Procedural Photograph Generation from Actual Gameplay: Snapshot AI in FINAL FANTASY XV

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Figure 1: Photographs generated from gameplay, compared to the old fashioned/ generated photo samples

ABSTRACT

In FINAL FANTASY XV, a triple-A open world RPG, we have proposed a new method of smart gameplay sharing by introducing a novel mechanism of automatic gameplay photograph generation. Unlike the classic screenshots that most players are familiar with, the photographs generated are depicted as though they were seen from the perspective of the in-game AI companion "Prompto". This system enhances the photos with several features such as shot facing, facial-body motion exaggeration, auto triggering, auto framing, auto focusing, auto post-filtering and auto album management. The system is capable of generating photographs that are stylish and unique, yet represent your gameplay in a new way no other games have accomplished before. With an in-game social network posting interface, generated photos can be easily shared. As a result, since the release of the game, our photos are flooding Facebook and Twitter, while creating a new benchmark to the world in the field of smart gameplay sharing.

CCS CONCEPTS

• **Computing methodologies → Computer graphics**; **Graphics systems and interfaces**; • **Applied computing → Computer games**;

KEYWORDS

Game, FINAL FANTASY, Snapshot, AI, Photograph generation

1 THE DESIGN REQUIREMENTS

- Must be able to express the player's gameplay
- Must be fun and unique to encourage social activity
- Must enhance the brotherhood road trip experience which is the theme of the game.

To answer these requirements, we decided to define several categories of photographs, each with its own purpose and algorithm that decides when, what and how to perform a snapshot.

2 TRIGGERING, THEME SELECTION AND AUTO FRAMING

The flow of the system starts with a triggering AI which decides when to perform the snapshots. The trigger will be divided into types: score triggers, event triggers and random triggers. Score triggering is based on the concept of coincidence; that is, if there are several interesting actors performing a special pose, this will be deemed a valuable shot. In a combat scene, we calculate the scores from each actor and try to maximize the sum while fitting actors within the frame to find the right moment for the picture. This way, the uniqueness of the photograph is ensured through the corresponding player's individual combat style.

In contrary to score triggers that ensure uniqueness, event triggers capture important moments, such as those in cinematics or

real-time events. When no interesting events are being played, random triggers will be used instead. Random triggers provide balance to the distribution of the photographs and enable us to capture large portions of the open world game where players spend their time running or driving. Also, due to the fact that they are triggered when there are no interesting events around, we can perform various reality augmentation techniques and make interesting events out of the photographs ourselves.

After deciding the moment of the photograph, we will perform the theme selection for the photos. There are around 20 themes available in the system ranging from a human portrait-oriented one to a battle-oriented one or even everybody-likes-selfie theme. Each has its own framing and focusing algorithm; e.g. for a human portrait, it avoids cutting actor's head by having the lower edge of the picture at his/her neck. To achieve that, the algorithm calculates the camera position, point of gaze and depth of field, using the actors' skeleton information. To retain believability, we always use Prompto's real position whenever possible.

3 REALITY AUGMENTATION

Figure 2: Left: Game rendered actors and photo rendered actors. Right: The outcome photograph.

To enrich the road trip experience, we decided to implement reality augmentation features that allowed us to adapt the actors' behaviors in the photo world regardless of what actually happens in the game. By separating the actors to be rendered in the real time game from the characters to be rendered in the photograph, we create doppelgangers of our preferred target actors. We position them in the scene at the intended body and facial pose to create an interesting event while keeping the situation of the photograph consistent to the actual gameplay. (Figure 2)

Using this technique, various enrichments can be performed. The most fundamental enhancement is the shot facing feature which allows us to change the doppelgangers' necks and eyes to turn toward the camera while keeping their feet at the same position. Also, adjusting the doppelgangers facial expression is vital; Cheese! It is amazing how the photographs look real and believable by just adjusting the characters eyes and faces (Figure 3).

We can also have the actors interacting with other characters to represent the brotherhood theme of the game. By showing these photographs in which the characters react to one another, they can stir the player's imagination and give these characters an illusion of life. Also we can added some fun elements such as photobombing event into the photograph.
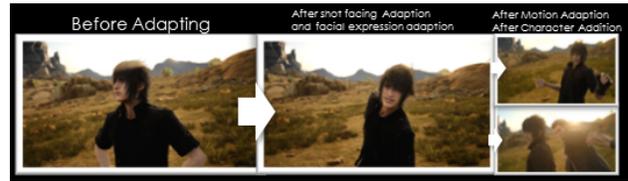
Figure 3: Shot facing adaptation, facial & posing exaggeration.

4 KNOWLEDGE REPRESENTATION AND AUTO POST-FILTERING

Throughout the process of filming, information about the situations where the snapshots have taken place will be stored inside the photo. This information will be used later for features such as auto post-filtering and AI conversation during the picture viewing. For auto post-filtering, we simply used a score based on computing information tags inside the picture and the filters available; e.g. the white bloom post-filter which is better suited for portrait but not for a landscape photo.

5 AUTO ALBUM MANAGEMENT

The taken photographs will be stored until the end of each day in the game at which point the photographer Prompto will show the result of the day's adventure to the player at a camp. Presenting too many photos to the player would slow down the pace of the game so a pass of the auto album management AI will be performed.

To represent the player's gameplay best with a small number (i.e. around 10) of photographs, we proposed a new algorithm based on the calculation of redundancy and uniqueness scores. Redundancy scores are given to the photo that shares the same elements with other photos; it has to be balanced since some redundant elements are less significant than others. Too many pictures with the element "wolf" would be boring but it's not the same for the "hero" or "day" element. Uniqueness score will represent the value of the picture and how much the AI should preserve it. Like the redundancy score, these parameters must be balanced too.

6 RESULTS & CONCLUSION

Despite the limited development time, the system and the photos were a tremendous hit, enjoyed around the world. Photographs taken by Prompto's snapshot AI can be found everywhere around the web especially on social medias. People enjoy sharing these funny moments and will even search and exploit bugs to get the funniest photo to share.

Even a professional photographer shoots silly shots sometimes. Implementing a snapshot AI that shoots perfect pictures all the time is close to impossible; however, there are several improvements that can be done to the system. Among them are landscape oriented shooting, in-frame actor density controls and machine learning. We aim to improve these features even more in our future work.