The worst view for virtual museum presentation

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Abstract

We discuss the possibility of the worst view utilization in virtual environment (especially virtual museum). Our approach uses one of the possible method of finding the best view on virtual 3D objects. We use the junky material from this method to make the visit of the museum more interesting. We outline the possibilities and ways of using the worst view for virtual museums presentation.

Categories and Subject Descriptors (according to ACM CCS): I.3.7 [Computer Graphics]: Three-Dimensional Graphics and Realism—Virtual reality

1. Introduction

In this work we present two different worst view approaches. The first one is based on finding algorithmic best view methods and then we present also a human based approach to find the worst view. Finally, we adduce several possibilities of using the worst view in the virtual museum.

Figure 1: *The best and the worst view of a church model according to Image based best view selection method.*

2. Motivation

Finding the best views (whether automatic or manual) is an important problem in several areas such as: automatic scene exploration, virtual cinematography, medicine, in the rendering algorithms as an improvement (ray-tracing or radiosity). As a ancillary commodity of finding the best view we get the worst view. Most of computer graphics users spill it like junk, or they use it just to compare the result of their recent best view finding method. But what if we use these views to upgrade the visit of virtual environment? We can use them as a starting position for exploring virtual objects or we can use them to entertain people in serious games.

3. Worst view searching methods

3.1. Inverse method

For the best view automatic searching there exist lots of algorithms, based on geometrical information (such as Viewpoint complexity [PB96], Viewpoint potential [NTJ06] ...) or geometry based view selection (Viewpoint entropy [VFSH01] or Perspective frustum entropy [VFSL02]) and Image based best view selection. Each method conveys the list of the views set up from the best one to the worst one.

Searching the best view

In this algorithm [LCM10], entropy of each view is considered at a pixel level [CPN06]. The image intensity levels vary from 0 to $N-1$. We calculate matrix C_t for frame f_t $N \times 1$. $C_t(i)$, with $0 \leq i \leq N-1$, means that the probability that a pixel has intensity level i in view f_t. Alternatively said, $C_t(i)$ is a number of pixels with intensity level i in view f_t, divided by the number of view pixels. Color images entropy is calculated for each of the RGB components separately. For view RGB f_t three $N \times 1$ matrices C_t^R, C_t^G and C_t^B are created similar in a way as in grey level case. We can express the entropy H_t of the view f_t as:

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$$H_t = -\sum_{i=0}^{N-1} C_t(i) \log C_t(i). \quad (1)$$

For color images, we calculate three entropy values H_t^R, H_t^G and H_t^B. Then the final entropy is estimated as:

$$H_t = \frac{H_t^R + H_t^G + H_t^B}{3}. \quad (2)$$

When we obtain the final entropy values of the views we can line up the values uplink from the lowest to the highest one. On the top is now the worst view, which we can use as a starting point for automatic path around this object. This path is made inversely to the best view path. The best view path is calculated as a connection of the views from the view list from the best one to the worst (or to the number of views we need) by the adequate curves. Inversely we gain on from the worst to the best view to bring up in the visitor the knowledge moment. The creator of the museum should let the visitor guess what is the object on the screen. We think that when we upkeep visitors attention enough, that he may spend more time in a virtual museum, without feeling bored.

3.2. Perception method

What is the effect of computing the best views on some object? Is it to give observer as much information as possible. In the [BJ88] they assume that the observer gets most informations from that view where camera stays in the point that from each side of object is 19 % free space (background). This rule is visible in Figure 2.

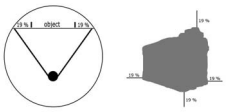

Figure 2: *Premises for finding a good view on an object according to [BJ88].*

But according to visual perception [Gol10] it is necessary to give to observer informations in such order, that he firstly gets known informations and then new ones. In other words he gets worse view before he gets better view. Else he is trying to apply the informations from the good view on the bad view and he sees what isn't there. Lets consider the found best view (Figure 1) - we can take it as the final view we want to propose to observer. Using Gestalt psychology [WD97], we can find the most attractive part of our object, which is different from the rest and we target that detail. We choose the detail of the window in the front part of the building. Now we use the premises to find a good view for whole object to his part and we get eventual worst view (Figure 3).

Figure 3: *The possible worst view on model of church according to Perception method.*

When we have the worst view, we can continuously get to best view by ascending. It will take some time, but at some point the observer will recognize our object but then he will feel hopefully more satisfaction.

4. Conclusion and future work

In this work we described a support tool for creating virtual museum presentations. Finding the worst view on 3D objects and connect them into the museum going-over may upkeep attention of visitors of museum. We work on the worst views as the helping tool for virtual museum creator to make the automatic path through the virtual museum special. Of course, the final decision is on the creator. In the future we will understand the best and the worst view as special attributes of any scene object.

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