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Research on Candy Can: Android Gaming App

Ritika Sugandhi, Punit Parakh, Nyasi Joshi

Acropolis Institute of Technology and Research, Indore(M.P.)

ABSTRACT: -

The intention of this project is to create a game application in flutter and firebase that is free, easy to use and entertaining for the players. Flutter is Google's portable UI toolkit for crafting beautiful, natively compiled applications for mobile, web, and desktop from a single codebase. Flutter works with existing code, is used by developers and organizations around the world, and is free and open source. Flutter is approachable to programmers familiar with object-oriented concepts (classes, methods, variables, etc) and imperative programming concepts (loops, conditionals, etc). With the use of flutter and fireways we intend to create a three match game comprising multiple levels which is both stress relieving and amusing.

Introduction

In older times people used to play chess carrom and indoor games to pass time. With changing Times, people tend to spend more time on their phones and their for all the entertainment has shifted on devices. Hence we intend to build a game that keeps people interested and serves as a good and jovial entertainment to people. This game would hold multiple levels with eye catching interface, great graphics and will be completely free of cost. With the use of flutter and fireways we intend to create a three match game comprising multiple levels which is both stress relieving and amusing.

Before starting talking any further, it might be interesting to understand how does a Match-3 game work

A Match-3 game is a puzzle game which consists in aligning 3 to more similar tiles on a board to make them disappear or be transformed to another tile. Tiles which disappear make "hole(s)" in the board. By (usually) gravity, tiles which are above the holes will fall to fill in the gaps. At the end of a move, columns are refilled with new tiles.

A player may slide 1 tile of one cell at a time, horizontally or vertically. Both the "source" tile (the one which was moved by the user) and the "destination" tile (the tile at destination after the move) are swapped. If this results in creating a Chain, the move is considered as correct and played. Otherwise, the move is considered as being incorrect and both tiles are put back to their initial locations.

Problem Formulation

The objective of the game is to build a game that is easy to use, completely free and very engaging for almost every age group. The main idea of this project is to develop a game in which players complete levels by swapping colored pieces of candy, or toffees on a game board to make a match of three or more of the same color (upto five) in order to win the level. This game would support multiple levels suggesting and helping players with a game controller.

Each game level may have different objectives or a combination of several objectives, such as:

1. Removal a certain amount of a certain type of tiles.
2. Creation a certain amount of "bombs".

This game is for the entertainment purposes of age groups of 8 to 60. We intend to basically focus on the younger and working class that are in dire need of some easy and cool stress relievers. But it has been recognized that it is easy to find retired people, housewives, and convalescents among us. Women enjoy it the most for its aesthetics and relaxed vibe (men are said to be extra competitive in video games), and players, in general, appreciate how easy it is to pick up. The study was conducted in Germany, France, Great Britain, and the US. People defined as ultimate gamers enjoy all types of games and spend all their time gaming. They rarely have other hobbies than gaming. The popcorn gamer is a regular on Twitch and Youtube because they enjoy watching more than playing. Finally, the time fillers only play games when they have some time to spare, which is why mobile games are their favorites.

Literature Review

Review of the previous progress done in that field is a crucial step in any project. This helps analyze, evaluate from the existing systems, learn from them, determine their shortcomings and improve. Thus, we referred to a lot of systems and understood their working to make ours competent and better in terms of efficiency.

For the review, we focused on empirical research articles and practical papers. The following keywords were used: mobile educational game, mobile serious game, mobile learning game, mobile game-based learning, (location-based, ubiquitous, mixed reality, augmented reality, pervasive) learning game. We included practical papers (publicly available journal paper and conference proceedings) that (a) report evaluation results from pilot studies with mobile learning games, (b) have a clear focus on affective and/or cognitive learning outcomes, (c) allow identification of mobile game design patterns and (d) report on concrete learning outcomes where the learning outcomes can be correlated with a pattern used in the game. Due to the educational focus of our analysis, we excluded 5 papers because they reported on games other than serious games. Also, we excluded 12 technical reports that focused on innovation, functionality, playability and/or usability testing. For our purpose, an explanation of effects in relation to individual game play mechanisms was crucial. We excluded another 9 papers that provided evaluation data on a very general level, thus no pattern – effect correlation was possible. We did not take into consideration a specific age group. The research we reviewed was conducted mainly on pupils and young adults (age range: 8 – 60 years). Possible variations in effect due to that range of age were not considered.

Methodology

This is a matching pieces game, where the core gameplay is based on swapping two adjacent candies or toffees among several on the gameboard to make a row or column of at least three matching-colored candies/ toffees. In this match, the matched candies are removed from the board, and candies above them fall into the empty spaces, with new candies appearing from the top of the board. This may create a new matched set of candies, which is automatically cleared in the same manner. The player scores points for these matches and gains progressively more points for chain reactions. Additionally, creating matches of four or more candies will create a special candy that, when matched, can clear a row, column, or other section of the board.

The game is split among many levels, which must be completed in sequence. Each level poses a different challenge to the user, such as achieving a minimum score in a fixed number of moves or clearing candies in a fixed number of moves to bring special ingredients to the bottom of the board. Boards have a number of different configurations and may include special spaces that have their own unique rules, such as spaces covered with jelly that must be cleared by making a match on that space. If the player meets the level's goal, they will be given from one to three stars based on their score and can proceed onto the next level. Otherwise, they will lose one life and must try again. If the player runs out of lives, they have to wait for some period of real-world time while their lives regenerate before attempting the level again. Completed levels can be replayed if desired.

Before starting with the code, we need to have an idea of the different parts of the game and how they will interact with each other.

1)*Home Page*: The Home Page is only meant to display a nice background, a title and a series of buttons, each of them launching the corresponding game level.

2)*Game Page*: The Game Page contains a series of elements.

3)*Splash Banner*: At the game start, a Splash banner is displayed to show the user the information related to:

- the level number
- the list of objectives

When the game is over, a *Splash* banner is displayed to mention whether the player won and lost the game.

4)*Moves panel*: This panel is displayed in the top left corner of the screen. This panel shows the player how many moves are left before the game ends.

The number of moves left needs to be refreshed each time the player plays a move.

5)*Objectives panel*: This panel is displayed in different locations of the screen, depending on the device orientation:

- in portrait mode, my choice was to display it in the top right corner;
- in landscape mode, my choice was to display it in the bottom left corner.

The objective panel is made up of a series of “*icons*” (which represent a type of tile), and the corresponding objective counter. Each objective counter needs to be refreshed each time the player plays a move that leads to decrement one objective counter.

6)*Board panel*: This panel displays the tiles, organized based on the level definition, with dimensions that depends on the device orientation and dimensions.

In other words, we need to determine the dimensions of a tile “*square*” based on the device dimensions and the position of the “*board*”, on the device orientation.

Game controller Creation :

The 1st step in the process of making the project is making the game controller that continuously runs in the background. The main task of the controller is to keep a watch on the player's moves and suggest the most appropriate move when stuck.

Tiles Shuffling:

During this step, it is very important to shuffle the tiles so that no direct Chain is created.

To achieve this:

we fill the grid from row = 0..max rows -1 and col = 0..max cols -1;

for each cell, we get a random tile type that we compare with the previous 2 cells left [row][col-1] & [row][col-2] as well as with the 2 cells down [row-1][col] & [row-2][col];

if the random tile type is the same as for any of these other cells, we loop until there is no matching.

Delays are calculated globally for the whole set of tiles.

* loop until there is no more moves

* delay = longest delay

* resolve combos => new delay

* for each column (0.. cols-1)

* process the avalanche with delay

* process vertical fall with delay => new delay

* calculate longest delay

1) *Module Creation*: The 2nd step of the process is module creation. We plan, decide and create individual modules of each level and its graphics, decide its difficulty and the number of moves it allows. It also involves selecting and designing new rewards for completing the level in record moves.

2) *Unit Testing*: After the module creation, we test the modules. Each module undergoes a test to ensure its proper functioning and reliability.

3) *Interlinking of Modules*: Interlinking module is a process of linking the modules which exist to associate the records to two different modules and ensure the whole unit works as a system.

4) *Integration Testing*: It's one of the most important steps of "planning a project". It is used to check the integrity of a software as it assures the interlinking of the pages is done properly and the whole system works as a whole.

5) *Deployment to the server*: The last is to deploy our project from our localhost to the online web hosting service so that it can be available to the world.

Result Discussions

The expected outcome is a mobile app which is easy to use, free and available on playstore and other online platforms with an introduction to the game for new downloaders. The game is to be monitored with a game controller suggesting moves to the players when stuck. This application intends to be amusing for its players.

Conclusion

To conclude, we are working on a project that is free entertainment for both the student class and the working class people, providing them an online platform for stress relief and amusement. This app will be freely available and contain a demo for the beginners. Animations are smooth, even using the emulators when multiple animations need to be played in parallel. The notion of Overlay is fantastic and opens the door to wonderful thing

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