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Supervisor's assessment of the thesis *„Optimization Techniques in Computer Graphics and Appearance Fabrication"*, submitted by Tobias Rittig at MFF UK

The thesis has 130 pages, and is divided into four main sections plus some attachments. It contains contributions in two main areas of research (appearance optimisation and sky models), with the contributions being unified by the fact that innovative use of advanced and partly still experimental optimisation techniques was contributed by the author to all of them.

The first section of the thesis describes the underlying technologies of the presented research work, mainly in the domain of optimisation, but also in realistic image synthesis.

The second section then gives an overview of related work: as the areas where the author made contributions are diverse, this section also spans several fields that are somewhat related, but otherwise rarely seen within one single piece of academic writing (in particular, work on sky models and 3D printing normally do not have much in common). The overview is succinct, and gives a good picture of where the state of the art in the relevant areas currently is.

Section three is about appearance fabrication optimisation, where the majority of the author's contributions were made. He significantly contributed to four major publications in this area, and was shared first author of two of them. Of particular value is that in this section, the author also outlines how some of this work happened: SIGGRAPH and Eurographics papers require dedicated long term efforts, and progress on the scientific end goals is not always linear. Documenting the process of how some theoretically viable options for achieving the state goals were eliminated is highly interesting, as such information is rarely shared with the outside world: journal publications themselves rarely mention much about the path that was taken to reach a particular conclusion.

The fourth section presents the contributions of the author in the area of sky modelling, where the main focus of the author's work was on the GAN models for cloudy skies. There, he shares first authorship of one conference paper, and one journal paper that is a substantially extended version of the conference paper.

Overall, the thesis presents a number of sound and significant contributions to the state of the art in graphics, and how creative use of cutting edge optimisation technology can make all the difference for solving complex problems that would be intractable by other means. Formally, the thesis only partially satisfies the conditions for a defensible Ph.D. thesis at MFF, as the applicant does not have two full first authorships of journal papers. But as the respectable list of publications on page 130 shows, he established a solid corpus of scientific work, and the thesis describes the exact contributions he made in sufficient detail so that the magnitude of his impact on the publications in question can be properly assessed.

Due to this, I consider the scientific contribution of the author to be sufficient for defence of a PhD: he has a multi year track record of contributing crucial components to publications that are considered highly influential in their respective areas, and has also demonstrated that he is able to lead publication efforts that push the state of the art forward.

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