Bachelor Thesis Review

Faculty of Mathematics and Physics, Charles University

Thesis author	Matúš Rožek
Thesis title	Order Independent Transparency
Year submitted	2024
Study program	Computer Science
Specialization	IPP6
Review author	Mgr. Tomáš Iser, Ph.D. Reviewer
Department	KSVI

Overall

	good	OK	poor	insufficient
Assignment difficulty		X		
Assignment fulfilled	X			
Total size *... text and code, overall workload*		X		

The author has successfully fulfilled the thesis assignment. While the assignment itself was not particularly difficult, the author managed to implement and describe several OIT (Order Independent Transparency) methods, more than the original assignment required. I believe the author has sufficiently understood the topic and delivered a solid implementation thesis.

For the defense, I have the following **question** for the author:

How does the 16F and 32F WBOIT implementation differ in the perceived quality? Would it be possible to use the 16F version with the weighting functions?

Thesis Text

	good	OK	poor	insufficient
Form *... language, typography, references*		X	X	
Structure *... context, goals, analysis, design, evaluation, level of detail*		X		
Problem analysis	X			
Developer documentation		X	X	
User Documentation		X		

The text contains all the information that I would expect to find there. My main two points of criticism are: 1) a somewhat short developer documentation, 2) the language and typography could be significantly improved.

As for the point (1), I find the attached developer documentation somewhat brief for a thesis that almost purely focuses on implementing existing methods. Instead of listing all the files in the source codes, which is a bit tedious to read, I would rather appreciate a simple diagram visualizing what happens when the application is started, where the scene is loaded, where the main UI code is, and how the individual algorithms fit into that pipeline.

As for the point (2), first of all, there are several grammar mistakes and typos, which I stopped counting after the first couple of pages. Examples include: p. 8 "describe **a** several approaches", "in **a** following manner", p. 10 "shaders are **a** simple programs", "the pixels closer to the camera **then** the content of the depth buffer". This continues similarly on the following pages.

Furthermore to the point (2), sometimes, the figures or tables are placed at a place on the page that does not match the context. Examples include: Figure 3.10, which could rather be placed at the bottom of the page, below Section 3.2, from which it is referred to; or Table 3.2, which would also be better placed at the bottom of the page as it refers to Section 3.4.

A few more comments:

I really liked the overview of the methods in Section 1.3. However, there are no diagrams, which makes understanding some of the methods (especially depth peeling) more difficult.

p. 21 "We should note that this equation differs from the one stated in the original paper" – it should be stated whether this has any negative consequences or not

Table 3.2 – Is the comma supposed to be a decimal separator? It is very hard to read the numbers. Numbers should be right-aligned and use a dot as a separator.

Thesis Code

	good	OK	poor	insufficient
Design *... architecture, algorithms, data structures, used technologies*	X			
Implementation *... naming conventions, formatting, comments, testing*		X	X	
Stability		X	X	

Unfortunately, the attached application does not immediately work. The author had hardcoded paths to their own computer, such as

```
C:\\MFF\\BAKALARKA\\rozekmatus\\models\\spheres\\sphere_full.fbx
```

in the default scene file, which makes it crash practically immediately. What is worse is that the author did not include any reasonable error messages that would be clearly visible to the user when such an error occurs. In fact, the error seems to be only detected by an assertion, which simply causes a crash in the release mode.

After I managed to debug and fix the problem, I thought the application still did not work because it only showed me a full-screen red window. However, I found out that the red color is simply a sphere in which the camera appears on start, and I have to hold the S key for a while to move outside. I would think the application should have a more reasonable default than starting in the middle of geometry. On the same topic, I also noticed that the default arguments for depth peeling are very misleading as depth peeling appears way worse than the other methods even though it was supposed to be the reference. I soon realized that I had to significantly increase the iteration count to reach better results.

Once I managed to finally use the application, I have to say that it seemed to be implemented very well otherwise. I found the source code exceptionally well-organized and the algorithm implementations relatively easy to understand. I especially appreciated the user interface in which I could very simply switch between the different modes and parameters. Really well done in that sense!

Overall grade	Výborně (spíše horší)
	Excellent (rather worse)
Award level thesis	No

Date: 18 June 2024   Signature