

# MAKSIM SINIUKOV

PHD STUDENT AT INTELLIGENT HUMAN PERCEPTION LAB,  
USC INSTITUTE FOR CREATIVE TECHNOLOGIES

## EDUCATION

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**PhD student of Computer Science**, University of Southern California 2023–current  
Thomas Lord Department of Computer Science, USC Viterbi School of Engineering,  
Intelligent Human Perception Lab

**Bachelor of Computer Science**, Moscow State University named after M. V. Lomonosov 2019–2023  
Applied Mathematics and Computer Science, Department of Intelligent Information Technologies,  
Graphics and Media Lab

## SCIENTIFIC RESEARCH

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### Publications

- Siniukov et. al "SEMPI: A Database for Understanding Social Engagement in Video-Mediated Multiparty Interaction", accepted to ACM International Conference on Multimodal Interaction (ICMI) 2024
- Tran et. al "DIM: Dyadic Interaction Modeling for Social Behavior Generation", accepted to European Conference on Computer Vision (ECCV) 2024
- Siniukov et. al "Unveiling the Limitations of Novel Image Quality Metrics", IEEE 25th International Workshop on Multimedia Signal Processing (MMSP) 2023
- Siniukov et. al "Hacking VMAF and VMAF NEG: vulnerability to different preprocessing methods", AICCC'21: 2021 4th Artificial Intelligence and Cloud Computing Conference, 2021
- Siniukov et. al "Applicability limitations of differentiable full-reference image-quality metrics", Data Compression Conference(DCC) 2023
- Siniukov et. al "NETFLIX VMAF no enchantment gain vulnerability to sharpness and contrast transformations", International Scientific Conference Lomonosov-2021
- Siniukov et. al "Limitations of applicability of differentiable reference indicators of image quality", journal "IPM named after M.V. Keldysh", 2022

### Conferences

- "Applicability limitations of differentiable full-reference image-quality metrics", Data Compression Conference(DCC) 2023
- "Unveiling the Limitations of Novel Image Quality Metrics", IEEE 25th International Workshop on Multimedia Signal Processing (MMSP) 2023
- "Hacking VMAF and VMAF NEG: vulnerability to different preprocessing methods", Asia Digital Image Processing Conference 2021
- "NETFLIX VMAF no enchantment gain vulnerability to sharpness and contrast transformations", International youth scientific conference Lomonosov-2021
- "High-frequency high-voltage short time electric discharge in air", The 39-th Beijing Young Science Creation Competition

### Awards

- The First Prize of Excellent Youth Science & Technology Innovation Project, The 39-th Beijing Young Science Creation Competition, first place

- The 2-nd place at the competition of scientific and technical schoolchildren works "Scientists of the Future", 11-th grade, MSU, 2018
- The 3-rd place in the All-Russian competition of schoolchildren scientific works "Junior", 9-th grade, MEPhI, 2017
- Olympiad "Kurchatov", prize-winner
- Olympiad "Phystech", winner
- Engineering Olympiad for schoolchildren, winner
- Olympiad of St. Petersburg State University, prize-winner

## Additional education

- Stanford University Machine Learning Course, [coursera.org/verify/MBCJY2ULUCLR](https://coursera.org/verify/MBCJY2ULUCLR)
- Specialization "Deep Learning Specialization" DeepLearning.AI, [coursera.org/verify/specialization/DVTU2Z5DTXTM](https://coursera.org/verify/specialization/DVTU2Z5DTXTM)
- Course Convolutional Neural Networks.Coursera., [coursera.org/verify/3ED6ZW8BRPPK](https://coursera.org/verify/3ED6ZW8BRPPK)
- Course Neural Networks and Deep Learning.DeepLearning.AI., [coursera.org/verify/VTBRB4UGE2UC](https://coursera.org/verify/VTBRB4UGE2UC)
- Course Structuring Machine Learning Projects. Coursera, [coursera.org/verify/3ED6ZW8BRPPK](https://coursera.org/verify/3ED6ZW8BRPPK)
- Course Sequence Models. Coursera. [coursera.org/verify/9UPKTEMFFW3E](https://coursera.org/verify/9UPKTEMFFW3E)
- Course Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization DeepLearning.AI., [coursera.org/verify/FXL4V7HPRSZH](https://coursera.org/verify/FXL4V7HPRSZH)
- Educational course on the basics of sports programming at the MISiS Research Technological University, 2018
- English Language Certificate: LTC. General English. Certificate of Attendance, 2018
- Course "Media data processing and compression methods", CMC MSU
- Course "Intelligent methods of video processing", CMC MSU

## Skills

- Programming: Python(PyTorch, Tensorflow 2, OpenCV, CatBoost, pandas, CUDA OpenCV, SciPy, DEAP, SymPy, Keras, PyTorch Lightning, scikit-learn, numba), C++, C, MATLAB(Octave), NASM, Java
- Technical skills: Docker, git, ssh, sanitizers, Valgrind, profilers, Make, ffmpeg, VQMT, LaTeX
- Languages: Russian(Native), English(Advanced, IELTS: 7.0/9.0, passed at October 2022)

## BACHELOR THESIS

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**Title:** Stability study of image and video quality metrics Video-quality measurement plays a critical role in the development of video-processing applications. In this regard, more and more metrics are under development, but little research has considered their limitations. In this paper, we show how video preprocessing can artificially increase the popular quality metric VMAF and its tuning-resistant version, VMAF NEG. We propose a pipeline that tunes processing-algorithm parameters to increase VMAF by up to 218.8%. A subjective comparison revealed that for most preprocessing methods, a video's visual quality drops or stays unchanged. We also show that some preprocessing methods can increase VMAF NEG scores by up to 23.6%.

We show how image preprocessing before compression can artificially increase the quality scores provided by the popular metrics DISTS, LPIPS, HaarPSI, and VIF as well as how these scores are inconsistent with subjective-quality scores. We propose a series of neural-network preprocessing models that increase DISTS by up to 34.5%, LPIPS by up to 36.8%, VIF by up to 98.0%, ADISTS by up to 21.3%, STLPIPS by up to 56.2%, CONTRIQUE by up to 63.7%, AHQ by up to 101.2%, IQT by up to 110.5%, and HaarPSI by up to 22.6% in the case of JPEG-compressed

images. A subjective comparison of preprocessed images showed that for most of the metrics we examined, visual quality drops or stays unchanged, limiting the applicability of these metrics.