TARAS KHAKHULIN

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I'm interested in 3D vision and motions problems. I (almost) received a PhD in Machine Learning under supervision of Victor Lempitsky. The results of my PhD were published at CVPR / ECCV and contributed to image synthesis, fast novel view generation and human avatars. The short goal is to develop immersive systems that recreate real world, help to communicate between people indistinguishably from reality.

Research Interests: Neural Rendering, Image and Video Synthesis, 3D Representations, Digital Humans.

PUBLICATIONS

* denotes joint first co-authorship

[1] P. Solovev*, T. Khakhulin*, and D. Korzhenkov*, "Self-improving multiplane-to-layer images for novel view synthesis," in *WACV*, 2023.

[2] **T. Khakhulin**, V. Skliarova, V. Lempitsky, and E. Zakharov, "Realistic one-shot mesh-based head avatars," in *European Conference of Computer vision (ECCV)*, Oct. 2022.

[3] N. Drobyshev, J. Chelishev, **T. Khakhulin**, A. Ivakhnenko, V. Lempitsky, and E. Zakharov, "Megaportraits: One-shot megapixel neural head avatars," in *ACM International Conference on Multimedia*, Sep. 2022.

[4] **T. Khakhulin**, D. Korzhenkov, P. Solovev, G. Sterkin, T. Ardelean, and V. Lempitsky, "Stereo magnification with multi-layer images," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2022.

[5] I. Anokhin, K. Demochkin, **T. Khakhulin**, G. Sterkin, V. Lempitsky, and D. Korzhenkov, "Image generators with conditionally-independent pixel synthesis," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2021.

[6] R. Schutski, D. Kolmakov, **T. Khakhulin**, and I. Oseledets, "Simple heuristics for efficient parallel tensor contraction and quantum circuit simulation," *Phys. Rev. A*, vol. 102, p. 062 614, 6 Dec. 2020.

[7] **T. Khakhulin**, R. Schutski, and I. Oseledets, "Learning elimination ordering for tree decomposition problem," in *Proceedings of NeurIPS Workshop Learning Meets Combinatorial Algorithms*, Nov. 2020.

[8] I. Anokhin*, P. Solovev*, D. Korzhenkov*, A. Kharlamov*, **T. Khakhulin**, A. Silvestrov, S. Nikolenko, V. Lempitsky, and G. Sterkin, "High-resolution daytime translation without domain labels," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2020.

[9] M. Burtsev, A. Seliverstov, R. Airapetyan, M. Arkhipov, D. Baymurzina, N. Bushkov, O. Gureenkova, **T. Khakhulin**, and et. al., "Deeppavlov: Open-source library for dialogue systems," in *Proceedings of ACL 2018, System Demonstrations*, Association for Computational Linguistics, 2018.

[10] V. Malykh and **T. Khakhulin**, "Noise robustness in aspect extraction task," *2018 IC-AIAI*, 2018.

[11] V. Malykh, V. Logacheva, and **T. Khakhulin**, "Robust word vectors: Context-informed embeddings for noisy texts," in *Proceedings of the 2018 EMNLP Workshop W-NUT: The 4th Workshop on Noisy User-generated Text*, Nov. 2018.

PATENTS

- "Plausible dayscale timelapse generation method and computing device", US 17741959, 2022
- "Image generators with conditionally-independent pixel synthesis", US 17697436, 2022

AWARDS

- "The Ilya Segalovich" Yandex fellowship for young scientists, *highly selective*, 2022
- Huawei scholarship for master students at MIPT, 2019

PROFESSIONAL EXPERIENCE

Synthesia Aug 2022 - Dec 2022
Research Scientist Intern *London, UK*

Human motion and non-rigid registration without priors. Developed novel algorithm for registration of implicit fields.

Samsung AI Center – Moscow Apr 2019 - Aug 2022
Research Engineer *Moscow, Russia*

Working on Image Synthesis and Neural Rendering. Lead several research projects, collaborate with technical teams:

- Proposed one-shot 3D reconstruction for head-avatars with neural rendering, worked with enhancement of human avatars with unpaired data for megapixel quality – ACMM'22, ECCV'22.
- Improved real-time novel views synthesis with scene as a set of semi-transparent meshes — CVPR'22.
- Developed generative models without spatial convolutions with the same quality — CVPR'21 *Oral Talk.*
- Improved style transfer for the high-resolution photo-realistic landscapes — CVPR'20 *Oral Talk.*

Laboratory of Neural Systems and Deep Learning, MIPT, Feb 2018 – Sep 2018
Research Intern *Moscow, Russia*

Worked on DeepPavlov an open source conversational framework.
Alleviated the issue of typos with contextualized approach for DeepPavlov library — W-NUT EMNLP'18.

NetCracker Technology Mar 2017 – Sep 2017
Junior Software Engineer *Moscow, Russia*

Built a client-server communication component with JavaEE. Accelerate SQL queries more than 2 times.

EDUCATION

Ph.D. student in Computer Science, Skolkovo Institute of Science and Technology 2020 - present
Advisor: Victor Lempitsky *Moscow, Russia*
New representations for view synthesis

Master of Computer Science, Skolkovo Institute of Science and Technology Sep 2018 - Jun 2020
Advisor: Ivan Oseledets *Moscow, Russia*
GPA 5.0 out of 5.0, diploma with honours

Bachelor in Applied Math and Physics, Moscow Institute of Physics and Technology Sep 2014 - Jun 2018
GPA 4.74 out of 5.0 *Moscow, Russia*

TEACHING & PROGRAM COMMITTEE

Reviewer: ICCV 2021, CVPR 2022, ECCV 2022, WACV 2023, CVPR 2023.

Teaching Assistant, Deep Computer Vision and Graphics, May, Spring, 2022 (80 participants).

Teaching Assistant, Deep Learning, Spring, 2021 (100+ participants).

Lecturer and manager of a deep learning school. Co-found practical courses for 500+ active students dls.samcs.ru

TECHNICAL SKILLS

Experience in	Computer Vision, GANs, NLP, Machine Learning
Programming languages	Python (daily use), C/C++
Technologies and Tools	PyTorch, TensorFlow, Git/GitHub, LaTex, Linux
Languages	English (Upper-Intermediate), Russian (Native)