Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

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Název práce Využití generativních modelů neuronových sítí v obrazové rekonstrukci
Rok odevzdání 2018
Studijní program Informatika   **Studijní obor** Umělá inteligence

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Text posudku:

The goal of this thesis was to propose and implement novel image reconstruction methods that are based on generative neural networks - one of the most advanced neural net models developed to this date. This work is primarily concerned with two image reconstruction tasks, namely denoising and single image super resolution (SISR). The developed methods are compared to the current state-of-the art.

The text can be divided into two major parts. The first part (Chapters 1 and 2) focuses on the mathematical description of the problems being solved, proposes the MAP (maximum-a-posteriori) approach for the solved image reconstruction tasks and summarizes the main motivation for using generative neural networks. It also contains a summary of related work, that puts the proposed methods into the context of the current approaches used in this area. Lastly, this part also contains a brief description of the generative neural networks that are used in this thesis.

The second part (Chapters 3 and 4) focuses on the technical aspects of this thesis, namely selection of the framework used for training the neural nets and implementation details of the proposed solution. Chapter 4 contains the discussion of some of the design choices that were adopted and evaluation against the current state-of-the art for the given task (denoising and SISR).

The results of these methods seem very promising, for denosing the results are comparable with the current state-of-the art and for SISR the results beat all the solutions in the benchmark.

The text of the thesis is well structured and easy to follow. I appreciate the summary of related works, which sets the context around the solved problems and makes the contribution of this thesis very clear. Also, this thesis builds on the latest development in the area of deep neural networks and image recongition.

However, there are also some shortcoming to this thesis, the main being in the evaluation methodology, which makes some of the results inconclusive. For denoising, the author performs training on smaller images because of hardware limitations, and thus, makes the results prone to bias (as he also admits in his own words). The proposed method obviously works well, however, the question if it can beat the current state-of-the art is not sufficiently answered. Similar compromises were made for the SISR task. On the other hand, not having the access to the same kind of resources as some of the other authors referenced in this thesis

is understandable.

Despite the aforementioned shortcomings I consider this thesis successful in its contributions and I recommend it for the defense.

Práci doporučuji k obhajobě.

Práci nenavrhuji na zvláštní ocenění.

Pokud práci navrhujete na zvláštní ocenění (cena děkana apod.), prosím uveďte zde stručné zdůvodnění (vzniklé publikace, významnost tématu, inovativnost práce apod.).

Datum 22.1.2018   **Podpis**