

Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

Autor práce Jan Špaček
Název práce Generation of realistic skydome images
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Studijní program Informatika **Studijní obor** Umělá inteligence

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Text posudku:

The goal of the thesis is to generate realistic skydome images that can be used, for example, in architectural visualizations. For generating the images, the author uses various types of generative adversarial networks.

The text is divided into six chapters. The first chapter gives the motivation and introduction to the topic. Second chapter describes existing techniques in great detail and provides all the necessary background for the rest of the thesis. This part is very well written with attention to detail and precise description of the methods. It could serve well as an introduction to deep learning and generative adversarial networks.

The third chapter gives a brief overview of Štěpán Hojdar's thesis that is extended in this thesis.

The fourth chapter describes the proposed method. Most of the description is dedicated to implementation of the method including a number of technical details. I believe a more high-level description together with some pseudo-codes would be a better way how to present the methods. Moreover, the new methods themselves are only small improvements to the ProGAN method used by Hojdar, and the replacement of ProGAN by another existing method – StyleGAN. The results of the method are presented in the fifth chapter where the author argues that the method presented in this thesis provides better results with less artifacts than the Hojdar's method.

The sixth and last chapter concludes the thesis and gives ideas for future possible directions of research, including an architecture that creates images in higher resolution and controlling of the look of the resulting image based on position of sun and atmospheric conditions. The future ideas are interesting and could provide good and useful results.

The whole thesis is rather well-written and easy to follow. The author paid great attention to detail while explaining all the methods used in the thesis, and the experiments are also performed and explained well. The presentation is the strongest point of the thesis.

On the other hand, the weakest point of the thesis is the contribution itself. It seems rather minimal compared to Hojdar's thesis. The author first tuned the ProGAN architecture, however, none of the changes had significant effect. Therefore, the author proceeded by replacing the ProGAN by StyleGAN, which lead to better results, and the network was able to synthesize usable 512x512 images. While these results are interesting, the assignment of the thesis specifically says that *[t]he model should produce high-quality images in suitable resolution and the user should be able to control the images using intuitive parameters (season of the year, position of the sun, meteorological conditions)*. I am afraid that the thesis does not fulfill this goal – the generated images are still only in 512x512 resolution, and the control of the images is not implemented at all. The author does propose a SuperGAN architecture that combines the StyleGAN with super-resolution networks, however, this architecture is only briefly tested in the thesis. The control of the images is mentioned only briefly in the conclusion as a possible future direction, but no steps are taken towards fulfilling this goal.

Based on the reasons above I recommend the thesis for defense. however, I also believe that this is a borderline thesis – most of the assignment was not fulfilled, but the work that was done, was done precisely and gives interesting results.

Práci doporučuji k obhajobě.

Práci nenavrhuji na zvláštní ocenění.

V Praze dne 26. června 2020

Podpis: