DEATH at Datasal, a crime investigation

DATASAL Final Paper Written Document

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Abstract— **This document will give an overview of the subject that discusses the concepts, and lessons that will be of use when creating an application as a project requirement for Data Structures. The objective is to be able to design and develop an app using Netbeans together with Java. The group members have decided to create a mystery-crime-themed story game with a twist, instead of just being a typical crime game, the group integrated DATASAL related questions. The members have created a user-friendly application that will bring addiction to the world of app users.**

Keywords—data structure; algorithm; functions;

I. Introduction

In today's modern age, technology is considered a blessing to humanity. It has evolved throughout years and it keeps on doing so. From medical technology to machineries, industries, and to many more engineering fields, the benefits of technology is very much evident. Data Structures play a big part in the success of modern technology. By integrating programs with Data Structures, students will be able to see the different real life applications of such structures like lists and graphs. Aside from being used for different purposes in a computer or electronic device, many of the concepts of Data Structures can be seen in our daily lives; lining up to buy food and going by the First In, First Out order, for example, shows how the Data Structure Queue is also realized in the real world. This project aims to further emphasize this point by building a program wherein a real life situation or problem can be solved through the use of functions and data structures. The user will be able to interact with the characters in the story, putting the pieces of clues together to achieve the game's objective of solving a case.

Not only is this project relevant to the lessons the students have learned in class and their degree program, it also highlights certain ***societal issues the Philippines*** faces today. There is, firstly, the gross number of crimes being committed in the country on an almost daily basis. In addition to that, there is the issue of ***extrajudicial killings*** lately due to the ***war on drugs*** declared by the President. Many of the statements given by the police and witnesses are contradicting, thus most of the cases go unsolved and justice is never really served to the victims and their families. This topic is

briefly touched in the game made, as it presents a possible way for authorities to know the truth. It also brings light to a sensitive topic that not many people are brave enough to cover.

II.   Concepts

A. List ADT - An abstract data type which denotes a finite number of ordered values. A dynamic ordered tuple of homogeneous elements.

B. Stack ADT - This ADT is a subclass of Vector. It implements a standard last-in, first-out stack. Stack includes all the methods defined by Vector, and adds several of its own.

C. Queue ADT - This ADT is a subtype of java.util.Collection interface. It's basically a list (ordered) of objects and is considered very limited also, it follows FIFO principle. Since it is an interface, It needs a class during its declaration. Some examples are linked list and stack.

D. Graph ADT - A graph is an abstract data type that is meant to implement the undirected graph and directed graph concepts from mathematics, specifically the field of graph theory. There are two well-known implementations of a graph, the adjacency matrix and the adjacency list.

E. Shortest Path and Dijkstra Algorithm

Dijkstra's algorithm, like Prim's MST, we generate aSPT (shortest path tree) with given source as root. We maintain two sets, one set contains vertices included in shortest path tree, other set includes vertices not yet included in shortest path tree. At every step of the algorithm, we find a vertex which is in the other set (set of not yet included) and has minimum distance from source.

II.   Methodology

In this section, our group will discuss the details of the game including the ADT integration and how they were used in-game.

Location Name: *Main Road (1st Street)*

Purpose: *This is the very first location of our game. This is where the story starts. You play as a detective tasked to solve the murder of Melvin K. Bridges, the former mayor of DATASAL town.*
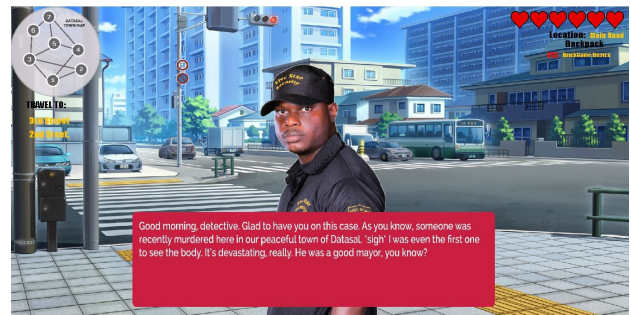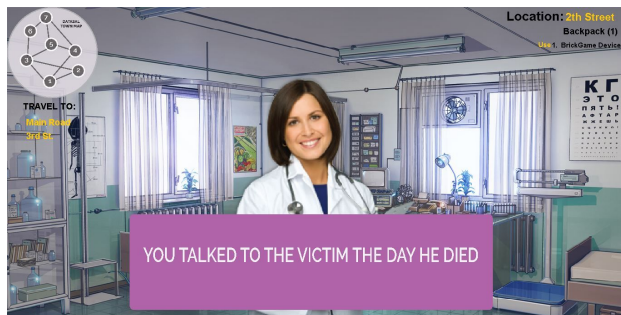

Location Name: *Hospital (2nd Street)*

Purpose: *This is where Dr. Gilligans hangs out. She is considered a suspect because she interacted with the victim the day he died and was said to be in a special relationship with him.*

Evidence Gathered: *In this place, you will be able to pick up this bottle. This might prove*

her innocence/guilt.

Location Name: *Bakery (3rd Street)*

Purpose: *This is where Paul Brioche hangs out. He is considered a suspect because he was rumored to have gotten into a big fight with the victim on the day of the crime.*
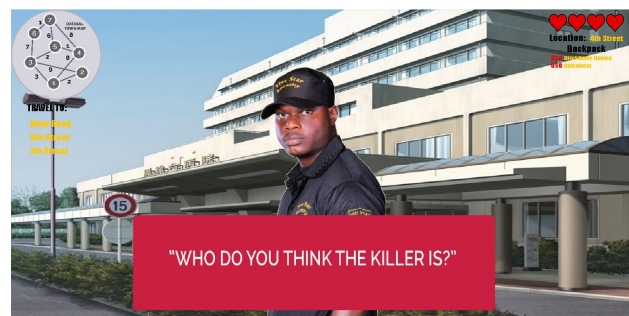
Evidence Gathered: *In this place, a ripped piece of paper will serve as a clue about the two's argument and the mayor's relationship with another suspect.*
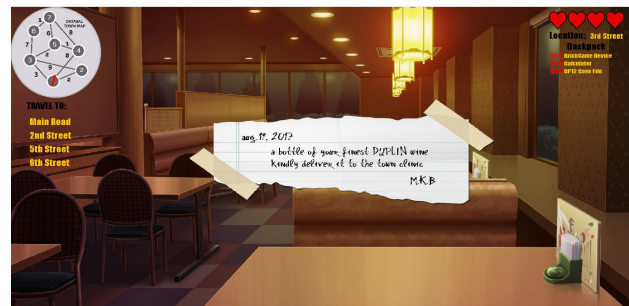
Location Name: *Police Station (4th Street)*

Purpose: *This is where you can talk to Police Officer Thompson and ask his opinions about the town or the suspects.*

Evidence Gathered: *None*

Location Name: *Town Park (5th Street)*

Purpose: *This is where the crime took place a night ago.*

Evidence Gathered: *None.*

Location Name: *Construction Site (6th Street)*

Purpose: *This is where you can find and interrogate Sam Brik. He is considered a suspect because he had filed a complaint against the mayor that day.*

Evidence Gathered: *Here, there will be a clue (hollow block) that could implicate the worker. You will also find out about his possible reason for killing the mayor.*
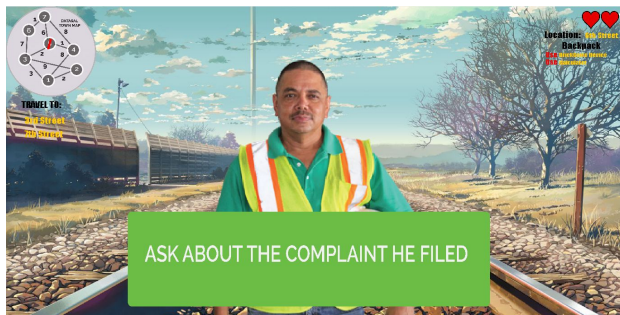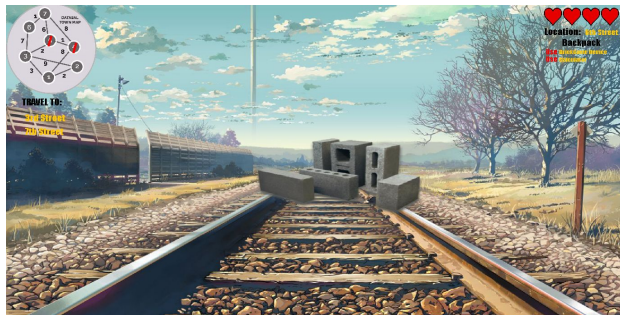
Location Name: *School (7th Street)*

Purpose: *This is where student Lisa Simmons is. She is considered a suspect because she was around crime scene before the body was discovered.*

Evidence Gathered: *Here you will find a poster that might serve as the key to understanding if she had a motive to murder the victim.*
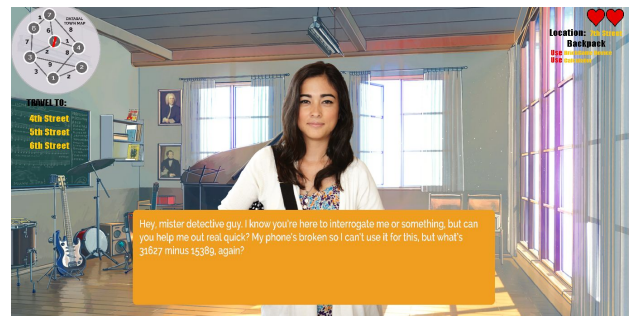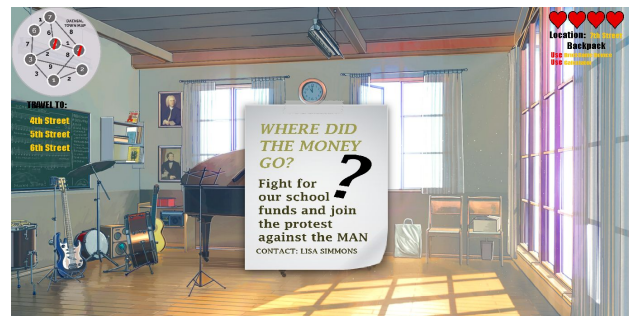
ADT integration in our game

A. List ADT

We created a backpack system for our game using the List ADT. Basically, every time the detective picks up something, it will be automatically stored inside his backpack.
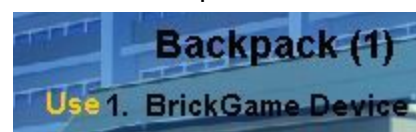
B. Stack ADT

At some point, the detective will be able to pick up a calculator in-game. The calculator was created using the Stack ADT.

C. Queue ADT

We implemented Queue by creating a life system for the detective. The detective will initially have 4 lives at the start of the game and would be able to pick up chocolate bars, each chocolate bar will give him 1 life

. In-game, the detective will go to different locations to look for evidences. For every location, a suspect will ask him a DATASAL question and in exchange, that suspect will agree to an interview. If his answer is wrong, he will lose a life.:


```
public void lives_METHOD() {
    if (LIVES.isEmpty()) {
        LIVES.add("ff");
        LIVES.add("ff");
        LIVES.add("ff");
        LIVES.add("fff");

        println(LIVES.size());
    }
    if (locationLabel_TRUE == 1) {
        for (int i = 1; i < LIVES.size() + 1;
i++) {
            GImage lives_LABEL = new
GImage("Lives.png");

            lives_LABEL.setSize(40, 40);
            lives_LABEL.setLocation(1357 -
(42*i), 10);

            add(lives_LABEL);
        }

        if (lives_TRUE == 1) {
            LIVES.add("ff");
            lives_TRUE = 0;
        }

        if (lives_TRUE == 2) {

            if (LIVES.size() != 1) {
                LIVES.deque();
            } else {
                gameOver_METHOD();
            }

            lives_TRUE = 0;

        }

    }
}
```
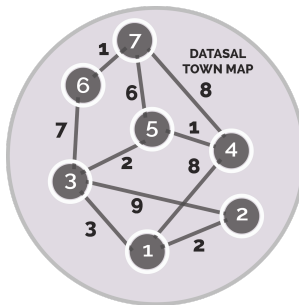
D. Graph ADT

We created a map system for our game using the Graph ADT. This weighted (weight will be revealed in-game) undirected map will be the key in solving the case.
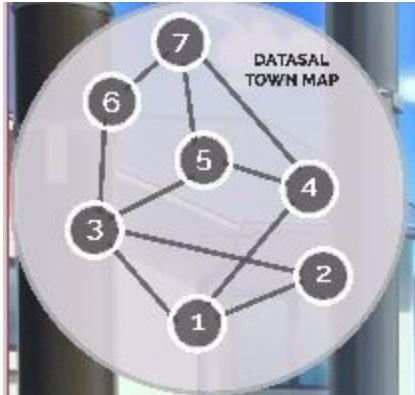
E. Dijkstra's Algorithm & Shortest Path

Dijkstra's Algorithm in finding the shortest path will be the method used by the detective in solving the case.

III.   Acknowledgement

Danielle Espiritu and Tammara Capa would like to thank each other for their cooperation in making the project. Both members contributed to not only the coding aspect of the game, but also the graphics and storyline used. Without one to help the other, DEATH at Datasal wouldn't have come into fruition.

The creators would also like to thank their professor, Dr. Melvin Kong Cabatuan, for sharing his knowledge of Java Programming to his students. They couldn't have done it without his help in making them understand Data Structures better.

IV. References

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