IERG3080 Project II Report

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1. Overview

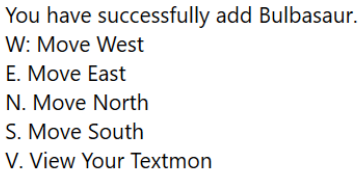
1.1 Why Pixelmon (or Textmon) ?

The Pokemon Game Series originated from 1990s, with its prototype being Pokemon Red, which is a simple game running on GameBoy. Recently, a popular online game named Pokemon Go has redrawn considerable public attention, gained reputation form both game developers and game players.

Pixelized UI of Pixelmon

Inspired by both the modern version **Pokemon Go** and the reminiscent version **Pokemon Red**, we came up with the idea called Pixelmon. Though running on modern PC, Pixelmon uses a pixelized UI, to create a similar experience as playing Pokemon Red in our childhood. Also, Pixelmon adopts many modern features of Pokemon Go, with the game logic updated to the newest trend.

If we trace back further into the game development history, we would find another game mode MUD, which is a bygone memory at 1980s. **MUD** game doesn’t have any graphical user interface. All of the information provided by the game and all of the instructions which user might give is presented through pure text. In that way, the interaction between the user and the game is done by reading and typing. Here, we additionally create a prehistoric case of pokemon: Textmon.



A MUD-liked Game: Textmon

1.2 Requirement Analysis: What Do We Need?

In our graphical version, aka Pixelmon, several elementary features are essential for the main structure. To begin with, we need a **Navigation** System, which means a map of 2D. Then, we need to have some method for **Capturing** pixelmons, which would add new pixelmons to our collection. And we may need to check the status of the pixelmons, **Manage** our **Collections**. At last, we may need somewhere to bring our pixelmon into battlefield, of which **Gym Battle** could be the best choice. Plus, some more features like **Story Line** can make our game more colorful and improve our user experience.

1) **Capture**
2) **Navigation**
3) **Gym Battle**
4) **Story Line (Extra Feature)**
5) **Collection Management**

The critical features of our text version, aka Textmon, are much easier to construct. Though the visual interface of our two versions share nearly zero similarity, their inner game logic can be analogous in many perspectives. Based on the feature of Pixelmon, we can deduct the visual part and reuse many key elements. In that way, our Textmon can be realized.

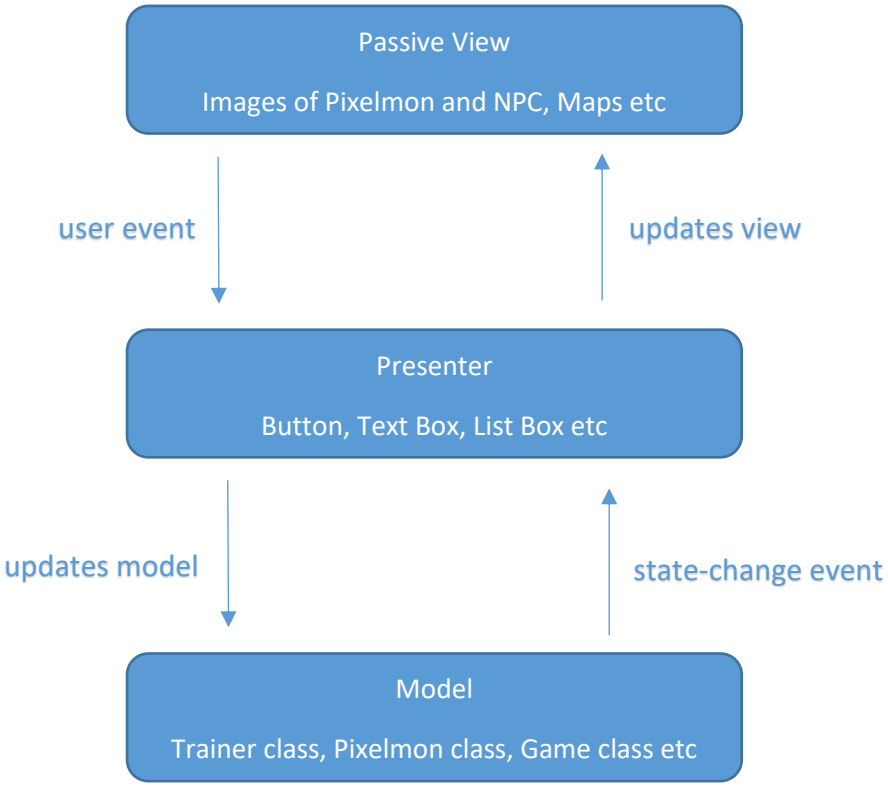
1.3 Design Pattern: Abstract idea of MVP

To fulfill the requirement we have discussed above, we decide to adopt WPF for realization. Considering the realization would not be small-scaled, and there will be more than one view or window to implement. MVP seems to be a preferable approach.

Consider the similarity shared by these two versions and the lack of graphical UI in Textmon, we would like to concentrate on the MVP of the graphical version: Pixelmon. We discuss the simple design first, then adding more detailed features.

To allow the basic function of Pixelmon to run properly, we need at least three classes: the Pokemon class, a Trainer class and a Game class. The Pokemon class targets at single pixelmon, which contains each pixelmons' properties like CP, HP, and Skill. The Trainer class keeps record of our player, contains properties like Name, Stardust (used to power up pixelmons), and Eggs (used to let pixelmon evolve). The Game class not only have one Trainer and many pixelmons (stored in

some data structure), but also have some data and underlying logic of other game elements like map allocation and distribution.



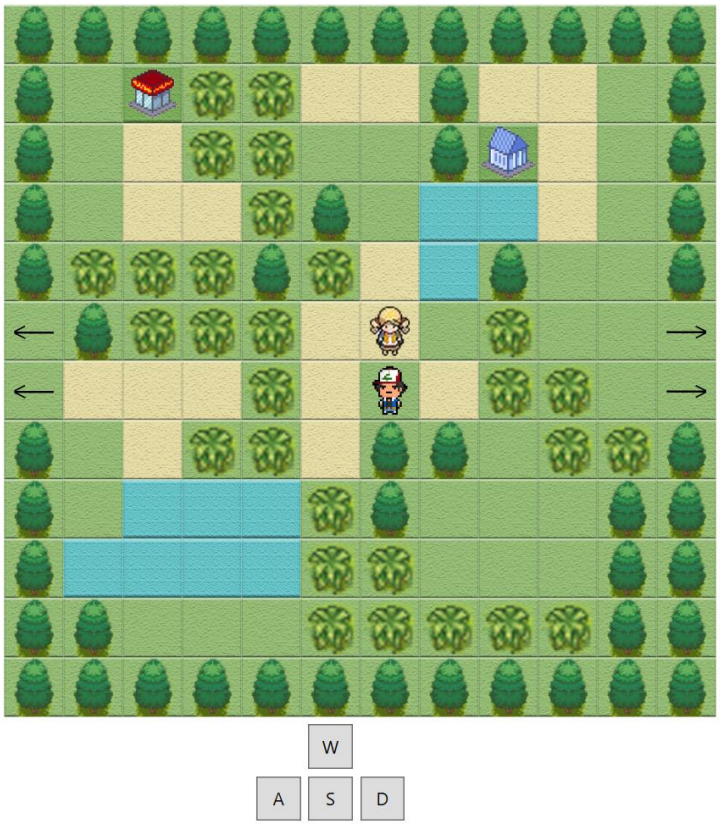
In the view part, we would like to see: the appearance of our pixelmon, the map, and some NPCs to tell our **StoryLine**. Here we may have many inline pictures for each pixelmon and NPC, and separate the map into multiple square block, in which certain texture representing various terrain will fill.

In the presenter part, buttons, text boxes and list boxes is applied for supervising control. To separate the view and model as thoroughly as possible, we use presenter to change most of the view, and these view is regarded as passive view.

The specification of the Real Game version Pixelmon will be covered in part 2 and 3, while that of the Text Mode version will be introduced mode separately in part 4.

2. Design Conception: MVP

2.1 Navigation



Model: the model is purely a number matrix containing different numbers. Each number may mean different terrain in map. For instance, when 0 means tree and 1 means grass land a simple implementation could be like the following:

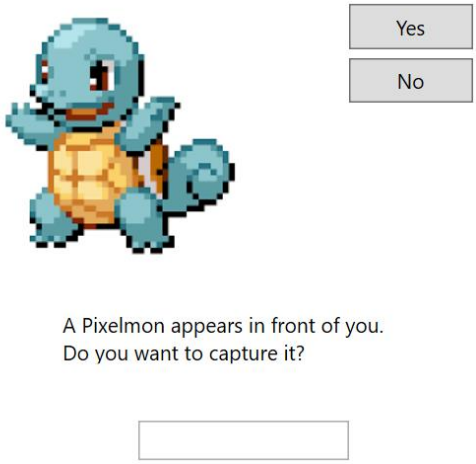
1	0	1	1

Grass	Tree	Grass	Grass

View: Based on the model, the view can be implemented by the presenter, we only need to find each texture's picture and draw it on the canvas.

Presenter: the presenter may contain four direction to go: upwards, downwards, leftwards and rightwards. Each direction is presented by one button and the related keys on the keyboard are bind in case using a keyboard.

2.2 Capture Window

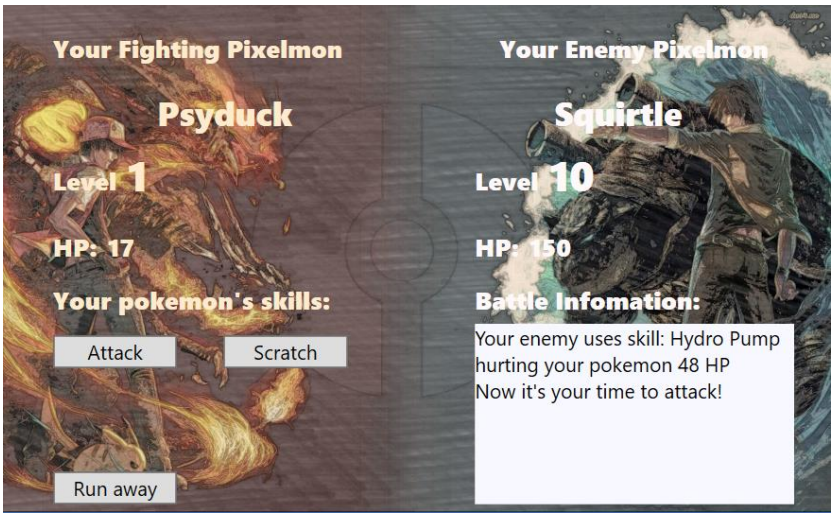


Model: Trainer class for adding newly captured pokemons and refreshing the pokemon list; Pokemon class for defining the properties of the captured pokemon.

View: A canvas showing the picture of the pokemon; two buttons with one ***Yes*** and one ***No*** for players to decide whether to capture; two textblocks showing information about typing game; a textbox to input for the typing game; a messagebox telling the result of this capture.

Presenter: mainly for controlling of typing game which asks players to finish typing the name of this pokemon within a certain time, and updating the pokemon list of the Trainer class for players to add the captured pokemon if they succeed in typing. Details of presenter will be introduced in ***Realization of Requirements*** part.

2.3 Gym-Battle Window

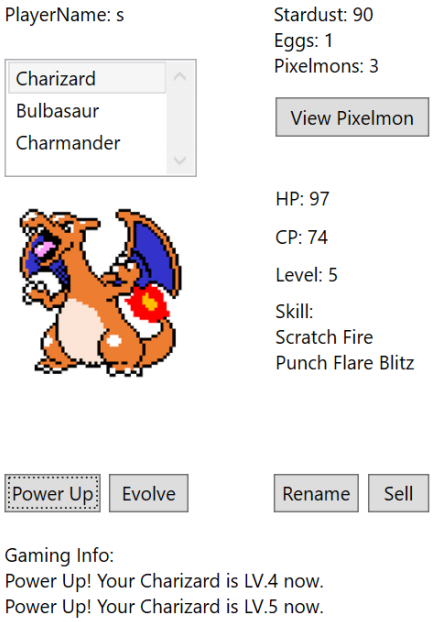


Model: Trainer class for updating the awards about the eggs and stardusts which can be used to power up and evolve pokemons; Pokemon class for providing the information of name, skills, HP and CP about the selected pokemon joining the battle.

View: providing a new battle window with a battle background and a battle platform where the player can choose different methods of attacking of the pokemon to attack or give up the battle and run away; a textblock being used to display the information of each round battle; a messagebox being used to show the result of the battle; a ***run_away*** button to allow the player leaving the battle in his/her round to attack when their fighting pokemon is still alive; one ***attack*** button to choose the normal attacking and four ***skill*** buttons to choose different, up to four special skills attacking.

Presenter: mainly for controlling the battle and controlling updating the award information in Trainer class if the player wins the battle. Details of presenter will be introduced in ***Realization of Requirements*** part.

2.4 Manage Pokemon/Collection

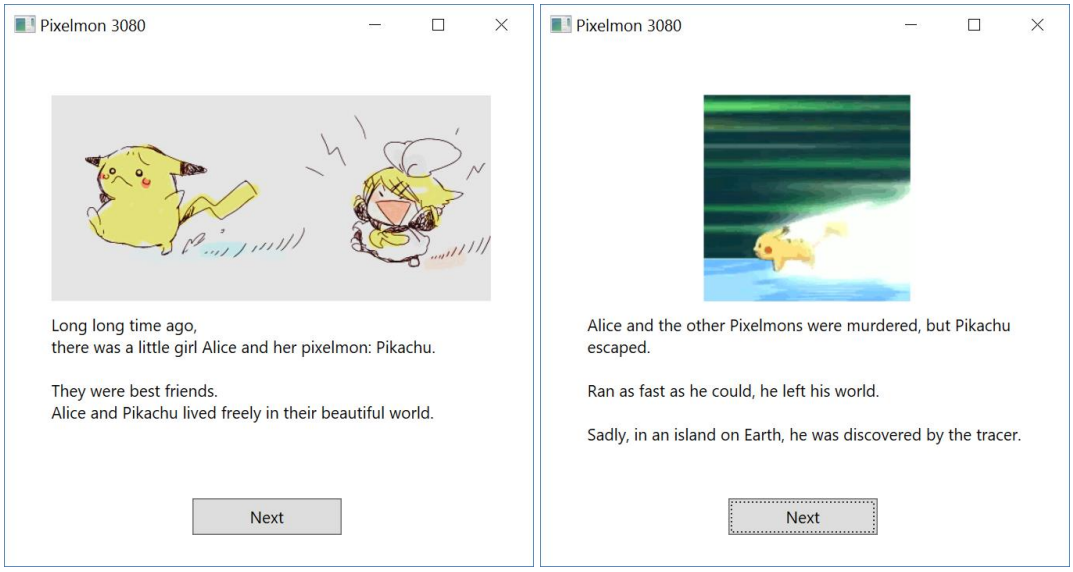


Model: The model is simply based on Trainer class and Pokemon class. The trainer class takes responsibility of the ***Name***, ***Stardust***, and ***Eggs***. While the Pokemon class takes responsibility of HP, CP, Skill or Level.

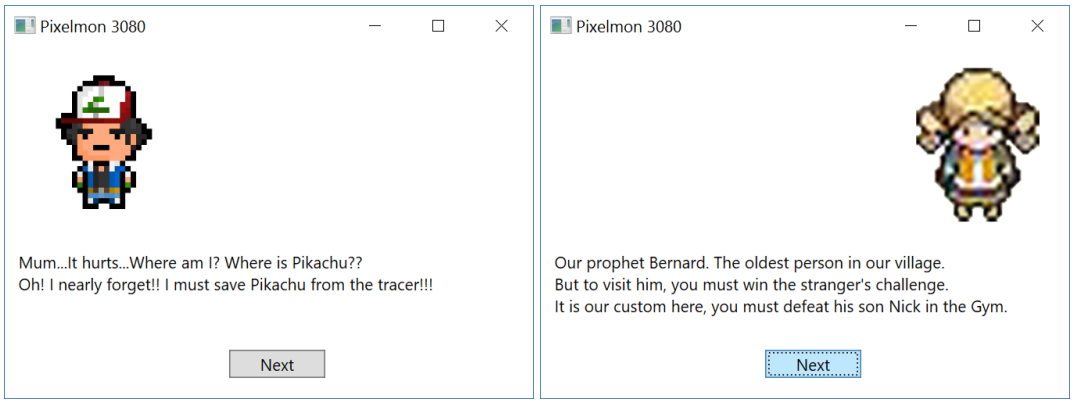
View: The view is decided by the presenter. After choosing a pixelmon and click ***View Pixelmon***, a picture of the pixelmon will be presented. Plus, after ***Evolve***, the view of the pixelmon changes too.

Presenter: The presenter is composited of a list box and several buttons. The buttons take responsibility of ***Evolve***, ***Sell***, ***Power Up, Rename***, and ***View Pixelmon***. And the list box is used to choose a pixelmon.

2.5 Story (Bonus Feature)

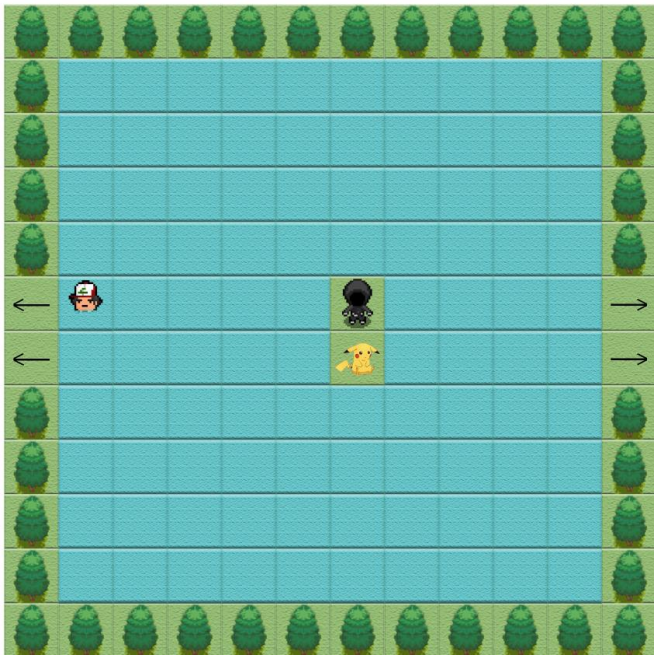


Introduction: Use Gif as Animation



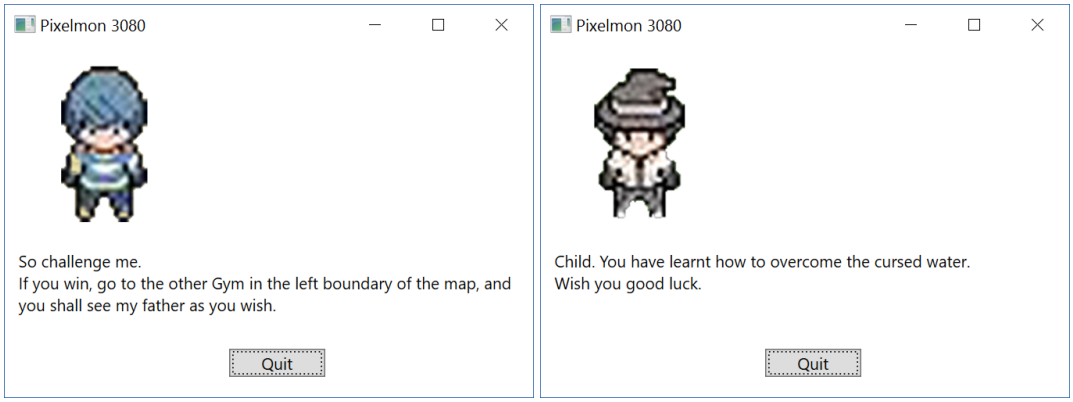
Dialogue with NPC and Tasks (Save Pikachu)

Model: The main model of storyline is several tasks. Firstly, the player's final goal is to save ***Pikachu*** form the ***Bad Guy*** (as figure followed). But the island where the ***Bad Guy*** traps ***Pikachu*** is surrounded by some dark magic, where our character cannot enter (in our design, cannot enter means the ***final battle*** between the ***Bad Guy*** and our character won't triggered unless all the previous Tasks has been accomplished). He must find the prophet ***Bernard*** to teach him how to break the dark magic.



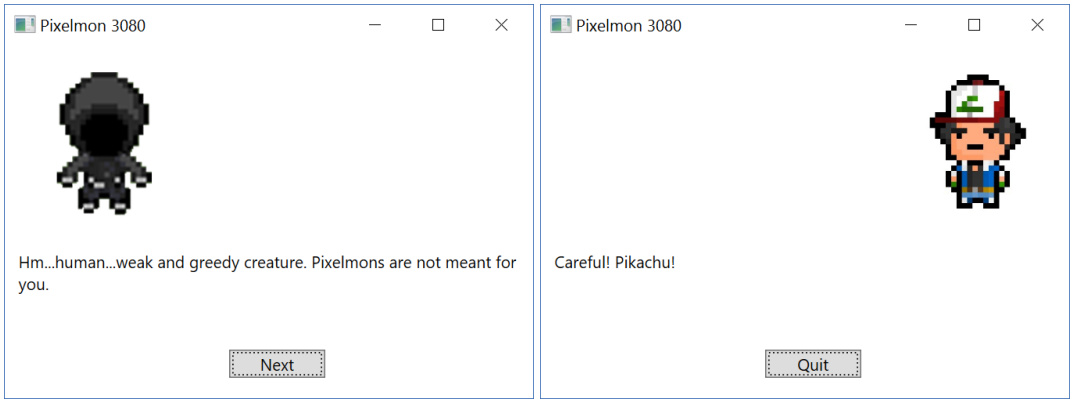
The Island Where the Bad Guy Traps Pikachu

However, the way is not always smooth, ***Bernard*** is not a guy which is easy to see. Our player must finish the ***Stranger's Challenge***, which is one old custom in the village, after defending Bernard's son ***Nick*** and the Guard, he can see ***Bernard***.



Nick and the prophet Bernard

Bernard breaks the dark magic surrounding the island, now is the ***final battle***.



Final Battle Between Bad Guy and Our Player

The **View** and **Presenter** is quite simple in **StoryLine**, so we will omit the detail.

3. Realization of Requirements

3.1 Navigation

We have several data fields for realization like ***BitmapList*** to store the bitmaps, the ***ImageList*** to store the image, the ***PokemonNameList*** to store the name of pixelmons. When deal with the map, we keep records of the X and Y coordinates where our player is, we use ***NumberMatirxList*** to store the data of map, and use ***ImageMatrixList*** to store the images in map. In our current version, the total number of map is three. We use an integer ***CurrentMap*** to tell which map our player is at.

Multiple Maps with Vairous Terrians

3.2 Capture

We select six grass boxes randomly located in our map to be the capture box where players have a chance to catch new pokemons. Players will not know exactly where the capture boxes are because these boxes are invisible to players so that they need to be explored by players. Once the player moves to one of these special boxes, which means that the player encounters a pokemon, the capture window will be triggered and ask the player whether he/she wants to capture this pokemon. If the player click button ***No***, the ***NoButton_Click*** handler will be triggered, the window will be closed and this pokemon will still remain in the map. If the player click button ***Yes***, the ***YesButton_Click*** handler will be triggered and a typing game will be

shown at the bottom of the capture window that the typing content is the name of this pokemon. A tick method used here to count down the timer. A ***typingbox_TextChanged*** handler is used here to check the correctness of user's input, which will be triggered every time the text is changed. If the player finishes typing before the timer is up, he/she will catch this pokemon with extra awards and his/her pokemon list will be updated. Here we do not allow the player owning two pokemons with the same name so that the player needs to pay attention to this point and avoid the condition that not being able to catch new pokemons. We randomly choose capture boxes in the map by generating random numbers through each step the player moves so that any pokemon not being captured from a capture will remain in the map with another random-location box waiting for next capture.

3.3 Gym-Battle

We set two kinds of gym and three levels bosses in the whole map for the need by our story. The first kind of gym has two gyms either with an evolved pokemon as boss, and the second kind of gym also has two gyms either with a double-evolved pokemon as boss. All the property information of each pokemon garrisoning the gym will be input from outside. Every time the player wins the gym battle, he/she will get awards which can be used to power up or evolve their pokemons. The higher level the boss is, the more awards will be given. The result of the gym battle will affect the showing of dialogue and may affect the pushing of storyline. According to the storyline, we expect the player to challenge these gyms from easy one to hard one. However, it is ok for the player not to obey the storyline and to choose to challenge gyms randomly and under this condition there will be no any clues being given for pushing the storyline no matter the player wins or losses. The last boss is the hardest one to beat with a much higher HP and much more powerful attacking than previous pokemons, which is also the end of this adventure. The battle is set as round-to-round, and during the computer pokemon attacking, the player cannot do any modification. A ***timer*** is used to count the round turning. Four ***skill_Click*** handlers control the use of up to four kinds of skill, and each button will disappear after being clicked so that every skill can only be used once. Compared to this, the ***normalattack_click*** handler controlling the normal attack can be triggered infinite times by clicking the ***run away*** button. All the battle information will be post out at the textblcok after every round battle. The judgment of the result will be triggered by every button click. If the player wins, a ***playerwin*** method will be called to show a messagebox and give the player awards; else a playerloss method will also be called to show a messagebox. And the most important thing is gyms will not disappear after battles, which means that players can train their pokemons all the time by winning the gym battle.

4. Text Mode Specification

In the design of our textmode Textmon, we reuse several classes from Pixelmon, like class ***Pokemon*** and class ***Trainer***, because the ***Model*** of Textmon also need those basic classes.

You have successfully add Bulbasaur. W: Move West E. Move East N. Move North S. Move South V. View Your Textmon	1. Bulbasaur CP 74 Q. Quit	Bulbasaur: E. Evolve P. PowerUP S. Sell Q. Quit

Hierarchy of Menu

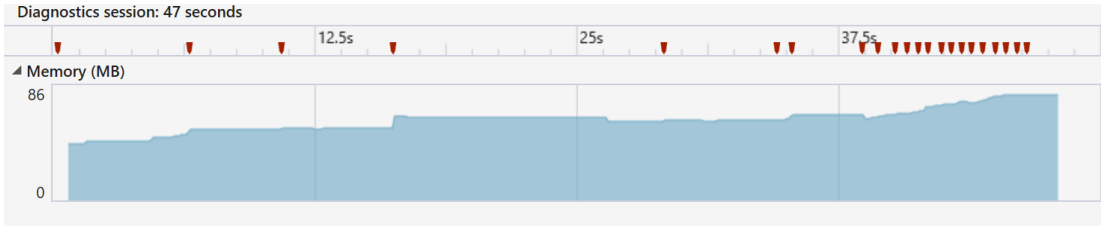
In textmode, we have ***Hierarchy of Menu***, which means in different state, different function is offered by the meau. Here we have integer state, to keep track of the current heirarchy.

Moreover, in the Textmon, because many detailed features in ***GymBattle*** and ***Capture***, including ***Navigation*** closely rely on graphical UI, those features has been simplified in our textmode. Only the essence has been kept.

5. Difficulty Overcoming

(1) Memory Management:

In our initial built of Navigation, each time the player moves, we use a new ***Image*** to cover the old one, in that way to simulate to movement of our character in memory. However, covering the old one means add a new ***Children*** to ***Canvas***, without deleting the old one. If we move our player rapidly on the map, the usage of Memory will go up.

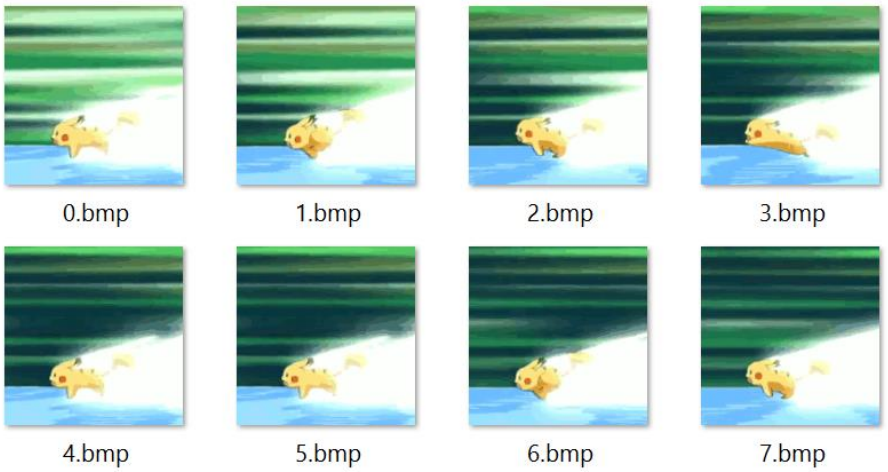


The Memory Goes Up When Rapid Move

To solve the problem, we create ***ImageMatirxList*** to store all the image shown in the canvas, when the player moves, we first traverse and delete the old image, then adding the new image as a new ***Children*** of the ***Canvas***. In that way, we will always have a relative small number of ***Children*** in ***Canvas***, which reduce the required memory.

(2) Animation Simulation

In the ***StoryLine***, we first want to adopt some encapsulated method for our animation. However, we find that the ***Image*** in the ***ToolBox*** only support GIF with ***absolute address*** but not ***relative address***. In that case, we separate the GIF into frames, then display each frame respectively.



Individual Frames of GIF

(3) Passing Parameters Between Windows

At first, we initiate a new window and use ***Show()*** to display the window. However, we find that between several windows, we may need to pass some parameters like ***PlayerName*** and ***PokemonName.*** And we cannot always hold window open. As a solution, we use ***ShowDialogue()*** instead of ***Show()***, which allow us to pass parameters between windows.

(4) Global Class

During designing these two parts, the most difficult thing I have met is the global sharing data. In the game, we need to share the same player's information stored in Trainer class including the information about pokemons the player own and the ***eggs*** and ***stardusts*** the player own. At first I try to use the singleton but it seems not work because I still have to create new instance in different windows and the use of singleton just bans me from doing that. After that I try to use the navigation service to transfer the whole instance of the Trainer class and still failed. Then I decide to change the Trainer class into a static class and put it into the global class and when every time I need it, I just call it using ***GlobalClass***. Finally, we use ***Navigation*** window as the central window transferring every filed and data we need from the custom constructor of different windows when it does navigation instead to solve this.

6. Work Contribution

LIU YICUN	**Coding: Navigation, StoryLine and Management** **Class Structure Designing** **Report Writing**
QI DI	**Coding: Capture and GymBattle** **Report Writing** **Testing**