A Project Report on

Go-Brainous: An AI based Educational App for Kids

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

Information Technology

by

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Under the Guidance of

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Approval Sheet

This Project Report entitled **"Go-Brainous: An AI based Educational App for Kids"** Submitted by **"Bhimraj Parihar" (19104004)**is approved for the partial fulfillment of the requirenment for the award of the degree of **Bachelor of Engineering** in **Information Technology** from **University of Mumbai**.

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CERTIFICATE

This is to certify that the project entitled **"Go-Brainous: An AI based Educational App for Kids"** Submitted by **"Bhimraj Parihar" (19104004)** for the partial fulfillment of the requirement for award of a degree **Bachelor of Engineering** in **Information Technology**,to the University of Mumbai,is a bonafide work carried out during academic year 2022-2023.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that, we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

———————————————————

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Date:

Abstract

The preschool years are critical for a child's development. In today's competitive culture, it might be difficult for parents to meet their children's educational needs. They have lack of time and are not current with technological advancements. This study looks into how to help today's preschoolers support their own learning. The Kids Training e-Learning System (KTeLs) is a learning tool that encourages preschoolers to learn on their own. It is theoretically sound and enables kids to acquire cognitive and psycho motor skills like drawing, writing, number identification, basic shape and colour recognition and logical thought. It includes a unique algorithm to recognise and direct the child to write a letter correctly without parental help. There is kid-friendly navigation available. The tool underwent focus group testing before being created as an Android tablet application. The scenarios, sounds, and colours have been specifically chosen to keep children's attention. E-learning is a popular method of education, but as society has progressed, traditional E-learning methods have revealed several flaws, such as a monotonous method of instruction, making it challenging to get pupils excited about learning and pay attention in class. Educational games used in E-learning can effectively address these issues and raise the standard of instruction. There are two primary factors to keep in mind when using educational games for online learning: educational objectives and game design. A educational game should organically blend the two elements and strike a balance between the games' instructive and entertaining components. The primary topics covered in this project are the function of games in E-learning, different aspects of game design, the classification of games' educational objectives, and the connection between these two factors. In order to offer direction in the design of educational games, we also work to categorise educational games and connect educational objectives with gaming platforms.

Contents

List of Figures

List of Abbreviations

GBL: Game-Based Learning
UXD: User Experience Design
XML: Extensible Markup Language
UI: User Interface

Chapter 1

Introduction

Children have been heavily influenced by technology over the past few decades; mobile apps in the education sector simplify many processes. Children need a solid educational foundation because it can mould their life, and this may be easily provided through technology. Today, we define game-based learning (GBL) as merely incorporating games or gaming elements into the learning process. Because of its interactivity, ability for teamwork, and built-in reward system, games are excellent for learning.

The current craze in education for kids is learning via play. When teaching their children, parents, teachers, and others must keep this idea in mind. There are various ways to execute the idea of "learning via fun" [1]. E-learning games offer a different method of achieving this goal [2]. They can be used to promote learning that goes beyond only reading from literature. User experience design (UXD), which combines the science of learning, human-computer interaction, and design thinking, includes learning experience design [4]. The students become the focus of the learning design process through the use of learning experience design. E-learning is meant to be able to give users the greatest experience possible these days and make learning enjoyable.Creating instructional design required the views of students there into match with the student's desired by achievement [5].

There are currently a lot of instructional games available online. These games may be played on a number of different platforms, including the web, Windows, and mobile. Thailand has a large selection of games that were created by universities, games software companies, or regular people. This study provides a prototype and tries to investigate the attributes of online learning games.

The Kids Training e-Learning System (KTeLs) is a tool that encourages preschoolers to learn independently. It is theoretically sound and enables kids to acquire cognitive and psycho-motor skills like drawing, writing, number identification, the basic shape and colour recognition, and logical thought. It includes a unique algorithm to recognize and direct the child to write a letter correctly without parental help. There is kid-friendly navigation available. The tool underwent focus group testing before being created as an Android tablet application. The scenarios, sounds, and colours have been specifically chosen to keep children's attention. E-learning is a popular method of education, but as society has progressed, traditional E-learning methods have revealed several flaws, such as a monotonous method of instruction, making it challenging to get pupils excited about learning and pay attention

in class. Educational games used in e-learning can effectively address these issues and raise the standard of instruction. There are two primary factors to keep in mind when using educational games for online learning: educational objectives and game design. This project is about an educational gaming application in which students build a range of connections with the content and can form good learning memories as games capture students' attention and actively involve them.

Chapter 2

Literature Review

The purpose of literature review is to gain an understanding of the existing research on Sentiment Analysis and debates relevant to area of study. The literature review helped in selecting appropriate algorithm and suitable feature extraction process for getting efficient results.

- In paper [1], According to V. Siddoo, D. Binla, K. Jaineawnaekuson and O. Yommana, E-learning games have become a potentially advantageous option for educational instruction. This type of technology could help the learner to comprehend an academic setting clearly, especially in the case of children who prefer activities above study. Play-based education gives kids the opportunity to learn while having fun. The purpose of this research is to examine the qualities that make e-learning games suitable for young children. A faculty of education early childhood education major conducted interviews with lecturers and students. Qualitative content analysis was used to examine the data that had been gathered. The results painted a picture of suitable e-learning activities for young children. In addition, created a prototype for a different e-learning game and presented the concept. We suggest getting information from more early childhood education professionals in the future to expand the prototype with more metaphors. [1]

- In paper [2], According to A. A.Yunanto, D. Herumurti, I. Kuswadayan, R. R. Hariadi and S. Rochimah, Currently, a game is an entertainment application for a user or a child. In addition to desktops, games can also be downloaded and played on mobile devices, particularly those using the Android operating system. However, many games available today have an addictive mechanism but no instructional component. For a user to receive both knowledge and fun, the educational game is crucial. In this paper, a game uses a technique to determine a level automatically, and the game and educational material attributes are both modified. According to experiments, the user interface, system performance and instructional lesson of the game were well received. Considering this outcome, we can say that the game is enjoyable and simple for kids to play. The children who have played this game can increase their level of calculation speed and increase the accuracy of their answers during an arithmetic lesson. [2]

- In paper [3], According to R. Toasa, E. Burbano, A. Constante, L. Hidalgo and F. Morales, Given that kids have a tendency to lose focus rapidly, learning is now a challenging activity for kids. It can often be challenging for the teacher to tell whether the students understood what was being covered in class. As a result, the primary goal of this work is to enhance English language acquisition through a fun game. An entertaining educational game that focuses on gamification was created just for this purpose. The game's outcome was satisfactory; kids could hear and see the fruits and colours on the screen while playing. In the first test of teaching fruits and colours using the traditional "teacher-student" method, 17 out of a total of 24 children were able to comprehend their teacher. On the other hand, the "Game - Student" test revealed the effectiveness of the game with 21 kids who improved their rating and showed that they comprehended what the game depicted, as suggested in this study. [3]

- In paper [4], According to A. Dinimaharawati, A. I. Wuryandari and H. A. Aziiz, E-learning is being pushed harder in education as a teaching and learning alternative. For implementing e-learning in the classroom, there are various open-source platforms available. Although some users only use it to create quizzes and upload materials, it is a form of a learning management system that supports multimedia for the learning process. Despite the fact that educational games are a common kind of multimedia to aid with learning. By incorporating educational games into e-learning, Learning Experience Design provides a solution for the increasingly challenging development learning experience. The goal of the study is to create an educational game for online learning using the System of Linear Equations in Three Variables and to assess the educational game's user experience using a questionnaire. Our study's findings support the notion that instructional games are appropriate for e-learning environments. The group's attractiveness, perspective, effectiveness, reliability, excitement, and novelty are all superbly conveyed by instructional games, according to research. This indicates that learning experiences were designed using educational games to interest students. [4]

- In paper [5], According to H. B. Ramírez Moreno, M. R. Ramírez, E. M. Rojas and M. Del Consuelo Salgado Soto, The society we live in has changed as a result of the advancement of digital technology and the rapid expansion of mobile devices and the educational sector is no exception. With regard to children, the use of applications in mobile technology was revolutionary, providing a new horizon for them. Every day, we witness an increase in the frequency with which teachers incorporate mobile applications into the teaching-learning process in their classrooms. In light of the foregoing, we provide a portion of the findings of a descriptive, quantitative study that was carried out in Tijuana, California and Mexico to evaluate three mobile applications in private primary schools where teachers use information technology in their teaching methods. [5]

- In paper [6], According to Q. Ni and Y. Yu, The growth of a child's linguistic skills, critical thinking skills, emotional development, intelligence and imagination can all be promoted and increased by playing educational mobile games. As a result, it is possible to consider that educational games are crucial to a child's growth. This paper provides a thorough examination of the effects of educational mobile application, their use both domestically and internationally, and the studies on preschoolers' cognitive growth. This analysis summarizes the notion that the design of interactive games has a significant guiding role in children's cognitive development using Piaget's theory of cognitive development as its base. [6]

Chapter 3

Objectives

We intend to do this project implementation to meet following objectives:

- To develop an application with instructional games using TensorFlow lite model.

- To create games activities based on math quizzes, alphabet training, drawing book, different sections on fruits, animals, vegetables, numbering, vehicles, shapes, colours, days, months and body parts should be developed in order to avoid burnout.

- To include a feature like curriculum integration within the application.

- To develop an application that would assist students in concentrating on their academics.

- To create a User-friendly layout using XML

Chapter 4

Project Design

The project's key features, structure, criteria for success, and major deliverables are all planned out in this steps. The aim is to develop design in a way so that it can differ from existing system that can be used to achieve the desired project goals.

4.1 Existing System

In today's world the existing systems for kid's game problems can offer many benefits, they also come with some potential problems. It is important for parents and educators to carefully evaluate games before allowing children to play them, and to monitor their children's screen time to ensure that they are getting a balanced and healthy childhood. It is seen that students are more into technology than focusing on their studies. They are always on their mobile phones to play games which will divert kid's from studies.

4.1.1 Early age Childhood Education Development

Early childhood education is crucial. The growth of children is influenced by parenting and education. Even finding effective ways to teach children of age 3 to 7 years is difficult, let them alone finding ways to keep them engaged and happy while learning. Children learn quickly and in a more effective manner if they start at a very early age. An efficient alternate method for assisting with children's education in computer technology. Children who use computers think more systematically and creatively. For instance, in Tanzania, game-based language for young children is employed in the classroom. In Sri Lanka, preschoolers used the Kids Training e-Learning System for self-learning. [1]

4.1.2 E-learning Games

E-learning games for preschoolers are designed to help kids grow in a variety of ways, including physically, emotionally, mentally, socially, and intellectually. The strategy used in these games places more emphasis on the children's active learning than on the learning content. One kind of electronic learning game is the educational game. The educational game can be used for instruction or training. Playing a game like this could make learning more effective. Our study focuses on creating a kid-friendly educational game. E-learning games have the potential to improve curriculum effectiveness, give teachers new teaching strategies, and

spark students' interest in the subject matter. Websites with educational games are abound. Despite the restrictions of a child's language development, the games are frequently not free.

4.2 Proposed System

This educational gaming application that aims to provide an engaging and interactive learning experience for students. This application will be designed to cover a wide range of educational topics and will incorporate game-based elements to promote active learning.

The application will be designed for students of ages 3 to 7 year and will be customizable to fit the specific needs of each individual user. It will feature a variety of games and activities that cover a range of subjects, such as math, science, history and language arts. These games will be designed to satisfied both fun and educational objectives, with an emphasis on active learning and problem-solving.The application will also include a assessment tools, such as math quizzes, to help students evaluate their learning and identify areas where they may need additional support.By incorporating game-based elements, the application aims to make learning fun and memorable, which also promoting the development of critical thinking and problem-solving skills.
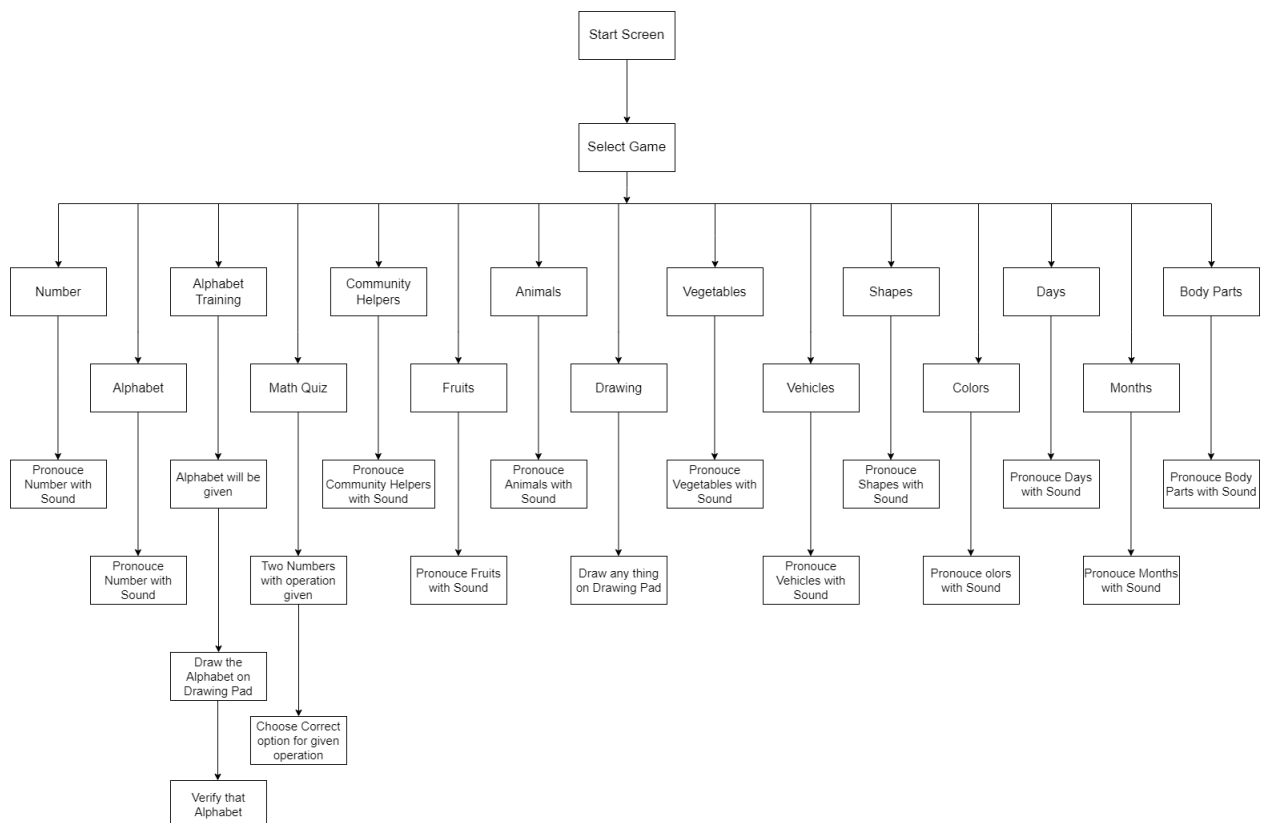

Figure 4.1: Block Diagram

The screen starts after which it can redirect to the game list on that page. This application includes a variety of quizzes, games, and creative activities such as numbering, alphabet, alphabet training, math quizzes, fruits, animals, and vegetables. It also includes drawing

books, vehicles, vehicles, shapes, colours, days, months, and body parts. When starting an activity, such as counting, the application will pronounce the number with sound, similar functionality will be provided by other activities. The user must draw the alphabet on the drawing pad three times in order for the system to verify if the user drew the alphabet correctly or not. If not, a message of try again will show, and if they did, then congratulation pop-up will display. On the maths quiz, two numbers will be given with an operation, such as addition, and the user will need to select the best answer out of four possibilities. If the user chooses the right answer, their score will rise; if not, they will be taken to the final score board. If kid's want to drawing then a drawing pad where they can use various brush sizes and colours to create anything they like.
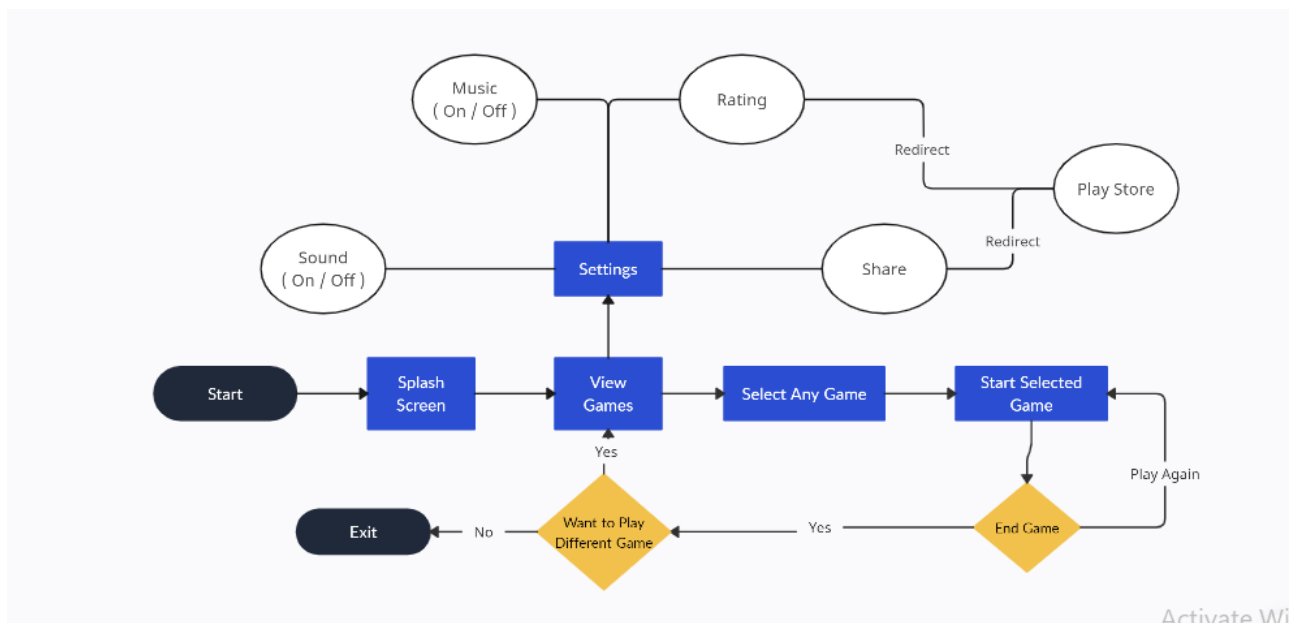

Figure 4.2: State Chart Diagram

It captures the software system's behaviour. It models the behaviour of a class, a subsystem, a package, and a complete system. In the User State diagram, the first splash screen will be appear then all the games will be shown. Then afterwards user can select which game he wants to play and can directly start the game. After he finishes the game he can play the same game again or else he can also choose a different game from the games list. On the game page the setting button is also their their are some options like sound and music on and off button, rating button for rating the application on play store and the share button for share the game with friends and family so on clicking the share button it can redirect to the play store.
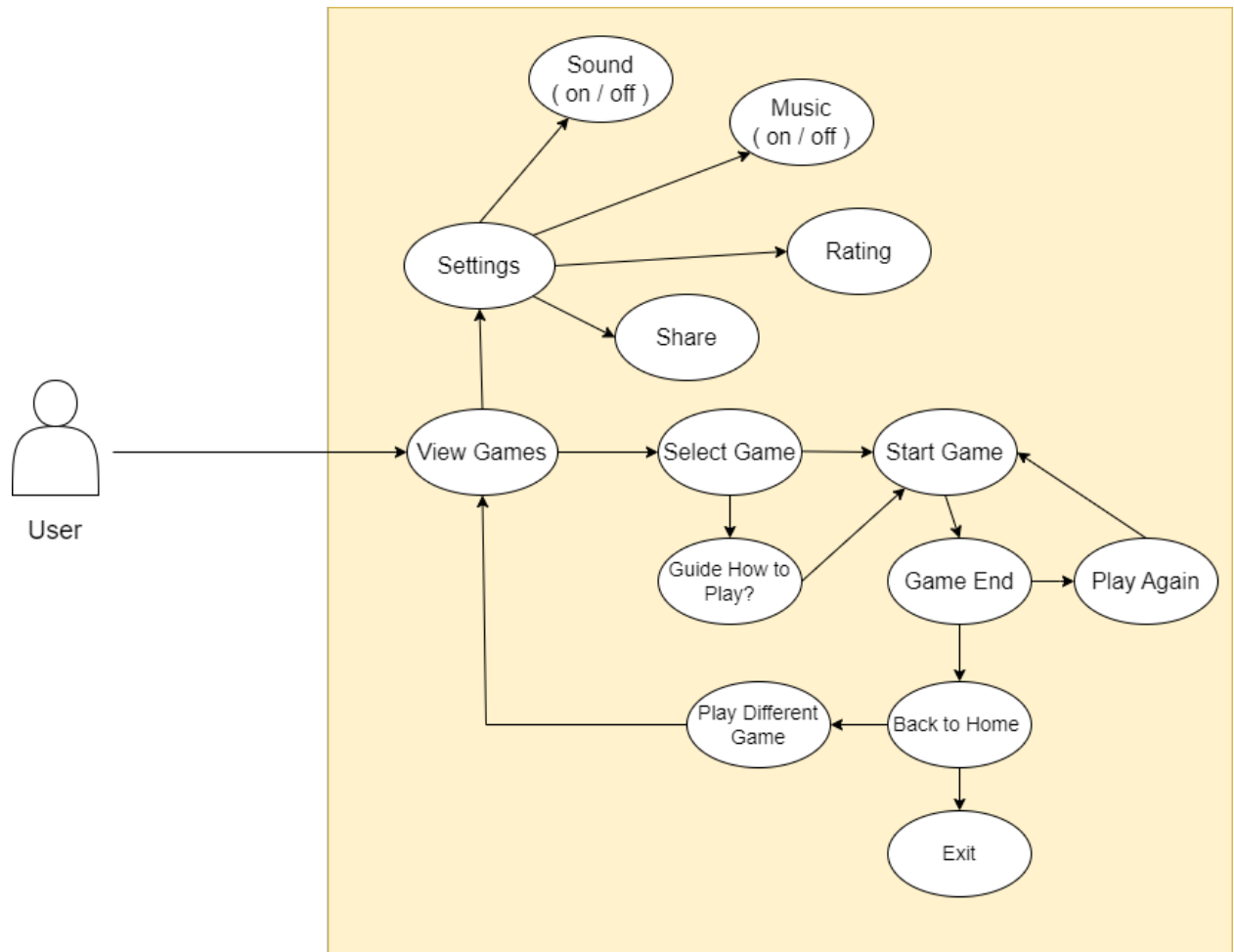
9

Figure 4.3: Use Case Diagram

Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors. The use cases and actors in use-case diagrams describe what the system does and how the actors use it, but not how the system operates internally. The actor in this use case diagram is the user. First the splash screen will appear after that it will go to the main /dashboard from where he can select the game from the list of different games. Afterwards, Two options will be there if the user is new to that game then he can learn how to play through the guide or else can directly start with the game. Once the game is over again the user has two options to play the game again or back to the home page it can redirect to the game page else he can exit from the game. if use want to play different game so follow the process on that game. The user has also the option to go forward to the next level of the game. After he finishes his game he can exit.
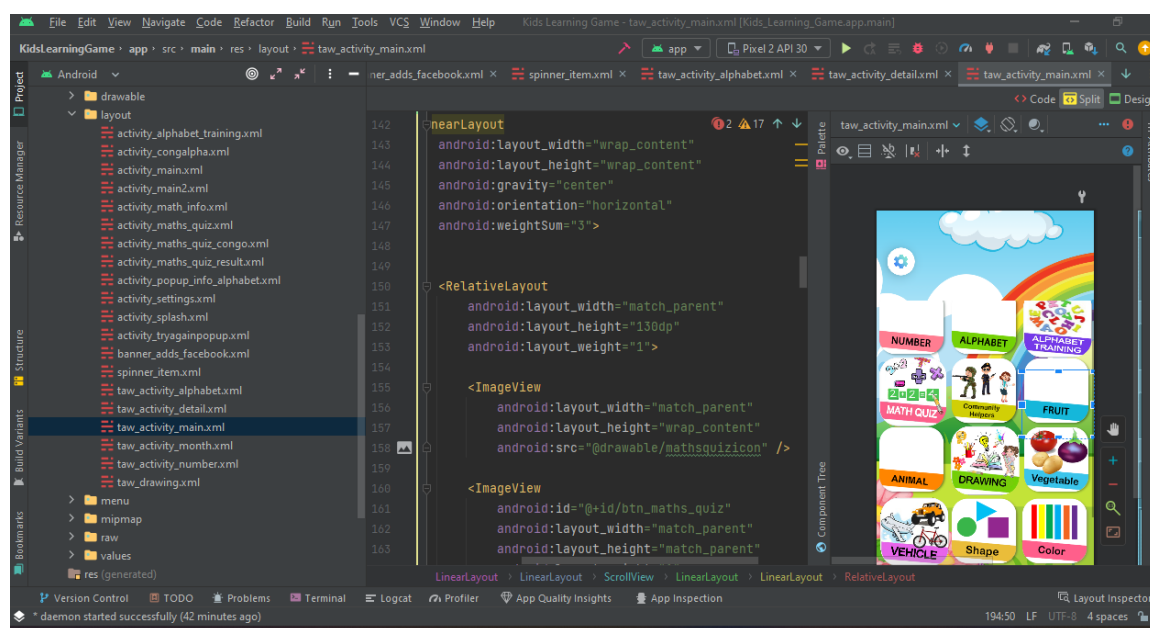
Chapter 5

Project Implementation

Figure 5.1: Home Page Layout

This Game is developed on Java and XML where XML use for creating a layout. The Go-Brainous is to provide an easy and interesting way of learning for kids. This project is about an educational gaming application through which students develop a variety of connections with the content and can form positive memories while learning from the games.

This application includes various quizzes, games, and creative activities such as numbering, alphabet, alphabet training, math quiz, fruits, animals, vegetables, drawing books, vehicles, shapes, colours, days, months and body parts.
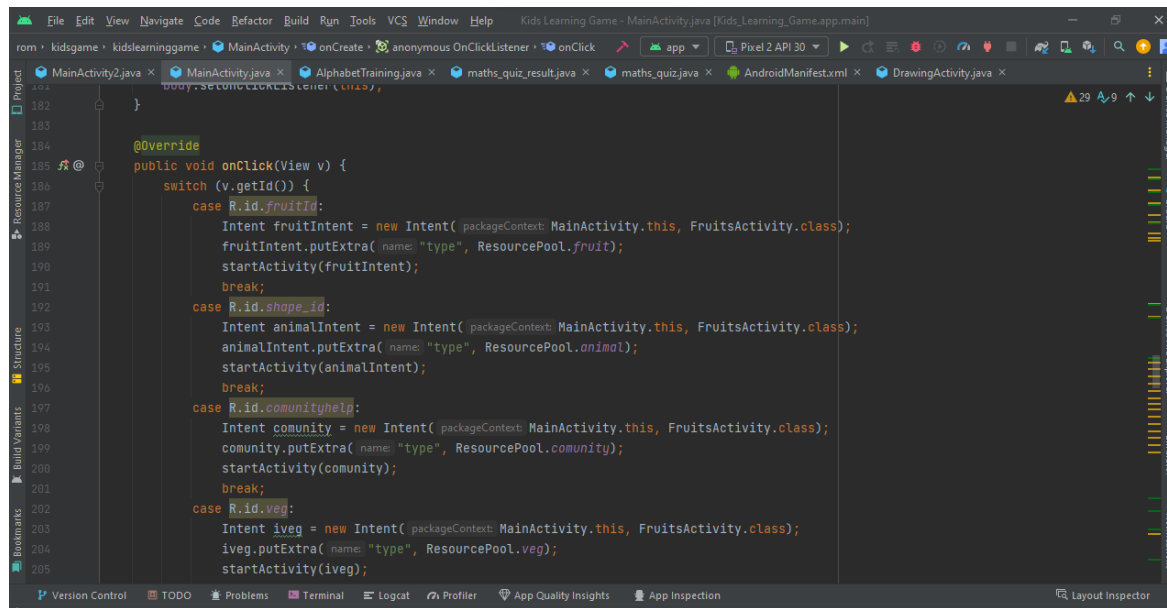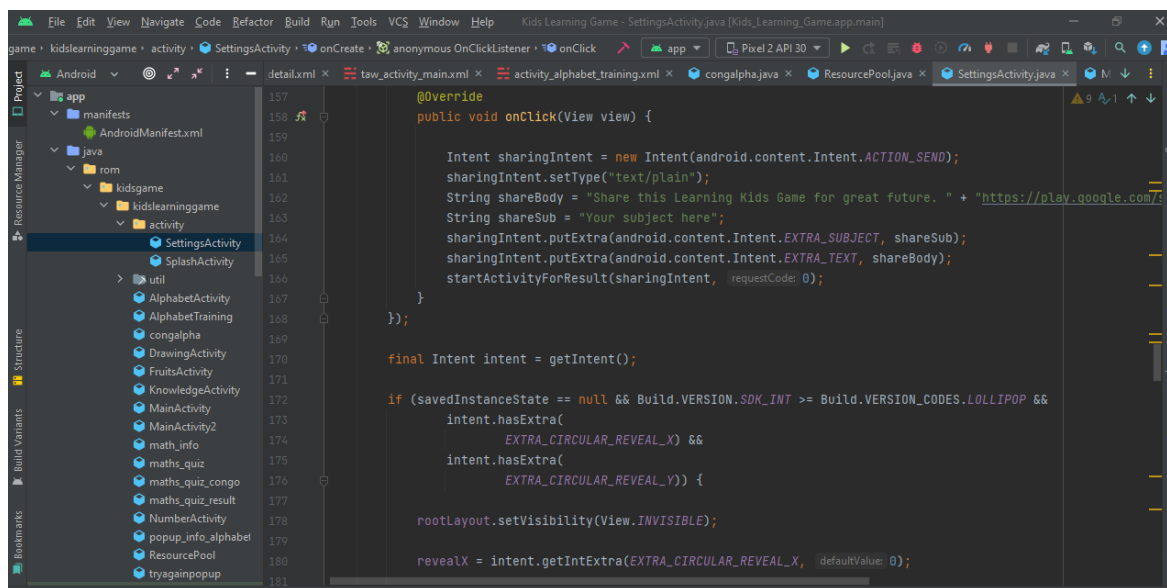
Figure 5.2: Home Page

Figure 5.3: Settings

The above code illustrates the variety of games that are available on the application. In the settings menu includes buttons for the sound and music, as well as buttons for rating and sharing with friends.
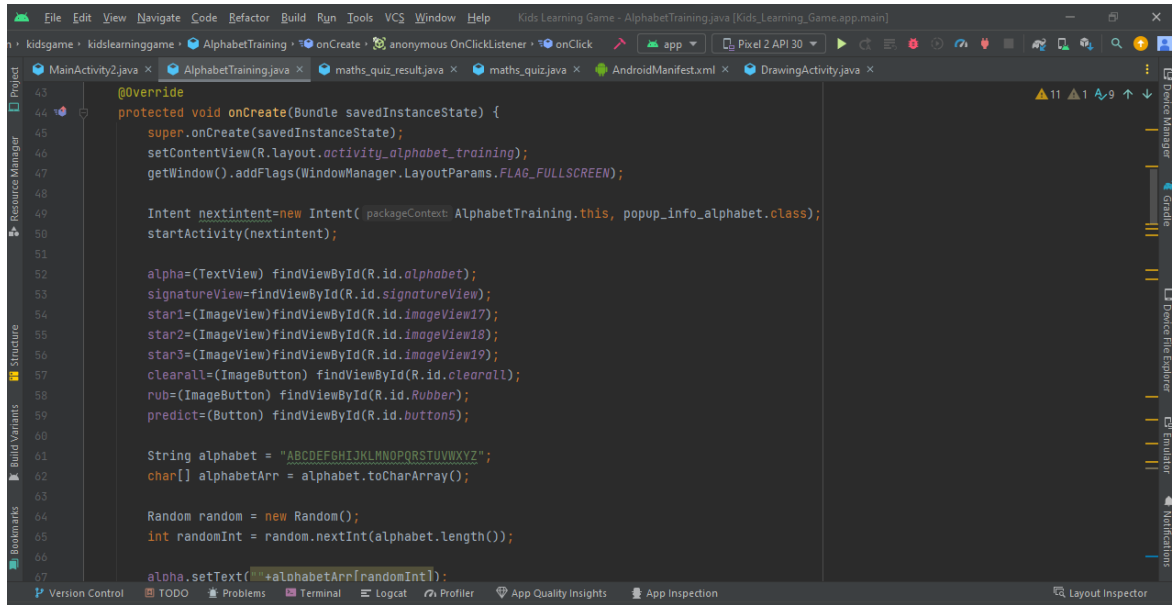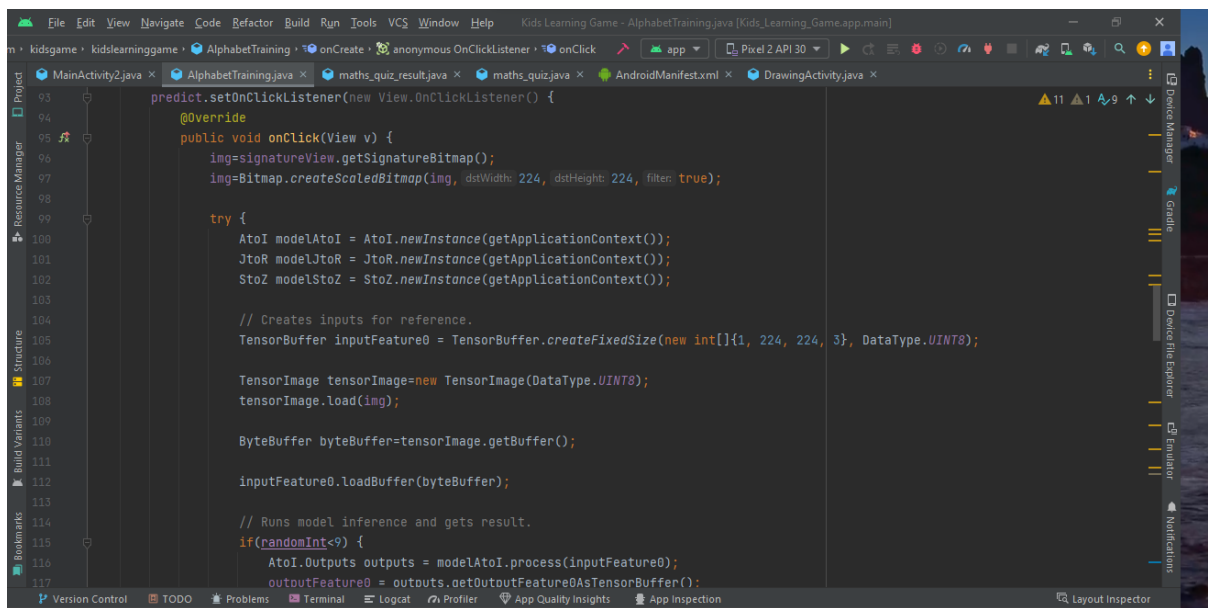
Figure 5.4: Alphabet Training

Figure 5.5: Alphabet Training Model

An open-source Android toolkit called Signature-View enables developers to create a pen-and-paper-like effect for Android signature creation and the method of running a TensorFlow Lite model on a device to provide predictions based on input information. It chooses and displays an alphabet from a to z at random. For example alphabet V is shown on the bottom of the drawing pad now the user needs to draw the given alphabet. Users are given three chances to draw the correct alphabet at random. If they do, a pop-up message of congratulations will appear; otherwise, they can try again.
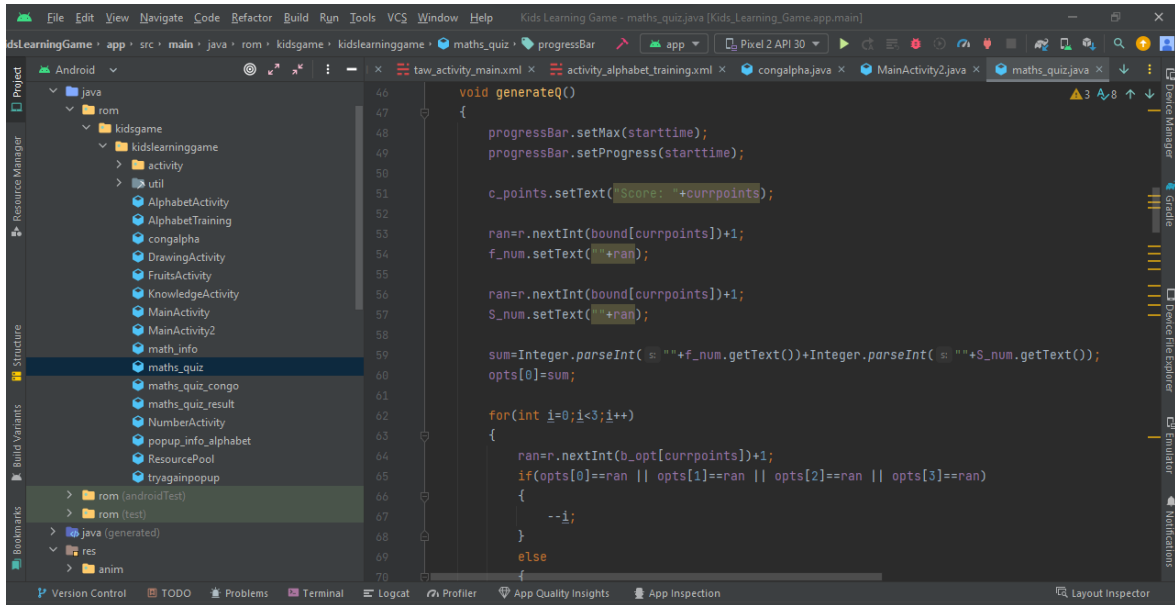
Figure 5.6: Math Quiz

In the mathematics quiz also known as "Math quiz" different mathematical operations will be shown and the user needs to choose the correct option. Four options will be shown among those one will be the correct option. After choosing the correct option, the user will move on to the next step. Each question has a timeout of 4000ms, if the user doesn't answer within that time limit the game will end and the final score will be shown. The final score is the sum of all the scores till now.
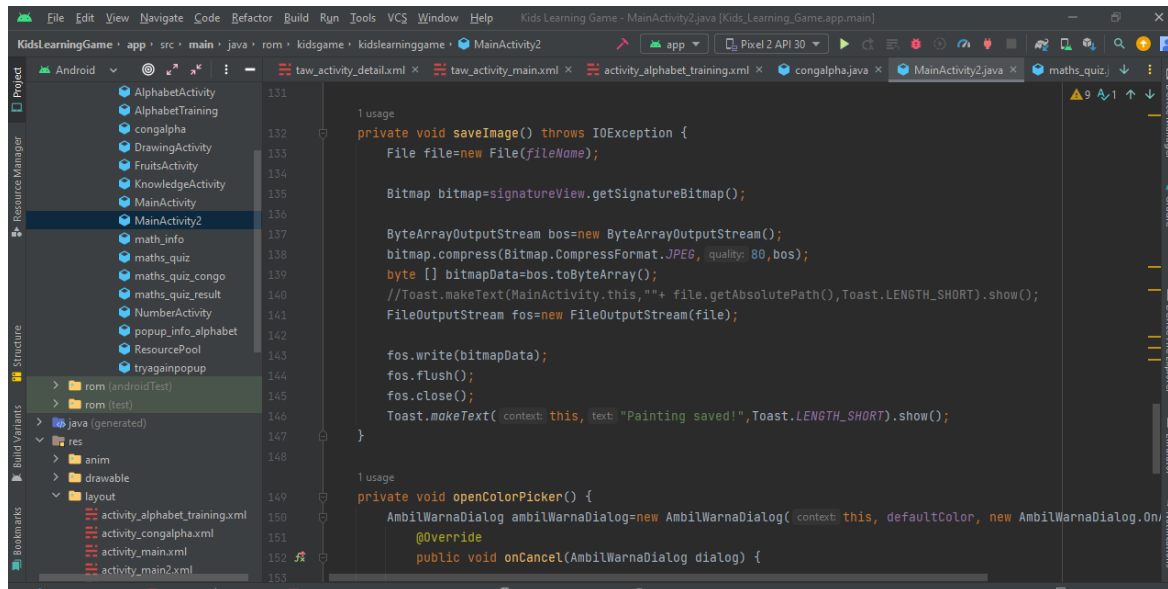

Figure 5.7: Drawing Pad

In the drawing book, a big canvas is shown in order for the users to be able to draw. Below a bar is shown where the size of the brush can be increased or decreased with the help of a range selector bar. To the right of the bar is an eraser to erase the page. Besides, it is a colour-changing option to change the colour of the brush. In the end, is a save button to save the drawing.
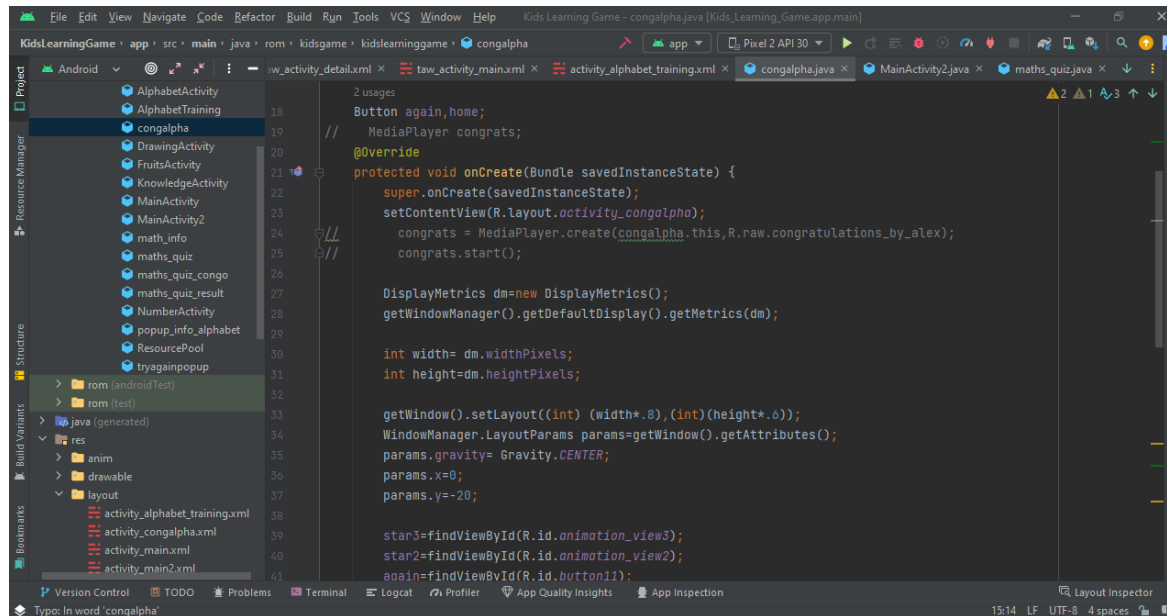

Figure 5.8: Congratulation Pop-Up

On the alphabet training the user's chances will determine how many stars they receive. If the user succeeds on their first attempt, a pop-up congratulations window will display 3 stars. If the user completes the task in two attempts, 2 stars will appear, whereas only 1 star will appear in three attempts.

Chapter 6

Testing

Testing is an organized summary of testing objectives, activities, and results. It is created and used to help stakeholders (product manager, analysts, testing team, and developers) understand product quality and decide whether a product, feature, or a defect resolution is on track for release. Test documentation includes all files that contain information on the testing team's strategy, progress, metrics, and achieved results. The combination of all available data serves to measure the testing effort, control test coverage, and track future project requirements.

6.1 Functional Testing

6.1.1 Unit Testing

Unit testing is the first level of testing, which is typically performed by the developers themselves. It helped us understand the desired output of each module, which we had broken down into separate units and in classifying the faces of users on the basis of the algorithm that we have used.

6.1.2 Various Test Cases

Test Case No.	Test Condition	Test Steps / Procedure	Expected Results	Actual Result	Pass / Fail
1.	Splash Screen	NA	Should show animation	Animation shown	Pass
2.	View Game Page	NA	Should show all the games	All the games are shown	Pass
3.	Alphabet Training	Draw the correct alphabet shown below.	Alphabet should match in similarity.	Alphabet matches with given alphabet	Pass
5.	Alphabet Result	Correct alphabet Drawn	Should show congratulation pop-up.	Congratulation Pop-up Shown	Pass
6.	Math Quiz	Simple Math Operation will be given along with options.	Should increase score on selecting correct option.	Score increased on selecting correct option.	Pass
7.	Settings	Click on settings button	Should show options for sharing, rating and sound.	Shown options for sharing, rating and sound.	Pass
8.	Drawing Pad	Draw on drawing pad	Should allow to draw on drawing pad	Able to draw on drawing pad	Pass
9.	Game with Sound	Click on any game with pronunciation	Should pronounce the object	The object name is spoken	Pass

Figure 6.1: Test Cases

6.2 Non Functional Testing

6.2.1 Compatibility Testing

Compatibility testing is a crucial step in the software development life cycle, and it involves verifying that an application works correctly on various platforms, operating systems, and devices. When it comes to Android application development, compatibility testing is performed to ensure that an application works as expected on different versions of the Android operating system.

Fig. 4. Home Screen 1   Fig. 5. Settings   Fig. 6. Numbers

Figure 6.2: Home Screen

Android is a fragmented platform, with many different versions of the OS running on various devices. This fragmentation creates challenges for us to ensure that their application work seamlessly across different Android versions. Therefore, compatibility testing based on Android versioning is essential for a successful application release.

Chapter 7

Result

After extensive development and testing, the Go-Brainous application has been successfully created, providing a fun and engaging way for kids to learn and improve their cognitive skills. The application includes various quizzes, games, and creative activities such as numbering, alphabet, alphabet training, math quiz, fruits, animals, vegetables, drawing books, vehicles, shapes, colours, days, months and body parts.

Figure 7.1: Home Screen & Setting

The figure above illustrates the variety of games that are available on the application. In the settings menu includes buttons for the sound and music, as well as buttons for rating and sharing with friends.

The use of the TensorFlow Lite model has enabled the application to provide accurate and reliable performance while maintaining optimal speed and responsiveness. The Java and XML platform used in its development has ensured a user friendly interface and easy navigation for kids. The feedback received from users during the testing phase has been over-whelmingly positive, with many expressing satisfaction with the application design, content, and effectiveness. Overall, the Go-Brainous application has met its objective of providing an enjoyable and effective educational tool for kids, promoting a positive attitude towards learning and mental development.

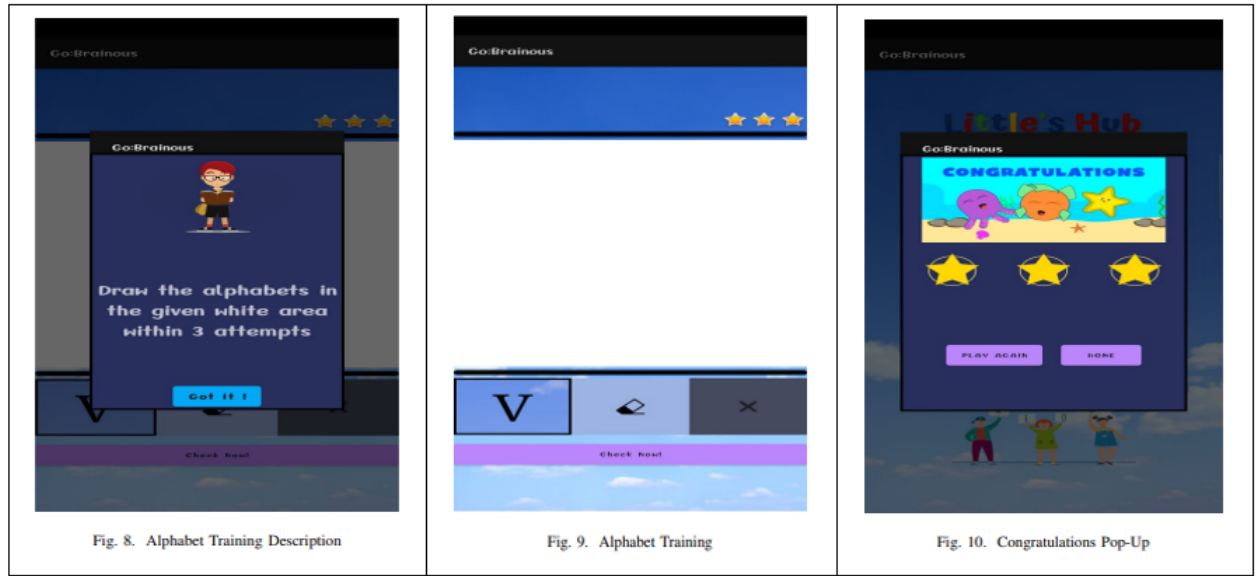Fig. 8. Alphabet Training Description   Fig. 9. Alphabet Training   Fig. 10. Congratulations Pop-Up

Figure 7.2: Alphabet Training

The user's chances will determine how many stars they receive. If the user succeeds on their first attempt, a pop-up congratulations window will display 3 stars. If the user completes the task in two attempts, 2 stars will appear, whereas only 1 star will appear in three attempts.
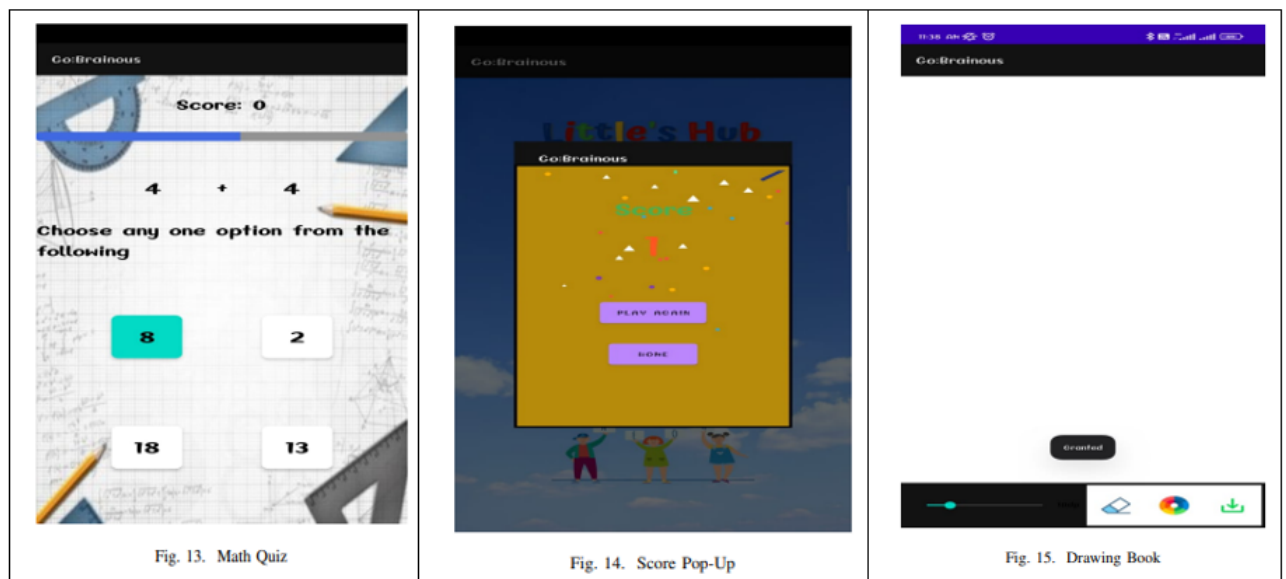
Fig. 13. Math Quiz

Fig. 14. Score Pop-Up

Fig. 15. Drawing Book

Figure 7.3: Math Quiz & Drawing Pad

Fig. 16. Vehicles

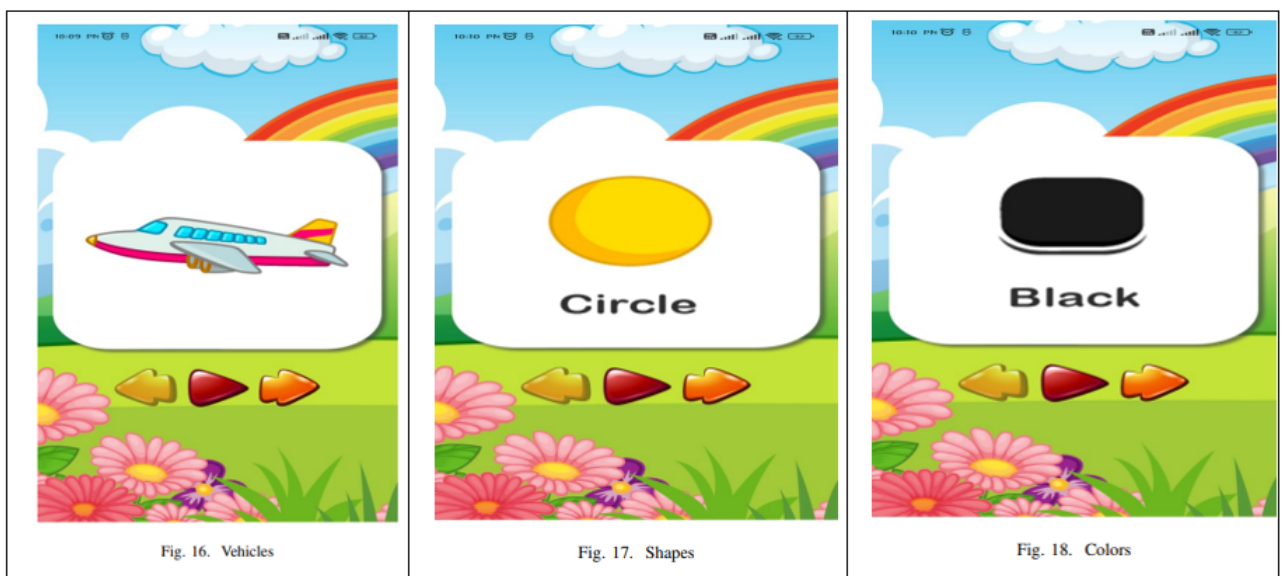Fig. 17. Shapes

Fig. 18. Colors

Figure 7.4: Vehicles, shapes & Colors

Figure 7.5: Days, Months & Body Parts

- The positive feedback from the user testing phase has further validated the effectiveness and usability of the application.

- The application has shown promising results in improving children's cognitive and educational skills, particularly in the areas of math, language, and memory.

- The incorporation of AI technology through TensorFlow lite model has enabled the application to adapt and personalize learning based on the individual user's progress and needs.

- Future plans for the application include adding more features and content, such as interactive stories and foreign language learning modules.

- Overall, the development of Go-Brainous has provided a fun and engaging way for children to learn and has the potential to positively impact their educational development.

Chapter 8

Conclusions and Future Scope

The Go-Brainous game has been developed for kids in which quizzes and games are included like numbering, alphabet, alphabet training, math quiz, fruits, animals, vegetables, drawing books, vehicles, shapes, colours, days, months and body parts. The application is developed using the TensorFlow lite Model. The proposed system is developed on Java and XML where XML is used for creating a layout. The Go-Brainous has provided an easy and interesting way of learning for kids. This project is successfully became an educational application through which students develop a variety of connections with the content and can form positive memories of learning as games to grab the students' attention and actively engage them.

In the future scope, the project includes several enhancements that can further improve the user experience of the application. One of the main objectives is to add more games to the application, providing users with a wider variety of options to choose from. Additionally, making the UI more attractive and user-friendly is also a priority, which can be achieved by implementing more appealing graphics and intuitive navigation features. The application can be published on the Play store, which will enable a wider audience to access the application. Another feature that can be added to the application is a feedback form that can enable users to provide suggestions or report any issues they face while using the application. Lastly, the addition of a score board can help create a competitive environment among users and encourage them to keep playing the games. These enhancements can make the application more engaging and user-friendly, ultimately increasing user satisfaction and retention.

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