Skoltech
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Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Egor Zakharov

PhD Program: Computational and Data Science and Engineering

Title of Thesis: Synthesis of human face and body images via generative adversarial networks

Supervisor: Associate Professor Victor Lempitsky

Name of the Reviewer: Gonzalo Ferrer, Associate Professor, CAIT, Skoltech

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Date: 11-03-2023**

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense. *If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.*
Reviewer's Report

The main topic of the present PhD thesis, by E. Zakharov is related to human face and body image synthesis. The thesis is written as a compilation of the papers, plus two more for the introduction and conclusion, consisting of 8 chapters in total. The introduction (chapter 1) does the effort to include all papers into a unique topic of discussion in a comprehensive way. This first view of the author organizes the following chapters, which are very independent, but introduction brings a common thread to all of them and leads the reader into a more informed navigation.

Chapter 2 is dedicated to image manipulation with GANs where a new architecture is proposed based on perceptual losses and losses based on adversarial discriminators jointly. Chapter 3 is on textured avatars from a 3D person skeleton to output a realistic full body avatar without requiring an implicit 3D model intermediate representation, but rather projecting the skeleton and image translation.

Chapter 4 is about video processing of human heads, given the landmark images of a face. The proposed method can be run on new faces not seen during training and achieved quite outreach in the media with the qualitative results of “one-shot” famous paintings/characters.

Chapter 5 is dedicated to the efficiency of the neural head avatar by subdividing into two parts: coarse image synthesis and fine texture details. Chapter 6 dives in the improvement to high resolution images.

Overall the thesis shows a sequence, which is chronologically ordered, but also ordered in the sense of the evolution of the ideas, initially from image manipulation, then to the avatar rendering of different forms and then several improvements on the efficiency and image resolution. Each of the chapters is also a publication in a top conference (more below).

The quality of the thesis is obvious to the reader. Each of the chapters provides a clear formulation and plenty of experiments, this is expected after passing the filter of the reviewers from top CV conferences. The way to refer to the citations on some parts is incorrect, by duplicating the author names.

The content of the thesis corresponds to the topic of the dissertation. The methods used in the thesis, although the works span a range of several years, are built on relevant methods and the results obtained are a reference to other related works on avatar, image synthesis, etc.

The scientific significance of the results obtained, as mentioned earlier, is of high impact, both on the venues that they were published as well as the impact that they have caused in the community by a large amount of citations. Of course, they comply with the international level and current state of the art.

The list of publications includes 3 ECCVs, CVPR, ICCV and ACMMM in total 6 publication in top A* conferences, 3 of them as the main author, an outstanding result for a Skoltech PhD defense. Additional results include patent of the works, which should be added to the results of this thesis.

Provisional Recommendation
☒ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*
☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*
☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*