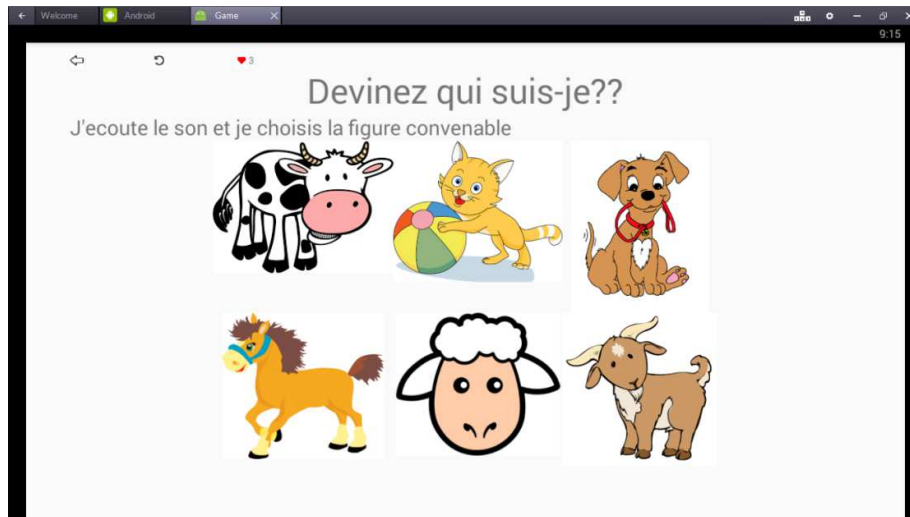## A- Project 1: Game (ML or AI?)

Cette application contient :

- Un bouton qui explique les règles du jeu
- Un bouton aide
- un bouton pour revenir au menu principal du jeu
- Un bouton pour répéter le jeu.

Pour ce jeu l'enfant peut choisir entre ces 2 options :

- Cri et image
- Nom et image

Cri & image : l'enfant écoute le cri de l'animal (d'une manière aléatoire) et choisit l'image convenable.
Nom & image : on affiche le nom de l'animal et l'enfant choisit l'image convenable.

On peut choisir entre ces 2 options si l'enfant ne connait pas la réponse :

- Un bouton pour l'aider en affichant l'ombre de l'animal
- Un score (par exemple il a 4 vies)
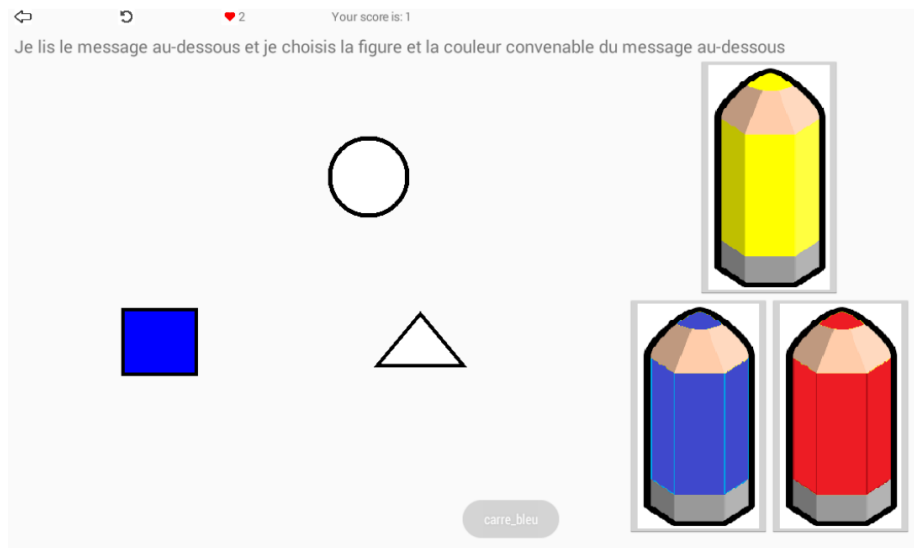
L'enfant a quatre chances avant d'avoir échouer.
A chaque mauvaise réponse le nombre de vies décrémente de 1. Dans le cas de bonne réponse le score sera afficher et un message apparait "je suis: cheval" lorsqu'on clique sur le cheval.

Le score incrémente jusqu'à 10 et on aura un message ("Bravo vous avez gagné")

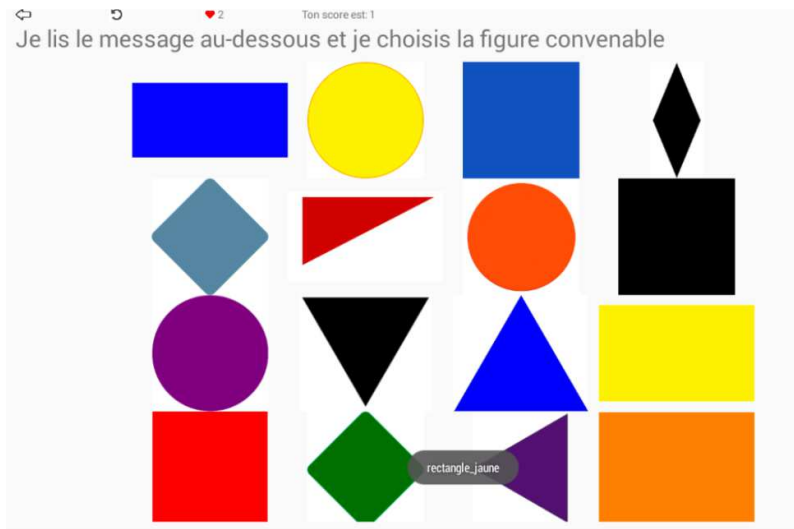## B- Project 2: Game (ML or AI?)

a- Niveau 1

Un message aléatoire s'affiche au-dessous de la page (par exemple : carré bleu). L'enfant doit lire le message et choisir la couleur et la figure convenable pour ce message.
L'enfant peut cliquer premièrement sur la figure puis sur la couleur ou vice versa.

b- Niveau 2

L'enfant lit le message au-dessous et il clique sur la figure convenable.

On a un bouton ⇐ pour revenir au menu principal du jeu "activity_menu.xml" et une autre flèche pour répéter de nouveau le jeu.

L'enfant a quatre chances pour tromper avant d'avoir échouer.

A chaque mauvaise réponse le nombre de vie se décrémente de 1. Dans le cas de bonne réponse le score sera affiché.

C- Project 3: Game – Anatomy (ML or AI?)

This game mainly addresses the knowledge of a person in Biology, more specifically the Human Anatomy. It's a simple "Click-And-Place" based game in which the player has to correctly put the organs in their correct positions.

This game has two modes: The first mode, "CLASSIC GAME" is where the challenge lies, it has three levels, from Easy to Hard, where the user has to correctly guess the place of each given organ in the human body, and the Second mode is called "FLASHCARDS", which is more of an informative mode to learn more about Human Anatomy.
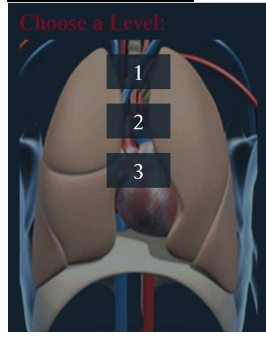
Since the game has many modes and levels, we will show you the different screens of the game while talking and discussing briefly their functionalities.
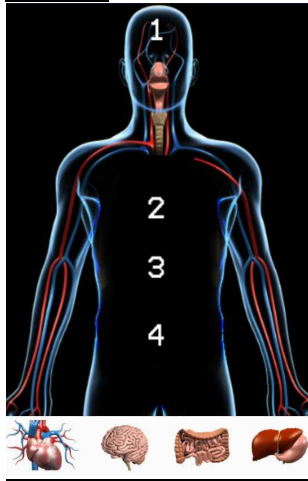
Modes Screen:
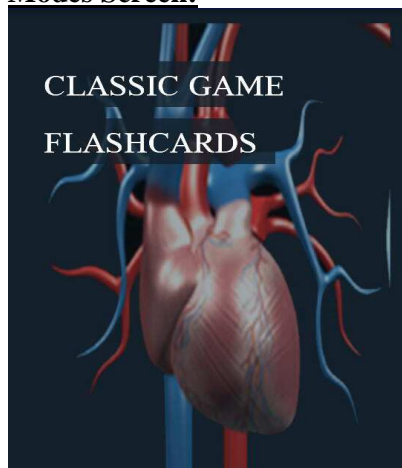
This screen is the Menu/Modes screen. You can either Click Classic Game or Flashcards. Clicking 'Classic Game' will display the 'Levels Screen'.
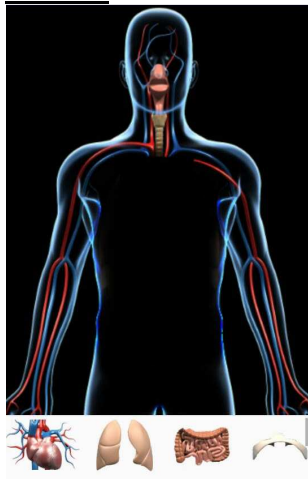
Levels Screen:

In this screen you get to pick the difficulty you wish to play; the greater the number, the harder it is.

Level 1:

This is Level 1 screen. In this screen you have to guess the position of each shown organ. To do so, you first click on the desired organ, then click on the corresponding number where it should fit, if the organ is well-put, the organ will remain at its position. Nothing will happen if you guessed wrong.

Level 2:

This is the level 2 screen. In this screen it gets a little harder; there are no shown numbers as to where to put the organs, you have to be precise and sure about the positions.
This means that at first, it shows 4 organs, but if you slide it upwards, another 4 organs will be displayed to a total of 8 organs. In this Level, there are still only 4 spots for organs like level 1, but these spots can

be filled by 2 or 3 organs each, so the user has to guess what organ comes before the other in the same spot, i.e. Heart comes before Lungs directly under the head.
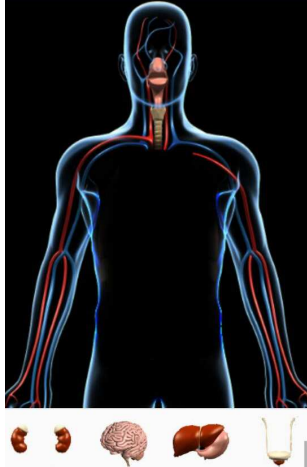
This is the screen in level 2 that shows the other 4 organs when the bottom View is moved upwards.

Flashcards Screen:
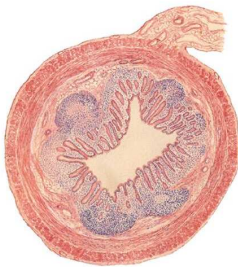
This is the FlashCards screen. In this screen you will see images of organs and be asked if you know them. Clicking on the image will display a legend (one legend for each click) explaining more about the organ as follows:

D- Project 4: Educational Game (ML or AI?)

This game is based on words following the concept of the Wordle game.

A. Technical description

We explore the educational potential of our game, a targeted word game designed to promote vocabulary expansion and intelligible engagement.

B. Frontend Implementation

1) Game Grid
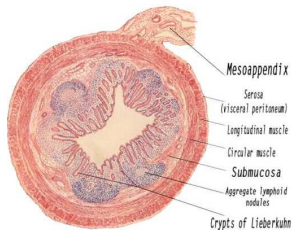
The game grid is responsible for rendering the visual representation of the game. Create a 2D array of widgets (tiles) in a grid format. Each tile represents a guessable letter. The grid is configured to display the number of tiles horizontally and vertically (by default, this grid contains six tiles horizontally and five tiles vertically, this number can be modified). The vertical tiles correspond to the number of letters into the guesses word. The horizontal tiles correspond to the number of possibilities to guess the word (this mean that we have six attempts to guess the word correctly).

2) Tiles Animation

Each tile in the grid has animation effects applied to it. The Dance and Bounce animations provide visual feedback to the player when selecting tiles and upon successful completion of the game.

3) Tiles Color

Tiles in yellow indicate that the letter is in the word but not in the correct position, while green tiles are both in the word and in the correct position. Grey tiles mean that the letter is not in the word at all.

4) Keyboard Interface

The keyboard interface allows players to input their guesses. It dynamically generates keyboard rows and handles user interactions with individual keys (for a better view, all letters are capitalized).

5) Statistics Display

The statistics box presents various game statistics to the player, including the number of games played, win percentage, current streak, maximum streak, and user's level.

E- Project 5: Focus Game 1 (ML or AI?)

Player must find objects in different images.

1) Overview

In this part, the game displays an image and an object that is in this image. The player must search in the image for the object displayed and when he finds it, he must click on it.

The player can explore the game through several levels, each offering a test of their concentration skills. With level 1 (easy), the game begins with intriguing images containing a single object to find. As he progresses to Level 2 (medium), the complexity intensifies as two objects await his discovery amidst the visual tapestry. But the toughest test awaits him at level 3 (hard), where the stakes are raised with three enigmatic objects in the image. What sets our game apart is its dynamic gameplay – every time the player adventures into a new level, the choice between images is randomized and the choice between objects is randomized too, that ensuring a fresh and unpredictable experience with each playthrough.

This randomization introduces an element of unpredictability, and engaging the user experience by offering different pathways based on the random outcome.

For each level we defined a type of image:

a) The first type is a simple image with few details. We have no complex colors and no complex shapes. Every object in it is easy and straightforward, so that when looking at it we can see all subjects clearly with no difficulty.
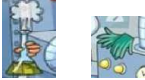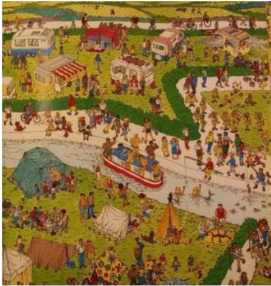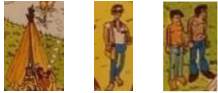
b)   The second type showcases images that are a bit more difficult to dissect as we have much more details one can notice. We can observe a more advanced color palette as well as more details in each of the objects. To add on, in this type of image, we can see that there are more things, events, and scenarios going on compared to the first type. It is lively, more detailed, and though it is possible, it takes more time to pay attention to every detail in it.

c)   The third type of images is the most complex one. It presents images with more complex colors, shapes and way more details than the other two types. We can notice that it is chaotic and cluttered, making it hard to find and notice subjects. This type crams tiny details, multiple scenarios and subjects, as well as several patterns and colors into one display, leaving it almost impossible to see and perceive everything in it and understand every detail and scenario happening. It is, in a way, merging the foreground, middle-ground, and background all together, giving it the complex, cluttered, and chaotic aspect of it.

For each level, we have ten images, for each image we defined six objects to find. The number of images and objects is not fixed, we can add as many as we want.

The following table shows an example of image and objects by level.

TABLE I.   EXAMPLE OF IMAGE AND OBJECTS BY LEVEL

Levels	Difficulty	Example of image	Example of objects to find
Level 1	Easy		
Level 2	Medium		
Level 3	Hard		

2) Functionality

Objects are identified, in the image, by a clickable square of size 100 x 100 pixels and is transparent, indicating that it serves as an invisible target in the user interface. This square is placed on the object at specific coordinates on the screen, defined by the bottom, right, top and left properties. This configuration manages interactive and touch-sensitive areas that appear conditionally based on their visibility states. When the player clicks on the square its visibility becomes false. This setup manages interactive, tap-responsive areas that appear conditionally based on their visibility states.

The main page of the application features a prominent "Start" button, which, when clicked, triggers an elevated button with an on-Press event handler. This handler generates a random integer between 0 and 9 (10 images). Depending on the result, the application navigates the user to the corresponding image.

We initialize the state by generating a random ID between 0 and 5 (6 objects) and setting the corresponding square's visibility to true. We generate a list of unique random integers, ensuring there are no duplicates within the specified range. We handle the user's tap on a square, updating the state by hiding the clickable square and incrementing a count, indicating one square has been tapped. This setup is used to manage the visibility of six squares and handle interactions, likely for a simple game or interactive feature.

When all objects in the image are found, a dialog box is displayed. The dialog features a title "Object Found!" and a message "Level completed." It includes a single button labeled "Next level." When the button is pressed, it dismisses the dialog and the game displays randomly image and objects. This method facilitates user progression to the next level in the application upon completing the current one, adding a randomized element to the subsequent user experience.

If needed, we can help the player by indicating the placement of the object in the image, using:

- General indications: bottom, right, top, or left.

- More precise indications: bottom - right, bottom - left, top - right, top – left, or center.

F- <u>**Project 6: Focus Game 2 (ML or AI?)**</u>

Player must find colors and numbers scattered on the screen.

1) Overview

The objective of this part is to test player's reflexes by challenging them to tap on targets that match a specific criterion within a limited time frame. The game features three levels of difficulty: easy, medium, and hard, each with varying durations. Players must tap on targets swiftly and accurately to score points and advance through the levels.

2) Functionality
   a) Target Criteria

Targets can either be colored circles or numbers displayed inside circles.

With each new play session:

- 5 colored circles are displayed on the screen: 1 circle contains one color and 4 circles numbered from 0 to 3.

- These 5 circles are positioned on the screen randomly.

- A message indicates the player's target. To make the player concentrate more, we have also colored the text of this message.

- All colors are chosen randomly

Example of target:

- If the text of this message "Tap COLOR yellow" appears in blue color, the player must tap on the yellow circle and not the blue one. So the player must focus on the text and not on the color of the text.

- If the text of this message "Tap NUMBER 2" appears in red color, the player must tap the number 2 without taking into account the red color.

b) Scoring

Players earn points by tapping on correct targets. Each correct tap adds one point to the player's score, while incorrect taps deduct one point.

c) Levels of Difficulty

- Level 1 - Easy: Players have 40 seconds to tap on targets.

- Level 2 - Medium: Players have 25 seconds to tap on targets.

- Level 3 - Hard: Players have 15 seconds to tap on targets.

d) Game Over

The game ends when the time limit for the selected difficulty level elapses. Players can start a new game by selecting a difficulty level from the main screen.

In the Fig. 1, the text of target "Tap NUMBER 2" is green. The user must tap the number 2 not the color green.

Figure 1: Target number

In the Fig. 2, the text of target "Tap COLOR orange" is blue. The user must tap the orange circle not the blue.

Figure 2: Target color

G- **Project 7: Focus Game 3 (ML or AI?)**

Player must find colors and shapes displayed on the screen.

1) Overview

The Shapes and Colors part is designed to help users, particularly young children, recognize and identify different shapes and colors. This part combines visual aids with interactive questions to improve concentration.

2) Functionality

This part presents users with an image of a shape and asks them to identify its color and shape from multiple options. The game includes features such as scoring, feedback on correct or incorrect answers, and a final results screen.

3) Key Features

- Question Display: Users are shown an image of a shape and asked to identify its color and shape. This image is selected randomly from a database containing several dozen images.

- Answer selection: Users choose their answer from four options provided. These four options (one correct answer and three wrong answers) are positioned and displayed randomly. We control the random selection to avoid having duplicates in the chosen answers. The selected answer is then evaluated.

- Immediate Feedback: After selecting an answer, users receive immediate feedback indicating whether their choice was correct or incorrect. These choices change color based on whether the answer is correct (green) or incorrect (red) "Figure 3".

- Score Tracking: The user's score is updated in real-time based on their answers.

- Results Display: At the end of the game, users are shown their final score and given the option to restart the game if desired "Figure 4".
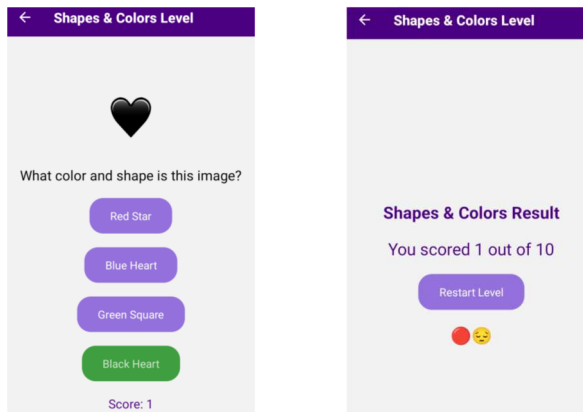
H- Project 8: assessments in the flipped classroom

The application is for a teacher who would like to create assessments for his students, the assessments are not graded, they are formative.

Two profiles are available:

- Admin for teacher
- User for student

The application contains the following modules:

1) Register module

This module is reserved for students. They must register before using the application by filling in Student ID, First name, Last name, Email, Password, and Confirm Password.

2) Assessment module

The teacher will be able to select the academic year, add a material (course ID and course name), and create an assessment for each material.

He must choose the type of assessment from the following options:

- Self-assessment. This option allows the student to evaluate his knowledge.
- Assessment by the teacher. This option allows the teacher to evaluate his students' work.

- Assessment by the students. This option allows the student to evaluate the content of the course, the method of teaching, and the work of another student (peer assessment).

After choosing the type of assessment, the teacher can add the following questions:

- Open-ended questions
- True/false questions, Yes/No questions
- Single-choice questions
- Multiple-choice questions
- Rubric questions (peer assessment)

The peer assessment is an in-class assessment and it can be done individually or in groups. One group will assess other peer groups, each group will be assessed by peer and by teacher. Team work is assessed by teacher in the basis of involvement in team and interaction of members.

Example of evaluation criteria:

- The presentation of the work must meet the quality criteria.
- The student's written and oral expression must not contain any syntax or spelling errors.
- The vocabulary must be varied.
- Answers and information must be relevant to understand the subject presented.
- Finally, the student's ability to carry out research and provide a summary on the subject is assessed.

Each criterion is evaluated by one of the following scale: Excellent (4), Very Good (3), Satisfactory (2), or Fair (1).

Table 1 shows an example of the rubrics for assessment (peer assessment) where categories, criteria, and assessment scale are defined.

Oral presentation	Excellent (4)	Very Good (3)	Satisfying (2)	Fair (1)
Electronic support	Presentation Slideshow + meets quality criteria	Presentation Slideshow + does not meet the quality criteria	Presentation very long	No slideshow
Written expression	no syntax or spelling errors + The vocabulary is varied + Presence of figures	less than 5 spelling and syntax errors + The vocabulary is varied + Presence of figures	less than 5 spelling and syntax errors + Vocabulary is restricted + Presence of figures	more than 5 spelling and syntax errors + No presence of figures
Oral expression	speech construction and diction are very good	speech construction and diction are good	speech construction and diction are satisfactory	speech construction and diction are unsatisfactory
Presentation /posture	the student is dynamic. He looks at everyone in the class and addresses them.	the student looks at the group, addresses them and presents a fixed attitude	the student does not look at the whole class and presents a fixed attitude	the student is static. He does not address the whole class.
Relevance of information	the information is relevant to understanding the topic presented	the information only allows a partial understanding of the topic presented	the information does not allow an understanding of the topic presented	the choice of information is not relevant to understanding the topic
synthesis capacity	the presentation demonstrates the ability to research and take a look at the topic	the presentation demonstrates the ability to do research without looking at the topic	presentation does not demonstrate ability to do research	the presentation is copy and paste

The teacher can modify, remove, or activate an assessment. After being activated, the assessment will be visible to the students. The student can only once complete the assessment.

3) Result module

The application includes a result module that enables teachers and students to view the result of assessment.