Directed Graphs in the Storyline with Multiple Endings

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Abstract—**Nowadays, storyline, mostly in fiction, is not like it is used to be. We used the terms conflicts, climax, and resolutions for the narration of a story. Then, from these terms we can define whether the plot is forward, backward, or the combination of both plot. But now, fiction is often modified. One of the modifications is giving the story many endings. A story with multiple endings, or sometimes mentioned as alternate endings, lets the reader decide how the story goes. It is more communicative and more attractive for its reader. Furthermore, an RPG (Role Playing Game) with alternate endings can leave the player wants to play for other endings after completing the game with a certain end.**

Index Terms—**Multiple Endings, graphs , plot, RPG.**

I. INTRODUCTION

Graph theory has been found in 1763 by the time a paper of Leonhard Euler, *The Seven Bridges of Königsberg* is released. Graphs are among the most ubiquitous models of both natural and human-made structures. Graph is then developed into a structure that called a "tree", a connected and undirected graph that has no circuit in it.

| Tree | Tree | Graph | Graph |
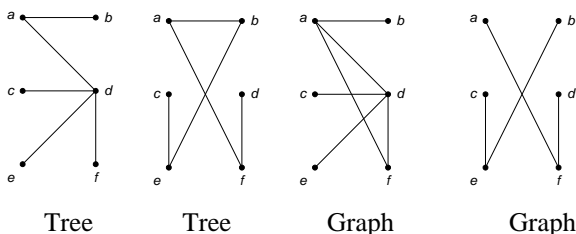
Figure 1.1 Comparison between graph and tree

Graphs and trees can be used to model many types of relations and process dynamics in physical, biological and social systems. In the world of literature, one of graphs applications is to make an image of a storyline. But remember, they are directed graphs, not trees (because of the definition of tree explained in the previous paragraph). It used the terms conflict, climax, and resolution. These terms then determine the how the story goes. There are 3 types of storylines. If the conflict comes first then the story is defined as "forward". If the resolution comes first, then the story is defined as

"backward". Otherwise, the story is defined as the combination of both types.
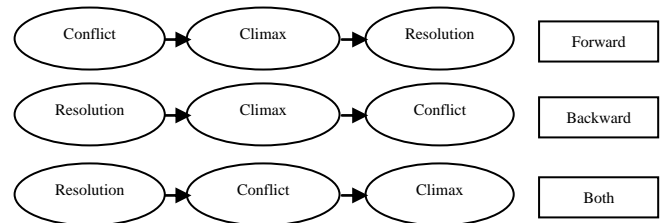
Figure 1.2 Comparison between the types of storyline

Although the storylines are so common, most people often use the forward. But then people started to think "What if he doesn't choose to do that?", "Why did she said that?", "How about the other guy that choose the other way?" Some people are not satisfied about how the story flows. Some others are demanding another ending, a more perfect ending. This thought makes a few writer makes a difference in how the story flows at the end of the 20th century. It brought us to the era where a story has multiple endings and its storyline graph is more complex than it's used to be.
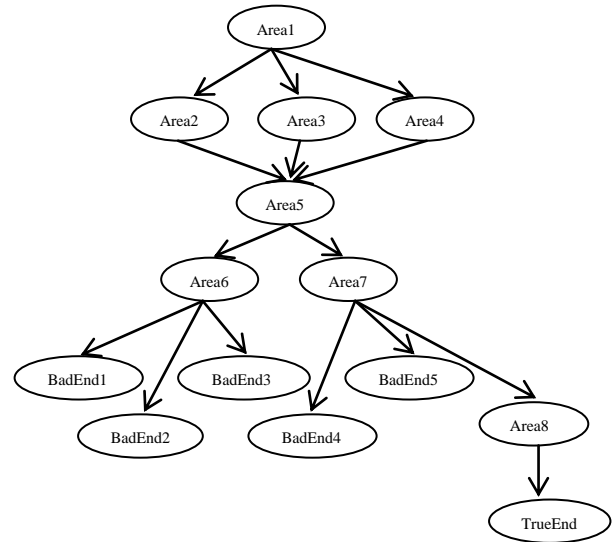
II. VISUAL NOVEL

At 1983, a game named "Portopia Serial Murder Case" sets a new experience of a story. It lets the reader, or should I say the player, to choose what to do to the story. For a case, it can choose whether the player wants to move, investigate, look for someone or other options. This kind of game is called "visual novel".

Figure 2.1 Branch of choices in Portopia Serial Murder Case

A visual novel does not always have multiple endings. For example, the game "Portopia Serial Murder Case" only has branching narratives but it has only one ending.


Figure 2.2 Choices of doors in 999

An example of a visual novel that has multiple endings is a game named "999: 9 Hours, 9Persons, 9 Doors". This game offers many choices of doors to be opened and to solved the puzzle and free the characters from the game called "Nonary Games". First, we have to choose between 3 doors, and then choose 2 more doors, after the branches the player is asked for a choice between 3 doors and the final door is just a door. Although there are multiple choices of doors, sometimes the doors lead to the same area. The choices make the story has 6 endings, 5 considered as "bad" ends and 1 considered as "true" end. In this visual novel, every time the player reaches an end, it will end the game and the player can restart from the very beginning (if only the player wants).

Think of it like the graph in the figure 1.2. We will find that the graph for this game has several doors as its branches and areas as its nodes.

Figure 2.3 Graph for the visual novel

III. GAME BOOKS

The second type of story which use graphs as its storyline is Game books. Called so because it is a book that the story depends on what page that the reader read next. On 1995, R.L. Stine begins his work for game books titled Goosebumps.
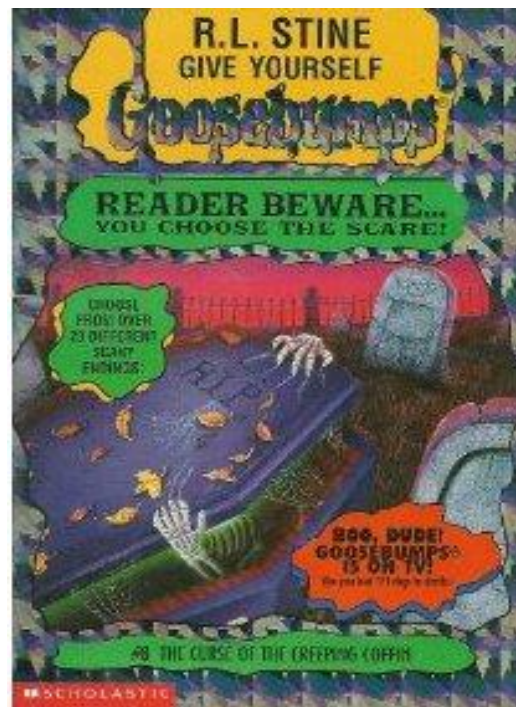

Figure 3.1 Goosebumps' Cover

For the most part, play is rather simple, as the books are merely novels with branching plots. The books are written in the second person and enlivened by puzzles or choices. Rather than being simply from beginning to end, the reader is told to turn to a certain page at the bottom of the current page, at certain pages the reader will be given at least two choices of which page to turn to, depending on what they want the main character (one's self) to do. If readers make poor choices, the book may come to a "bad" ending that will feature a horrid fate for the main character but the readers are always able to go back and choose a new choice. There is also at least one page in each book that uses an alternative method to selecting each choice, and is done more by chance rather than the reader's decision. These include; "Tossing a Coin" (where "Heads" represents one page and "Tails" another) "Rolling a Die" ("Odd" and "Even" sides having their own pages), or the reader trying a challenge in real life (and turning to a different page depending on whether they were successful or not).

Because of the choices and page connections, there are many ways the story can end. The ways vary depending on which book is being read, but largely the endings involve the reader's character dying, being permanently turned into something other than human, getting trapped somewhere inescapable (implying that one will die eventually), being put in a state of immobility such as becoming a statue, or - if the correct choices are met, surviving the story. The ending pages are the only ones which don't have any choices, and simply have the words "The End" where the choices would usually be. Occasionally it will just say "End" because it is supposed to be part of the final sentence, or it will say something else appropriate.

Goosebumps is only one of the game books that let people choose how the story will end. We can now make
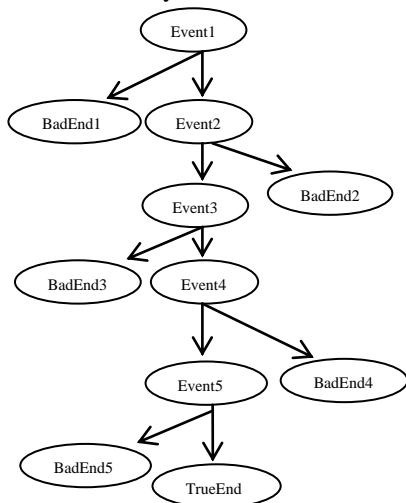
**Figure 3.2 Graph for the game books**

the graph that relates to the plotline in the game books

which is actually different from the one we have discussed in the visual novel. As the storyline leads to, mostly, one true ending, we can define the graph that its edges are the reader's choices at the branches of "next page" and the nodes are the events in the story.

IV. ROLE-PLAYING GAMES

The last type that we will discuss here is the role-playing games (usually people call it RPG's). RPG has been introduced since the early age of 16th century, but its development of modern version begins on 1980's with a game titled "Dungeons and Dragons".

Unlike any other RPG's, that has the linear storyline and a certain ending, the RPG we will discuss here is the RPG with multiple endings in it. One of such RPG's is called Devil Survivor. The game is about a boy who has to choose what the fate of his world is. As the story advance, the boy then choose who to talk, who to follow, and where to go. Numerous choices made by the player will affect his friends and allies, and there are several endings to the game, which include whether the player's goal is to simply escape the quarantine or to prevent the demon uprising.
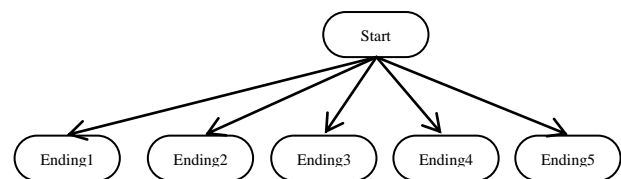
Figure 4.1 Devil Survivor and its graph

For every ending the player reach, the player can then do it over from the very beginning to play for another ending.

The other RPG that has a unique graph of its storyline is Radiant Historia. The game gives a unique take on the concept of non-linear branching storylines, which it combines with the concepts of time travel and parallel universes. Radiant Historia takes it much further by giving players the freedom to travel backwards and forwards through a timeline to alter the course of history, with each of their choices and actions having a major impact on the timeline. The player can return to certain points in history and live through certain events again to make different choices and see different possible outcomes on the timeline.

The player will be using the ability to travel through time and space throughout the game. The player will be changing the past to create a "true" future, and the game has the player travel through time and space as the player switches between parallel worlds. The game has many possible parallel endings.
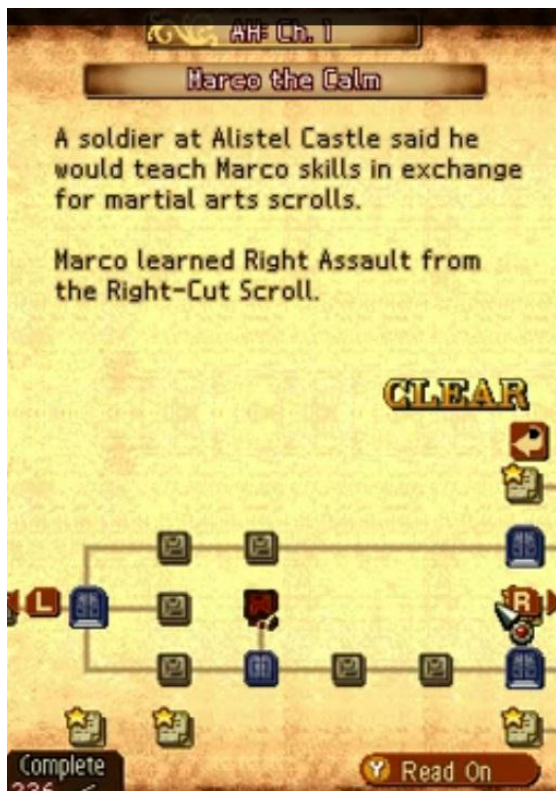

Figure 4.2 Radiant Historia graph

In this game, the plotline splits into 2, the Alternate History and the Standard History. This game lets the player to move from the 2 timeline of history whenever he/she likes. The White Chronicle, figure 4.2, in the game represents its graph of the storyline.

Some RPGs has alternate endings. It means there is a better ending if only the player accomplishes some of the challenges. Radiant Historia is the example of such RPG. If the player accomplishes all events in the game, the player will knew a new fact in the ending. Different game has different achievements for its alternate endings.

V. GENERAL OVERVIEW

After we discuss about the types of graph in storyline, we can make a general overview from what we have learned.

Aspects	Visual Novels	Game Books	RPGs
Bad End	Yes	Yes	No
Number of branches in a node	uncertain	2	Uncertain
Alternate Ending	No	No	Yes
Planar Graph	Yes	Yes	Yes

Although there are still a lot of people like reading regular novels, story with multiple endings still attract better. With the variation of the endings, people will want to know the result of other options that they have. That just hoe life goes. It has many choices, unlimited probability, and full of surprise.

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