Supervisor’s Ph.D. thesis assessment

Ph.D. candidate: Mgr. Jan Beneš
Supervisor / author of review: doc. Ing. Jaroslav Krivánek, Ph.D.

Let me start by stating that I consider the candidate, Mr. Jan Beneš, an independent, creative researcher, fully capable of devising and executing novel research ideas in the field of Computer Graphics. I recommend his Ph.D. dissertation thesis entitled “Procedural Modeling and Realism in Computer Graphics” for defense.

In the presented thesis, the candidate concerns himself with the area of content creation in computer graphics, specifically focusing on procedural modeling. The importance of these sub-areas of computer graphics has been steadily growing over the last years: in today’s entertainment industry, be it film or video games, creation of the 3D content consumes a major part of the entire project budgets. Hence, any new discoveries and techniques in these areas may have a profound impact.

The candidate’s approach, however, goes well beyond just developing new practical procedural modeling algorithms. Instead, he pursues more fundamental questions on the nature of realism in computer-generated imagery in general, and procedural modeling in particular.

His thesis starts with an extensive review of the concept of image realism: starting from medieval painting, over photography, all the way to computer generated imagery. This chapter highlights the various notions of realism and identifies the different agents influencing it. The candidate then follows up with a discussion of realism of procedurally generated models, teasing apart the notion of a procedural rule from a specific rendition of a particular generated 3D model. A user-study directly motivated by this discussion then follows. The purpose it to discover how realism of procedurally generated buildings is carried on different levels of detail, from a fine texture-level detail to an overall building structure. As far as I can tell, this is the first attempt to systematically investigate, through a formal user-study, the nature of realism of procedural rules. Finally, the following chapter presents candidate’s work on procedural modeling of the historical development of urban street networks. Once again, the author does not satisfy himself with an ad-
hoc method that generates `something plausible`. Instead, he goes to a great depth in a review of the history of urban development and bases his method directly on the findings of this research. As is often the case in research, the path to these important results was not easy, and many dead ends had to be considered, and reconsidered, along the way. I attribute this to the authors’ ambition to approach any of his research topics with a true honesty and depth.

To summarize, I believe that Mr. Jan Beneš’s research work will have a lasting impact and will inspire new research into the important direction of realism in procedural modeling. This direction will be gaining even more importance in the immediate future, as more and more of human labor in content creation will get replaced by semi-automated, AI-based systems. I consider the candidate’s work truly foundational in this respect, as well as timely.

I am convinced that the candidate’s work provides plentiful evidence of his maturity as an independent and creative researcher.

Kind Regards,

Jaroslav Křivánek