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SAC 2011 Reviews for Submission #1365
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Title: Improving 3D Navigation in Multiscale Environments Using Cubemap-based Techniques

Authors: Daniel Ribeiro Trindade and Alberto Barbosa Raposo
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REVIEWER #1
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Reviewer's Scores

Technical Content and Accuracy: 7
Significance of the Work: 6
Appropriate Title, Introduction, and Conclusion: 6
Overall Organization: 6
Appropriateness for SAC 2011: 6
Style and Clarity of the Paper: 6
Originality of Content: 5
OVERALL RECOMMENDATION: 6

Comments

The paper tries to improve navigation in 3D environments, which is still a problem. The interface affected by this improvement are fly, including support to collision detection and automatic speed adjustment, and examine.

The paper is clear, well written and technically solid. Even the user tests have been conducted in a very rigorous way. The only problem is that the number of users should be increased.

Regarding the number of users tested, according to Nielsen's studies 5 to 8 users with the same characteristics are enough to detect most of all usability problems. We used two groups with different characteristics: one with 7 and another with 5 users. We are now conducting new user tests, whose results would be available for an eventual expanded journal paper, but unfortunately they are not concluded at this moment, to be included in this paper revision for the conference.

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REVIEWER #2
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Reviewer's Scores

Technical Content and Accuracy: 5
Significance of the Work: 5
Appropriate Title, Introduction, and Conclusion: 5
Overall Organization: 5
Appropriateness for SAC 2011: 6
Style and Clarity of the Paper: 5
Originality of Content: 5
OVERALL RECOMMENDATION: 5

Comments

The authors tackle the problem of navigation in 3D environments with multiscale features. They extend the well-known interfaces fly and examine. The first was extended by supporting (a) automatic speed adjustment and (b) collision detection and treatment. The latter was extended with automatic pivot control. The paper includes the models associated with proposed improvements and the description of a user testing.

The paper, as presented, suggests that the subjects did not have exactly the same predefined tasks to perform during the experiment. Using two versions of a system (with and without the new features), 7 advanced and 5 non-advanced had to (1) navigate from a starting point to platform A; (2) once at platform A, they had to examine any of 3 objects; (3) afterwards, they had to navigate from platform A to platform B. At the end, subjects had to answer 5 subjective general questions with respect to their experience, targeted at collecting impressions with respect to use of the new features provided. Problems with this configuration include the fact that each subject may have performed different tasks (how many examined the same object in platform A? how many of the advanced subjects and of the novices subjects?), and they respond to the questions according with their previous experiences. Even though the order in each users used which version of the tool was randomized, the fact the same questionnaire was applied after each experience implied that, whatever the response in the first questionnaire was, subjects had the comparative view of their own to report while answering the questionnaire for the second time. As an alternative experiment, some measures could have been collected if all tasks were filmed or the interface instrumented to collected some user-interaction data: collisions could be detected, the use of pivot control could be qualified and quantified, navigation tasks could be evaluated in terms of success, disorientation, etc. It would be also the case to ask the same specific task to each user: instead of allowing them to

choose which object to examine, have them to collect some specific information with respect to one particular object in the first run, and another object in the second run, etc.

Following this suggestion, we are currently conducting new user tests, not only asking the users to execute more rigorous tasks, but also separating the implemented characteristics in different tests. I.e., instead of making a test using none of the implemented resources and another using all the resources, we are making distinct tests: one using the automatic navigation velocity, one using collision detection and another using the automatic pivot point. We believe this second round of tests could overcome the limitations of the first round of tests that, although having the mentioned flaws, was important to indicate the effectiveness of the approach. Due to time and space restrictions for this revision, we are not able to include the results of this test at the moment, but we will do that in an eventual expanded journal paper.

in favour:
- important problem
- associated implementation
- user testing

against:
- evaluation collects only subjective impressions from user-experience with enhanced tool in comparison with non-enhanced version

See comments above.

comments to authors:

- please, avoid using direct references as it happens in many opportunities in Section 2.Related Work. This means that, for instance, "the method proposed by [7] is discrete" should use an alternative construction that refers to the author or the work, and not the publication, an example is "the method proposed by Kopper at al.[7] is discrete"
Done.

- there are several problems with the references (missing page numbers and capitalization)
Done.

- the 7-page length of the paper helps
We keep the number of pages in the final version.

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REVIEWER #3

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Reviewer's Scores

Technical Content and Accuracy: 5
Significance of the Work: 3
Appropriate Title, Introduction, and Conclusion: 5
Overall Organization: 3
Appropriateness for SAC 2011: 5
Style and Clarity of the Paper: 5
Originality of Content: 3
OVERALL RECOMMENDATION: 5

Comments

This work presents improvements made to two interfaces: fly and examine based on the cubemap structure. Although the text is well-structured, some considerations are presented as follows:

1. The authors use the term "improve" and "develop" in different parts of the text, which makes the text ambiguous. The work shows improvements in a well-known technique and is not a proposal of a technique totally new. This misunderstanding must be corrected in the text.

We changed “develop” to “improve” in some situations, to avoid that ambiguity. However, in some cases the word “develop” is really appropriate, such as in “solutions developed”, and “we developed a tool”

2. The example: "the camera speed ..." at the top of page 2 seems out of context.

We removed the example, since it isn’t important at all.

3. Some phrases are a little confused, for instance "We noticed that..." on page 2.

We rewrote this part of the text, trying to clarify this.

4. In Section 4.1, authors mention "centerDist" but it is not clear if this measure was proposed by them or not.

The idea of using centerDist is ours. We mention that in: "With that goal in mind, we attempted to use the distance to the central point of the screen." This was our first attempt, and in the sequence we clarify why it wasn't perfect and the solution we found to solve the problem.

5. In Figure 2 authors showed different curves according different values of "A" (constant value in equation 2) but they not explained how "A" is chosen in each situations.

The values shown in Figure 2 were merely didactic, to explain the effects of constant A in the EMA curves.

6. Along the Section 4, the authors commented about aspects related to the experiments what should be avoided.

Actually, the aspects we mention in Section 4 are not exactly related to the user experiments. They were obtained from our own experiences when developing the resources. For example, the instability problem with the use of centerDist without EMA was detected during the development. The formal user tests were conducted with our "final implementation", after these problems had been corrected.

7. In the experiments, they compared two techniques: manual and automated version. However, they should include another version with the techniques proposed by J. McCrae whose work is been improved. Thus, it is easier to know how efficient and effective were the improvements proposed by the authors.

The creation of an experiment comparing McCrae's original work and ours is not as trivial as it might sound. In fact, we improved on McCrae's techniques, but used them in a very different navigation tool. We used the techniques for the "fly" navigation tool, which gives the user free navigation control. McCrae used the techniques for a taget-point navigation, where the user selects the destination point and the camera navigates automatically towards this point (this way, not giving the user total freedom during the trajectory).

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REVIEWER #4

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Reviewer's Scores

Technical Content and Accuracy: 6
Significance of the Work: 6
Appropriate Title, Introduction, and Conclusion: 6
Overall Organization: 6
Appropriateness for SAC 2011: 7
Style and Clarity of the Paper: 6
Originality of Content: 5
OVERALL RECOMMENDATION: 6

Comments

The paper deals with navigation in a multi scale virtual environment. In this context, three particular issues have been addressed, namely (1) how to tune the speed of the camera according to the "type" of the environment, (2) how to avoid collisions between the camera and objects present in the environments, and (3) how to manipulate the camera in order to investigate a particular object.

All these three issues are clearly introduced, and the proposed approaches, in each case, are formally stated and explained. The only point I'd like to mention in this respect is that the last issue, addressed in Section 4.3, would require some clarification. Indeed, in the explainations given page 4, column 2, and referring to Fig. 3, it is not clear why "the pivot point could be mapped to an object behind the one the user wishes to examine".

Actually this is exactly the reason we propose an automatic pivot point based on the point corresponding to the center of the screen. Without the automatic pivot point, any strange situation, such as those mentioned in Fig 3, might occur, because the pivot point is defined manually by the users, which will move and probably will not readjust the pivot point before trying another "examine" operation.

Then, experiments clearly show that the proposed approach improves on previous ones regarding the three issues. Naive and advanced users have been involved in the experiments.