Sugarizer game activity pack

Sugarlabs

Proposal for Google Summer Of Code 2020

(Mentor - Ashish Aggarwal and Lionel Laské)

Basic Details

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Previous works in open source projects: I started contributing to open source projects since October 2019. I have participated in an event called "Hactoberfest" where I have contributed to a few projects. Since then I was eager to know about open source projects and contribute to it.

Community Questions

- **What is your motivation to take part in Google Summer of Code?**

  Google Summer Of Code is a great platform to get into the field of open source. I want to take part in this platform because it provides the opportunity to work in different open source projects which is a good way of learning and knowledge growth.

- **Why did you choose Sugar Labs?**

  Sugar Labs is a community that works on various projects to support the learning of children. I also want to work for this community as it uses technical platform for societal cause.

- **Why do you want to work on this particular project?**

  I want to work on this project because I am interested in web-based applications especially game development. As it covers my interests I am looking forward to working on it in the summertime.

- **What are your expectations from us during and after successful completion of the program?**

  During this program, I want to give my best by proper guidance of the mentors. And I want to be an active member of this community and guide the newcomers trying to get into this community.

Abstract

Two activities namely:-

- A Mind Math Activity
- A Tangram Activity

Mind Math Activity

The Mind Math activity will be a game to practice mathematics in a different way. The student is given five random numbers and should use the four basic arithmetic operations (+, -, ×, ÷) to build an operation that will result in the given output.

Tangram Activity

The Tangram activity will present a set of Tangram pieces to the right of the screen and canvas where the user should form a specific shape using these pieces to the left of the screen.

Proposal

Project Details

Mind Math Activity

In this activity, five different numbers are generated by the system. The user should be allowed to use four arithmetic operations to generate the desired output.

Two levels of difficulty can be chosen:

- an easy level with a chosen number between 10 and 69
- a medium level with a chosen number between 0 and 99.

The difficulty will increase by making some operations mandatory.

The user will be given five random numbers (one between 1-4, one between 1-6, one between 1-8, one between 1-12 and one between 1-20) and there will be 4 slots to find the correct answer. The user is allowed to refresh the current slot. A fixed time limit is provided for the completion of this challenge.

The score will depend on:

- Number of slots used.(more is better)
- Bonus when all four arithmetic operations are used
- Bonus depending on the time spent to solve the challenge

The game could be played alone or against other users on the network by presence.

Extra features In single-player mode:-

- A solver will be integrated to help the user to show the best result at the end.

Extra features in multiplayer mode:-

- A leader board will be displayed to show the final scores and decide accordingly who is the winner.

Designing the User Interface:

I am going to make the complete UI in HTML5 and CSS.I will make five partitions for the display of the five numbers.After performing an operation the partitions are going to lose their current values and gradually become empty.I will create four buttons for the arithmetic operations and design them accordingly to make them more attractive to children.Above the partition of numbers there is going to be the main output which is to be obtained.I will integrate four slots each containing three free spaces for the numbers to be assigned.In between there will be space for the arithmetic operation.I will integrate a refresh button to refresh the slots in the toolbar.There will be a dropdown to select difficulty in the toolbar.I will also integrate a solver button in the toolbar.

Making the game functional:

I will be using javascript for this purpose.I will integrate an algorithm to generate five random numbers in the partitions.Then, I will integrate the functionality to transfer them to slots when they are selected to solve the algorithm.I will integrate the output functionality which is going to be precalculated and generated in the output section.The refresh buttons functionality should be integrated to remove the values of current slot only.The difficulty section is going to integrated with the respective output interval and compulsion of operations.I will integrate a timer which will show the time left for the completion of the game.Then, I will integrate the functionality to calculate the final scores which are going to be displayed immediately after completion of the game.The solver should be integrated to guide the player.Then, I will integrate the journal functionality.Addition of the presence functionality in the presence palette should allow multiple players to play over the network.The localisation feature should be integrated to provide the correct language current set in sugarizer.

Integrating other necessary features:

As extra features I will integrate a full-screen button which will expand the screen whenever the user wants to expand the screen.A tutorial button to show the meaning of UI elements by pointing at them.

Additional features:

- **Provide stars for the winning player to determine how good the player is.**
- **Restart button which will completely restart the game.(in single mode)**
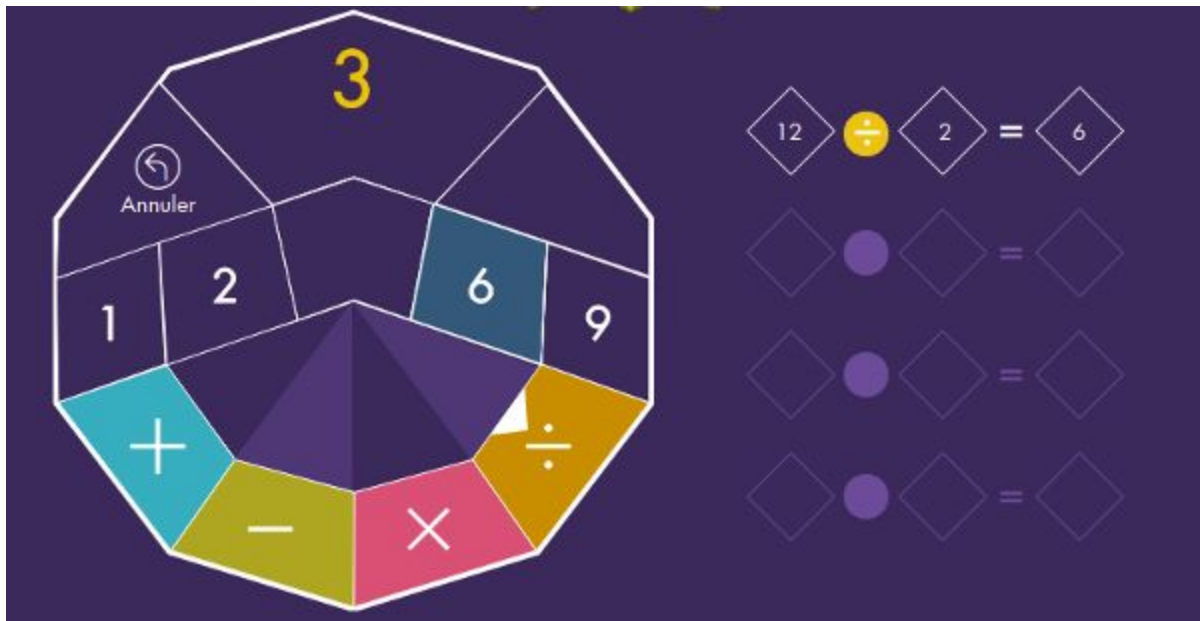
Tangram Activity

The Tangram activity will present a set of Tangram pieces and a canvas where the user should form a specific shape using these pieces to the left of the screen. There will be 7 Tangram pieces and the user is allowed to pick one piece at a time and place it to form the desired shape. After selecting a particular piece the user is allowed to rotate that piece in order to fit it in the desired place. The user is allowed to change the shape before the beginning of the game.

Two levels of difficulty:

- an easy level where the user knows where each piece should be set on the shape and just have to move/rotate the right piece to the right place
- a medium level where the user should guess where each piece should be set and move/rotate it to the right place.

The difficulty level could also depend on the complexity of the shape.

Designing the User Interface:

Here also, I am going to make the complete UI in HTML5 and CSS.I will make two partitions on the left there will be the shape which is to be made by the tangram pieces on the right there will be a canvas partition where the tangram pieces are located.Then, I will integrate options to change the tangram shape which is located on the left.Rotation of different tangram pieces is necessary.So,I will integrate different button for the

rotation of tangram pieces.Then, I will integrate the difficulty option in the toolbar to change the difficulty.

Making the game functional:

I will be using javascript for different functionalities in the game.I will integrate the functionality to pre-generate the shape which is to be made by the tangram pieces.Then,I will integrate the functionality to provide 7 randomly arranged tangram shapes at the beginning of the game.The functionality to show different tangram shapes on the left is going to be integrated with an option to change them.Then,I will integrate different rotate features for the tangram pieces.I will integrate the difficulty option providing the feature of highlighting the partition where the tangram piece is to be placed in easy mode and make the pre-generated shape more difficult by increase in difficulty level.Then I will integrate the journal functionality and the localization feature.

Integrating other necessary features:

As extra features I will integrate a full-screen button which will expand the screen whenever the user wants to expand the screen.A tutorial button to show the meaning of UI elements by pointing at them.

Additional Features

Tangram Activity

- **Time Limit for solving tangram.**
- **Color Change of the set of tangram pieces.**
- **Online gameplay using presence.**
- **Restart button in single mode.**
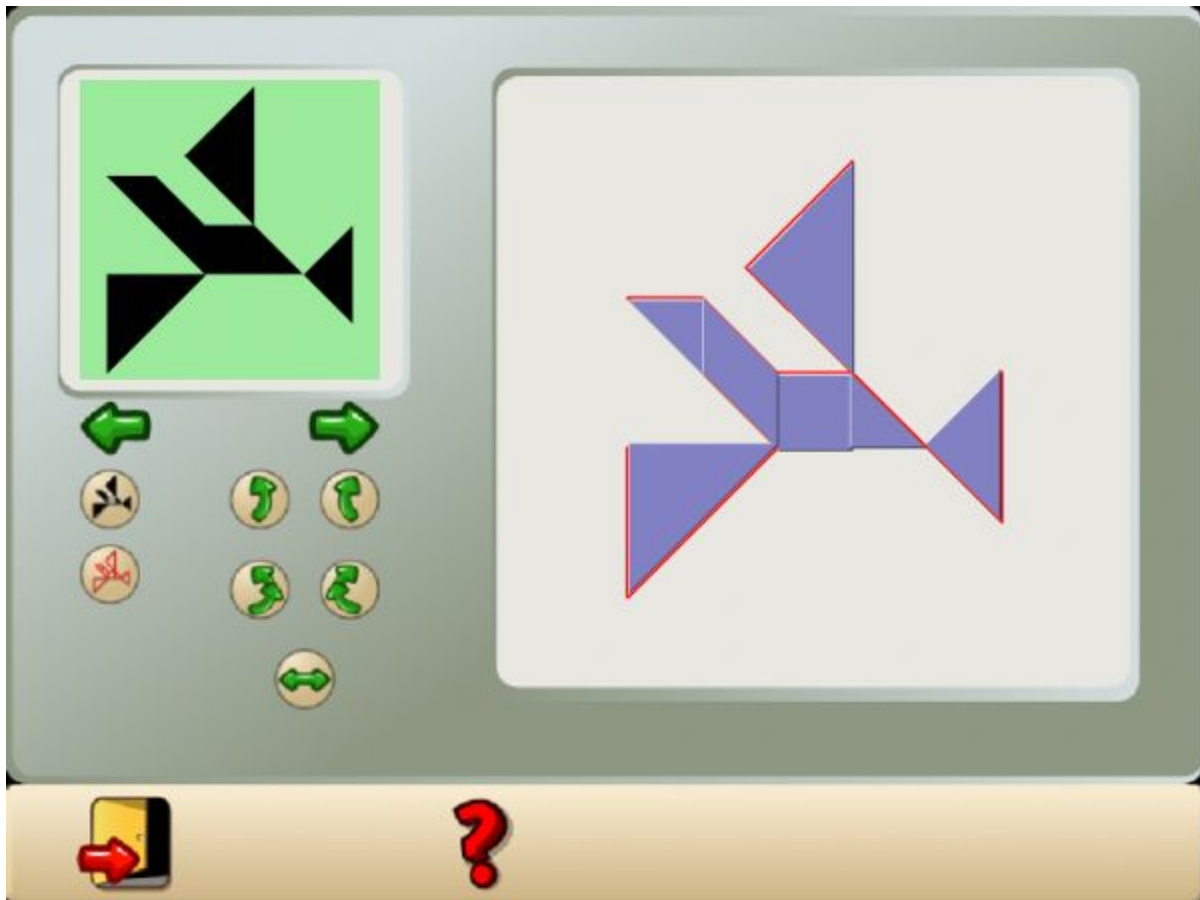
Primary Goal:

Common:

- The activity should load quickly.
- The activity should be easily understandable and operable by children.
- Tutorials should be added for better understanding of the activity.
- The activity should be responsive(It should work on all devices).
- The activity should work on any browser.

Mind Math Activity:

Secondary Goal:

Common:

- The contents should be loaded and saved in the Journal.

- **The activity should be shared over a network so that multiple users could play together.**
- The activity should be correctly integrated into Sugarizer and use buddy colours when possible.
- The activity should use localization.
- The activity should not depend on internet connection.

Technologies Used:-

- Javascript
- HTML5
- Vue.js

Timeline

Following is an approximate schedule for accomplishing important milestones. I have provided an estimated duration for each task. The timeline is divided into three phases.

Community Bonding Period:

April 28th - May 17th

Discuss implementation details with the mentor. Finalize any changes in the proposed timeline and getting familiar with the Organization.

Phase 1: Working on mind math activity

May 18th - May 24

- Build the base of this activity.
- Integration of an icon for this activity.
- Integration of the functionality to provide 5 random numbers.
- Integration of the 4 arithmetic operations.

May 25th - June 1st

- Integration of the output which is to be generated.
- Integration of the slots to perform different operations.
- Integration of the refresh button to refresh the current slot and a timer

- Integration of the difficulty level option.

June 2nd - June 8th

- Integration of the display of the final result.
- Integration of journal to the activity.
- Set up localization.
- Set up a tutorial.

June 9th - June 19th

- Addition of a full screen button.
- Integration of presence in the activity.
- Integration of a scoreboard to show the final results in multiplayer.
- Submit Phase 1 results.(deadline - June 19th).

Phase 2: Working on tangram activity

June 20th - June 26th

- Build the base of this activity.
- Integration of an icon for this activity.
- Addition of 7 different shapes in tangram activity.

June 27th - July 3rd

- Addition of a particular pre-generated shape.
- Integration of an option to change that shape.
- Integration of different rotate options.

July 4th - July 10th

- Integration of an option to refresh current arrangement.
- Integration of difficulty level option.
- Integration of journal to the activity.

July 4th - July 10th

- Set up localization.
- Set up a tutorial.

July 11th - July 17th

- Addition of a full screen.
- Submit Phase 2 results.(deadline - July 17th).

Phase 3:Additional Features and Documentation

July 18th - July 24th

- Addition of a feature of awarding stars for winning player in mind math activity.
- Integration of restart button which will completely restart the game in mind-math activity.
- Integration of time limit in tangram activity
- Integration of colour change in tangram activity.

July 25th - August 1st

- Restart button in single mode in tangram activity.
- Integrate online gameplay using presence in tangram activity.

August 2nd - August 8th
- Documentation
- Refactor the code.

August 9th - August 17th
- Buffer time for unexpected situations.
- Prepare for final evaluation.

If selected, I'll give my full dedication to the project. I have no prior commitments during the month of May to August and will be able to provide 30 hours a week to the project.

Periods of unavailability or other constraints:
- **May 2 to May 25:** I have my end semester exams during this period. Since this period lies during the community bonding period, I expect it to have very little effect on the implementation of the project. I have one paper per week, so I will be able to devote my free time to research about systemd dbus APIs, to discuss the implementation with the community, and to learn about publishing to NuGet.
- **August 1st week onwards**: My classes are expected to begin from 1st week of August. During that period, I would be able to give 20-25 hours per week.

Commitments after Google Summer Of Code:

I would like to contribute to the project even after this summer. I would like to make contributions to this community by solving queries and reporting issues. I wish to be an

active member of this community and I want to give proper guidance to anyone who wants to enter into this community