

GameStory: An event-based Approach

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ABSTRACT

In this work, the authors propose an event-based approach to generate summary of an e-sport match which satisfies certain criteria nominated by GameStory: The 2018 Video Game Analytics Challenge. The authors' solution aims to recite the match while emphasizing the highlights of the game to keep the enthusiasm of viewers. Our remedy analyses only player's behaviour information logged from each match of the game to select important attributes as standard criteria for summary construction. From our perspective, the highlights of CS:GO game recorded in the summary should include killing scenes with headshot or penetrated, bomb planting, and bomb defusing attempts.

1 INTRODUCTION

Video game analytics is a new research area which serves the need of watching streaming e-sport games in a short time while capturing the essential content of these videos. Besides, analyzing video game also provides basic understanding of the gaming market including: what kind of games that the majority of viewers are interested in, what event in the game makes the spectators excited, which part of the streaming video that viewers pay attention to most of the times, etc. However, video game summarization is a challenging task as not only should the summary recite the full story of a long game in a short time (downscale from hours to minutes) but it should also make the spectators exciting with highlights emphasis, comments and sound.

In GameStory: The 2018 Video Game Analytics Challenge, we are provided 11 CS:GO games which include game logs, game statistics, map overview, videos of player perspective, and commentator stream [1]. With these data, we propose a simple event-based solution to summarize CS:GO game with prominent events pre-defined from our perspective. We analyse the game logs and select the attributes that we consider as noticeable events in CS:GO game which involves killing events with headshot or penetrated scenes, bomb planting and defusing actions. The idea of our proposed remedy originates from a simple observation from CS:GO game which is the more actions the players of both teams perform, the more thrilling the match is. From this idea, we statisticize, vectorize those attributes from game logs to create hand-crafted feature, and then multiplied them with our pre-defined weights to compute the score. Finally, we sorted the list according to the score and combine remarkable events from that ranked list to generate game summary. Although comments for game events could be attached to make the summary more exciting, we do not utilize commentators' voice or text due to the fact that the information shown in each player's perspective videos is enough to provide viewers with the process

of game content and any other attached voices might overwhelm the original game sound.

2 APPROACH

With the prior purpose of reciting appealing moments of the entire match, the authors come up with an approach which is dividing the game-play into several sequences and ranking them based on its excitement. Each extracted sequence is corresponding to a game-play event as recorded in the timelines' structured data and belongs to one of ten categories: *assist*, *bomb_defuse*, *bomb_defuse_begin*, *bomb_plant*, *kill*, *purchase*, *round_end*, *round_start*, *suicide*, and *throw*.

According to the references on game summarization, we observe that the *kill* events and match progress are the cornerstone of the game story and of the most appealing moments across the whole matches. Therefore, the authors focus on evaluating those sequences to obtain the final weight in order to craft the demanding synopsis through the sorted rank-list.

2.1 Pre-processing

There are various factors which could affect the entertainment of the game story. The pre-processing focuses on analyzing the extracted sequences under different criteria independently, and giving a corresponding score for each criterion.

2.1.1 Headshot. Obviously, this is one of the most important factors that defines a good kill in almost any shooting games. Moreover, the weapon which executes the kill also contributes to the amazement of the story. For instance, a head-shot caused by pistol or sniper rifle is more appealing than the one caused by assault rifle. Therefore, we apply a score for each weapon in order to classify the kill and its excitement. The formula of the Headshot score would be: $weapon_score^{headshot}$.

2.1.2 Penetrating kills. Sudden death also entertains audiences by its surprise. Penetrating kill is one cause of such deaths, which is happened when the bullets of a player going through non-solid objects and hitting his enemy.

2.1.3 Consecutive kills and Multiple kills. Another factor of an intriguing match is the continuous kills of a player. The same is true for the one that has a lot of kills in a single round. Therefore, we also take these two factors into account in generating the summary video.

2.1.4 Round Bonus. It is also important to look at a general manner which is how the game events linked with each other to form an interesting story. From our observation, a round becomes thrilling when a bomb is set by terrorists and two teams start to struggle to protect/defuse the bomb. Additionally, when it comes to the decision round, the round itself is also extremely attractive. These explained why we construct a round bonus for each sequence

Table 1: Evaluation of HCMUS summary of CS:GO in GameStory: 2018 Video Game Analytics Challenge

	HCMUS_Run1
The submission gives a summary of the match at hand	3.00
The submission is entertaining	3.00
The submission provides the flow and peak of a good story	3.67
The submission provided an innovative way to present a summary of an CS:GO match	3.67
A summary like this submission can be applied to games different from CS:GO	2.67

so that we can emphasize the special rounds in the final result, and we calculate the bonus based on the *bomb_plant*, *bomb_defuse*, *bomb_defuse_begin* events.

2.2 Game Story Generation

As our approach aims to tell the story by unifying game events, it is necessary to obtain the top exciting sequences corresponding to each event. The authors define a weight for each sequence which is calculated by the linear combination of the examining criteria as explained in 2.1 with sufficient coefficient to create a rank-list. The higher score the sequence obtains, the more thrilling it is.

Based on the provided meta-data, we are able to split the players' stream videos into smaller parts with duration of 3 seconds in length. Each part is corresponding to a sequence in the game-logs. With simple iteration through the rank-list, the authors are able to filter the top interesting sequences with adequate total length in duration. After that, we generate game summarization by combining these sequences in the ascending order of event's happening time in order to preserve the flow of the story.

3 RESULTS AND ANALYSIS

Table 1 displays the result of our approach with the evaluation from three different reviewers. According to tabel 1, we maintain entertainment of the game story at the average level of 3.00. This means that decision to focus on the *kill* and bomb involved events is appropriate. However, we think that we could modify our step by joining the small sequences into a summary video such as smoothing the transition among sequences, putting texts as well as player information, reporting the round status, and adding slow motion on particular kills. By doing so, the authors hope to obtain better score on story flow and peak compared to the 3.67 on our Run1 submission.

With the event-based approach in summarizing game story, the authors achieve the goal of keeping the process simple while reciting the main events of the matches. The approach is dynamic as we could choose what story to tell actively just by modifying the coefficients in the linear combination of the examining criteria. This enables the capacity of our approach to be applied in other games and results in the score 2.67 in the cross-domain criteria on our submission.

4 CONCLUSION

We present our proposed event-based solution to generate a summary of CS:GO game streaming in GameStory: Video Game Analytics Challenge based on event ranking. Our remedy is a simple and promising approach to apply not only in CS:GO game but also in other game domains if game logs is detailed enough to create hand-crafted features while creating competitive results of prominent scenes.

REFERENCES

- [1] Mathias Lux, Michael Riegler, Duc-Tien Dang-Nguyen, Marcus Larson, Martin Potthast, and Pål Halvorsen. 2018. GameStory Task at MediaEval 2018. In *Working Notes Proceedings of the MediaEval 2018 Workshop*.