✗	✓
Differ of the therapy methods when the condition normalizing.	✗	✓	✗	✓	✓
Usage of the most accurate and efficient methodologies rather than just a common activity.	✗	✓	✗	✗	✓

Research Problem

- How to provide instructions and procedures to direct primary teachers to handle mental health problems of children's under 10 years old since that is the most important development phase of a healthy person?

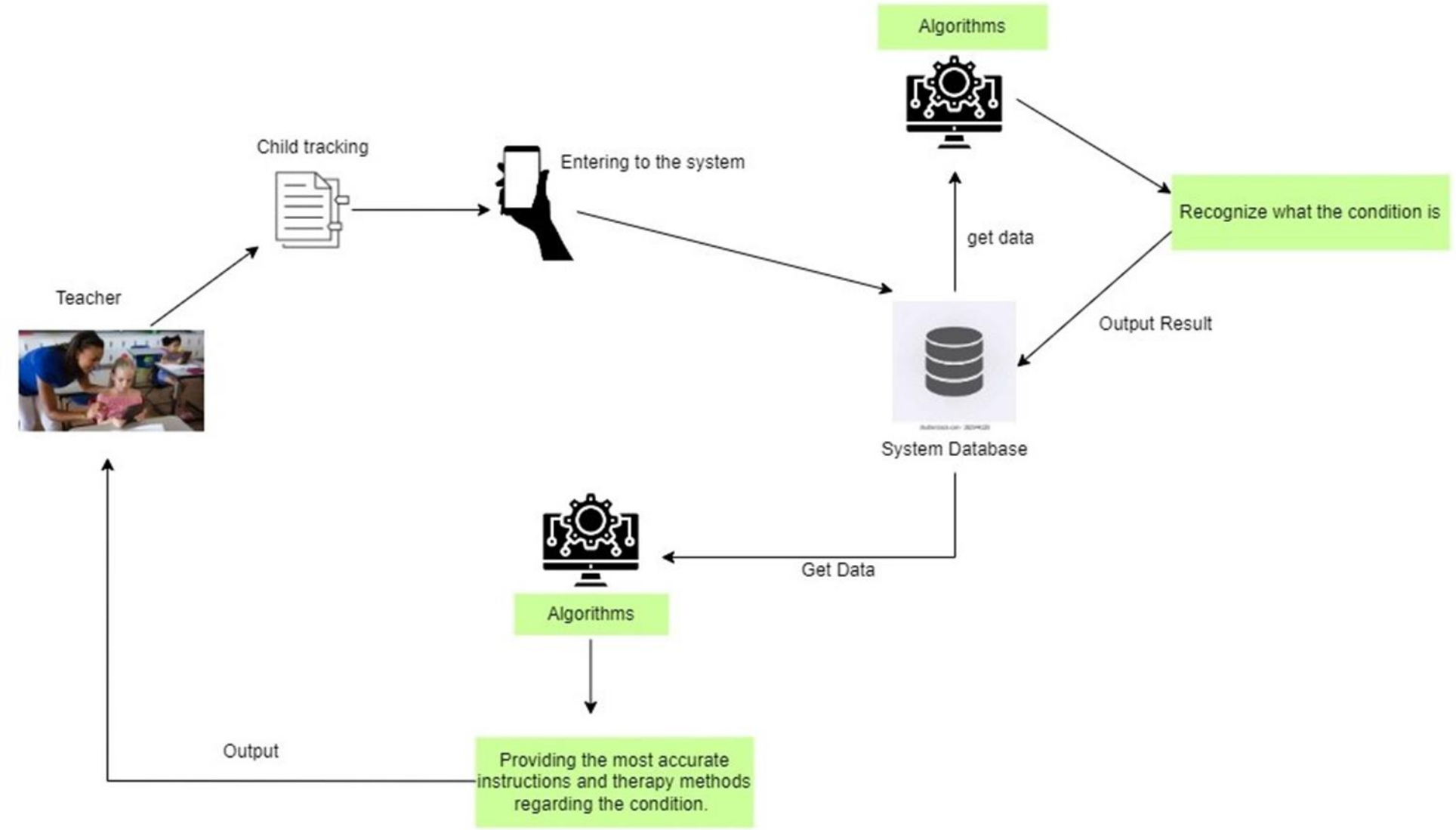
Specific Objectives

- Include a function in the app that provides educational resources, articles, or manuals on child psychology and procedures in order to encourage kids' mental health.

Sub Objectives

- Create a user-friendly and intuitive interface that is easy for users to view and engage with.
- Identify and extract key factors and activities from the child's environment that can be used to promote positive mental health and well-being.
- Evaluate the performance of instructions and methodologies issuing procedure using appropriate metrics like accuracy, precision, recall, and user satisfaction.

Methodology


Algorithms
Child tracking
Entering to the system
get data
Recognize what the condition is
Teacher
Output Result
System Database
Get Data
Algorithms
Output
Providing the most accurate instructions and therapy methods regarding the condition.

Technologies

Technologies

- Development – Java, Python, js
- Building model - Visual Studio Code

Technology stack:

- Version controlling – GitLab,Github

Algorithm:

- Apriori algorithm
- Collaborative filtering algorithm
- K-Nearest Neighbors (KNN)

Functional Requirements

- Data Collection
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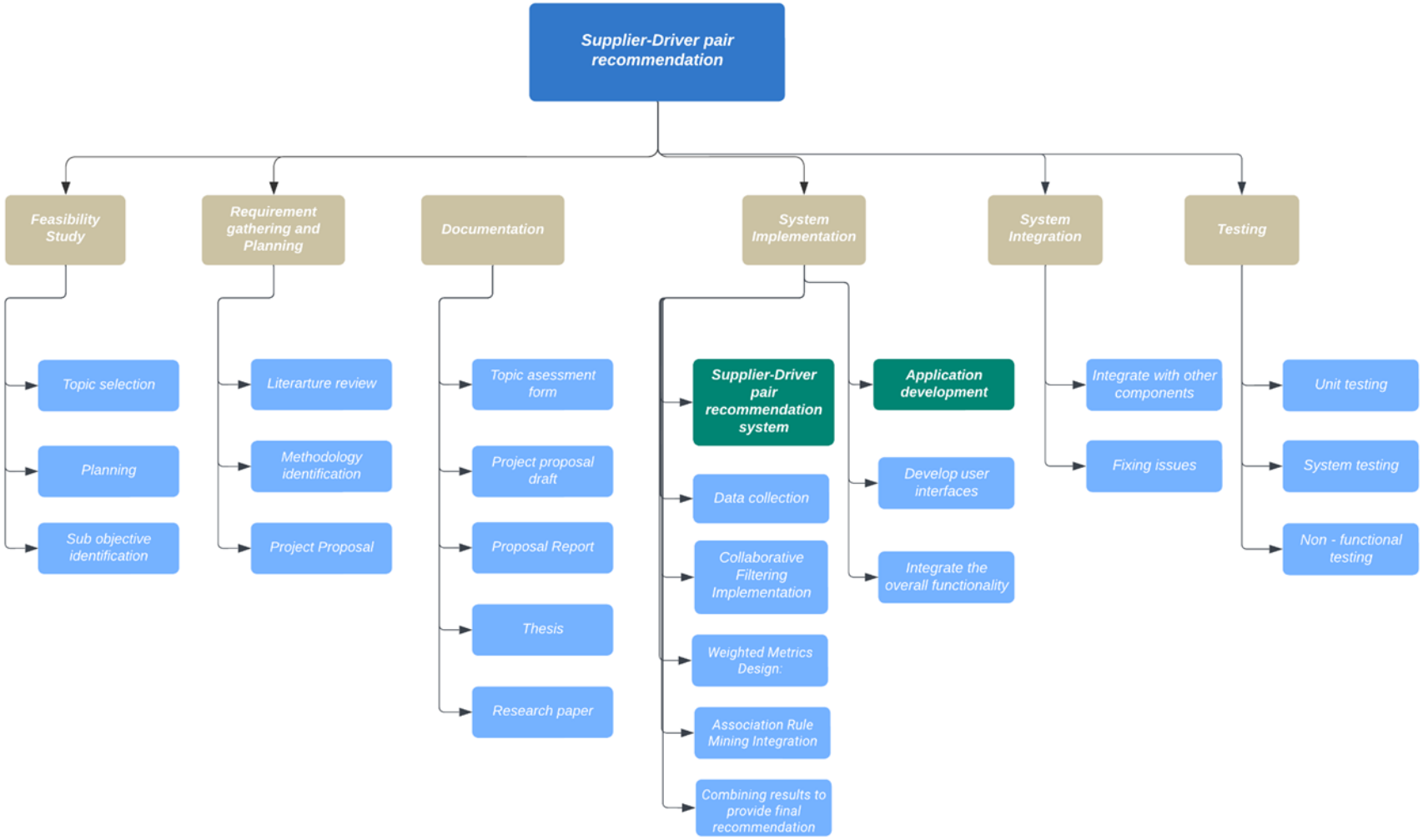

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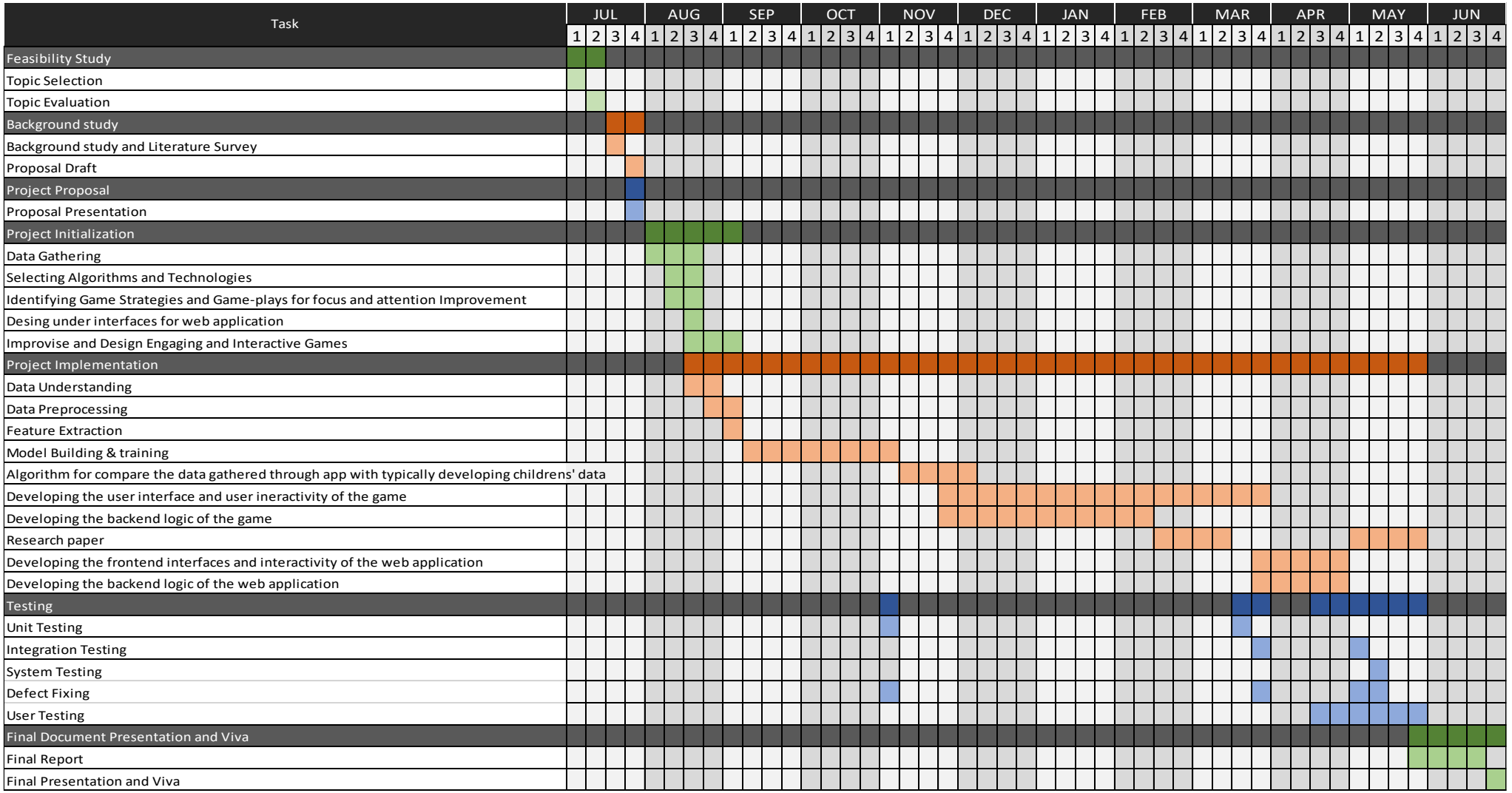
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