Programming Fundamentals Project- Fall 2022
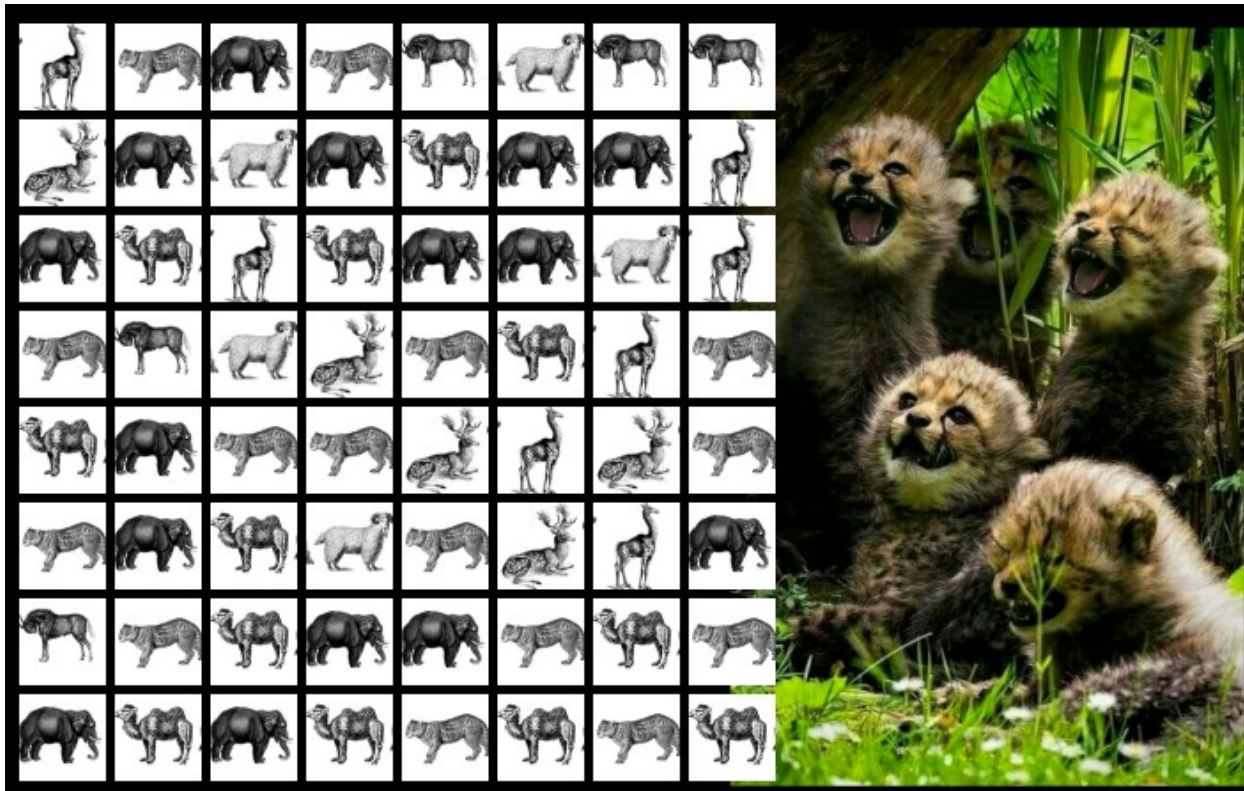
Deadline: 9th December , 2022

Instructions

Plagiarism is strongly forbidden and will be very strongly punished. If we find that you have copied from someone else or someone else has copied from you (with or without your knowledge) both of you will be punished. You will be awarded (straight zero in the project — which can eventually result in your failure) and appropriate action as recommended by the Disciplinary Committee (DC can even award a straight F in the subject) will be taken.

- This is a group (4 people) activity. Every member is required to complete atleast 2 features.

- You can use anything to code this (preferably the contents you have covered in the course). If you will be using any other concept then be prepared to present it as well during your demonstration. You can get an idea of the implementation from any internet resource but dont try to copy any chunk of code exactly from any resource. Zero tolerance policy for plagiarism.

- **Try to understand and do the project yourself even if you are not able to complete the project. Note that you will be mainly awarded on your effort not on the basis whether you have completed the project or not.**

- Divide and conquer: since you have many days so you are recommended to divide the complete task in manageable subtasks.

- Imagination Powers: Use your imaginative powers to make this as interesting and appealing as you can think of. An excellent solution can get you bonus marks.
- Combine all your work in one .zip file.
- Name the .zip file as ROLL-NUM SECTION.zip (e.g. 19i-0001 B.zip).
- Submit the .zip file on Google Classroom.
- Use good programming practices (well commented and indented code; meaningful variable names, readable code etc.).
- You must follow the submission instructions to the letter, as failing to do so will get you a zero in the Project.

- Make sure that you read and understand each and every instruction. If you have any questions or comments, you are encouraged to discuss your problems with your colleagues (and instructors) on Google Classroom.
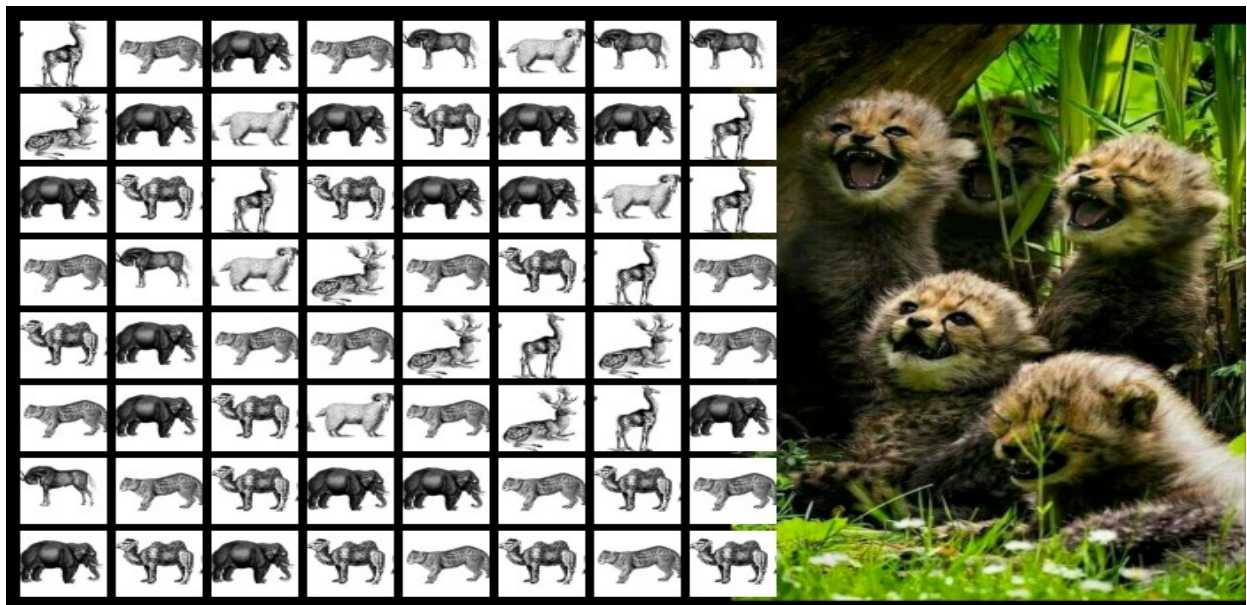
Menagerie

Description:

We are going to make a menagerie (Video of sample app is shared on google classroom) where there are different animals. We are supposed to let user make a chain of animals of same species and count the number of animals belonging to different species. Please be noted whenever atleast three animals of same species are found by the user (a chain is formed) current animals disappear, count of particular species is increased, and tiles fall from the top to fill in gaps (new animals will replace them).

Our goal is to make as many chains of animal (both in rows and columns and it will be accomplished by swapping position of different animals) as possible but in as few moves as possible.

- Our intial objective is to make a repository of atleast 8000 animals of 1st species, 7000 animals of 2nd species, 6000 animals of 3rd species, 5000 animals of 4th species, 4000 animals of 5th species and 3000 animals of 6th species.
- As you proceed to the next level of the game, we shall have a time constraint to make the repository.

Figure 1: Menagerie

Rules:

- User can swap one animal with an adjacent animal with the help of mouse to form only horizontal or vertical chain of three or more identical animals.

- Bonus points are given to player when chains of more than three identical animals are formed.

- Bonus points are awarded to player when two chains are formed in one swap.

- Cascades (more than two chains) are also awarded with bonus points.

- There should be a specific number of moves allowed to go to next level.

- Game is over when there are no more moves left.

Required Features:

1. A menu is included optioning Level Modes.

Level Modes include difficulty of level (at least two modes)

1. Normal Mode

In Normal Mode, the player fills up the progress bars on the bottom of the screen by forming chains. The game starts with empty progress bars and the game will end only if no moves left. When the progress bar is filled up completely, the player goes to the next level. As the level progresses, more points are required to proceed to the next level. As the player levels up, they get more points by making a chain (example: Level 1= 100 pts. for making one chain of three animals, Level 2= 150 pts. for making one chain of three animals etc.).

2. Time Trial Mode

In this mode, the gameplay mechanics are like Normal Mode, but the progress bar starts half- way filled. The player must keep the bar filled by making chains, and they will level up by filling the progress bar.

2. Draw game board (Sample is attached (Fig 1) but think of your own different theme)

Code is given for loading the background and starting the application.

Make a grid where you will be loading different animals (There should be at least 6 different animal species (max 8)). You can use different images of animal species.

3. Match Rows and columns

You should not allow the chains to be formed diagonally. Only allowed directions are horizontal or vertical. As soon as the chain of three animals is formed, remove them from the screen, give credit to the user and let new animals from the top replace these vacant positions. (sample video is attached)

4. Allow to swap the animals

User can swap position of one animal with an adjacent animal with the help of mouse.

5. Define a scoring scheme.

All animals will not carry equal points rather. When three animals chain is formed, player gets bonus triple points (x3). When Player forms chain of five animals, points will be added 5 times more (x5). Game Control will be Mouse only.

6. Progress Bars should be displayed.

You can show six progress bars displaying count of each species. Please be noted that we have to keep track of the count to move to the next level.

7. Next Level will require specific frequency of animals

There should be atleast 8000 animals of 1st species, 7000 animals of 2nd species, 6000 animals of 3rd species, 5000 animals of 4th species, 4000 animals of 5th species and 3000 animals of 6th species, when the required number of chains are formed only than you will let user move to the next level.

8. Level 2 will have a time constraint.

Means user have to make specific number of chains (to be decided by you) in specific amount of time (to be decided by you). Please show the time progress on the screen.

9. Game is over when there are no more moves left.

You will decide number of moves allowed in a level and after each move please show number of moves left.

Bonus Points

Bonus marks will be given based on

1. Creativity on Game Board.
2. Graphics of Game.
3. Game Aesthetics.
4. Player Profile (can include Name of Player, number of levels completed both in normal and time trial mode, Language, completion rate etc)
5. New Feature

Some guidelines from the starter code:

Please use these commands to run the given code from your terminal.

Step 1.

```
ansa@ansa-Vostro-14-3468:~$ sudo apt-get install libsfml-dev
```

Step 2.

```
ansa@ansa-Vostro-14-3468:~$ sudo apt-get install build-essential
```

Step 3.

```
ansa@ansa-Vostro-14-3468:~/Downloads/AI&DS_PF_PROJECT$ g++ -c main.cpp
```
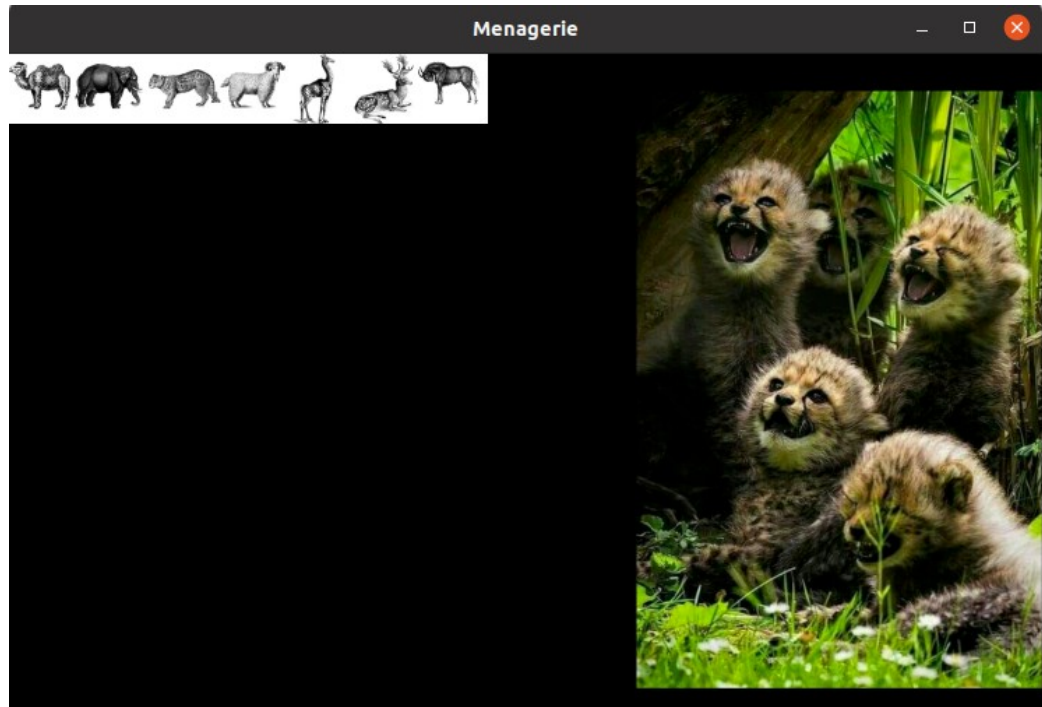
Step 4.

```
ansa@ansa-Vostro-14-3468:~$ g++ main.o -o sfml-app -lsfml-graphics -lsfml-window
 -lsfml-system
```

Step 5.

```
ansa@ansa-Vostro-14-3468:~$ ./sfml-app
```

Following screen will appear:

Now, we are good to go.

Happy Coding