Konstantin **Burlachenko**

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i Homepage : `https://burlachenkok.github.io/` (Old homepage : Link)

I have created systems for Machine Learning, AI, Computer Graphics and Vision, Computational Physics and Graphics with exploiting hardware via DSL languages and using contemporary areas of Applied Math and CS. My current focus is Federated Learning, the area that my advisor proposed in 2016 with Google : *"Federated Learning : Strategies for Improving Communication Efficiency"*.

Education

2020-Now	Saudi Arabia : Ph.D. program in CEMSE/CS Program at King Abdullah University of Science and Technology. Member of Prof. Peter Richtárik's Optimization and Machine Learning Lab. *Awards :* Dean's Award 2019, KAUST. Transcript : Link-1. *GPA : 3.81*
2015-2019	USA, Leland Stanford Jr. University : Graduate Non-Degree Program. Transcript : Link-2. *GPA : 3.96*
2015-2018	USA, Leland Stanford Jr. University : Data, Models and Optimization Graduate Certificate Link-3 (Program)
2016 - 2019	USA, Leland Stanford Jr. University : Artificial Intelligence Graduate Certificate Link-5 (Program)
2003-2009	Russia, Bauman Moscow State Technical University : Master Degree (Bologn process equivalent) in Computer Science and Control Systems. *GPA : N/A.* (Original scans)
Conferences	ICML-2021 (Certificate) ; NeurIPS-2021 (Certificate) ; ACM CoNEXT 2021(Certificate)
Summer Shools	Regularization Methods for ML 2021 (Certificate) ; The PRAIRIE/MIAI AI summer school 2021 (Certificate) ; Oxford ML Summer School-2021(Certificate) ; The HSE/MIPT/Sirius Optimization without Border.

Selected papers and notes

Faster Rates for Compressed Federated Learning with Client-Variance Reduction 2021
https://arxiv.org/abs/2112.13097

FL_PyTorch : Optimization Research Simulator for Federated Learning 2021
https://dl.acm.org/doi/abs/10.1145/3488659.3493775/
Accepted for presentation and proceedings to 2nd ACM International Workshop on Distributed Machine Learning

MARINA : Faster Non-Convex Distributed Learning with Compression 2021
https://arxiv.org/abs/2102.07845 https://proceedings.mlr.press/v139/gorbunov21a.html
Accepted for presentation and proceedings to Thirty-eighth International Conference on Machine Learning (ICML 2021)

Personalized federated learning with communication compression 2021
E. Bergou, A. Dutta, K. Burlachenko, P. Kalnis and P. Richtárik

Note : Main math models in the area of interest of Machine Learning 2018
https://sites.google.com/site/burlachenkok/articles/main-math-models-in-area-of-interest-of-machine-learning

Note : About book A.N.Kolomogorov, S.V.Fomin Introductory Real Analysis 2020
https://sites.google.com/site/burlachenkok/articles/notes-about-the-book-of-ankolomogorovsvfomin

Notes about various aspects in ML, AI, CS, Optimization, Programming Languages, Physics, Applied Math 2010 - x'2021
https://sites.google.com/site/burlachenkok/articles

Presentations

DEC-2021	A session talk in DistributedML2021 : FL_PyTorch : Optimization Research Simulator for Federated Learning.
JULY-2021	Poster and spotlight for in ICML-2021 : MARINA Faster Non-Convex Distributed Learning with Compression
APR-2021	Poster presentation at Communication Efficient Distributed Optimization at NSF-TRIPODS Workshop.
FEB-2020	Moscow, Russia. Speaker in OpenTalks.AI conference : Huawei technologies for AI developers
JULY-2019	Sochi, Russia. Educational center Sirius : Deliver one month Deep Learning course with D.Kamzolov
DEC-2018	MIPT(Moscow Institute of Physics and Technologies). Deliver guest lectures about subtle things around Decision Trees. Slides : Slides in github. Presentions : Presentation 1 record, Presentation 2 record.
APR-2016	GTC 2016, San Hose, USA : Presenter in Driveworks NVIDIA Booth
AUG-2012	ACM SIGGRAPH 2012, LosAngeles, USA : Presenter in CentiLeo Booth.

Competences

General Programming Languages that I have used	C89/C99, C++14/11/03, C#, Python, Cython, Bash, Perl, x386/ARM, Java
DSL Programming Languages that I have used	Gl SL, TVM, Google Protobuf, CUDA, OpenCL, Matlab, R, SQL
Frameworks	Qt, CUDA, WinApi, Posix, OpenGL, OpenCL, PyTorch,TensorFlow,CvxPy
Operating Systems	Windows, Linux based, Orbis, XBox, Android, NDA OS-es
Development Environments	QtCreator, Visual Studio,Eclipse,WinDbg,Android Studio,TexStudio,Nsight
General purpose development tools	SysInternals,AqTime,Cmake,GNU Toolchain,CppCheck,Valgrind,Git,QMake
Markup and Type Languages	Latex, HTML, XML, Markdown
Areas of interest	Federated Learning, Stochastic Distributed Math Optimization, Computer Science, Machine Learning, AI, Computer Vision, System Programming, GPU Programming, Distributed Systems, Convex/Non Convex Math Optimization, Differential Privacy
Recomendations from co-workers on recent projects	Provided under request
Sport achievements	Candidate for master of sport in chess by FIDE.

Professional Experience

August 2020 – March 2019 — **Principal Lead Engineer | Foundation AI Lab, HUAWEI, Moscow**

- R&D in internal classical Machine Learning and Deep Learning middleware for HUAWEI HiSilicon
- R&D in internal projects in Machine Learning middleware for HUAWEI Consumer Business Group
- Preseting HUAWEI HiSilicon solutions internally, and externally in Russian AI conference OpenTalks.AI, with goal to share HUAWEI plans to build AI Ecosystem in Russia as described in HUAWEI news thread.

Math Optimization | AI | Low level ASM | C/C++ | Python | TVM | Java | Google Protobuf | CMake | Qt | TensorFlow

March 2019 – July 2014 — **Senior Developer Technology Engineer, NVIDIA, Moscow**

I have created and supported different modules in the middleware software of NVIDIA.

- Driveworks SDK - computer vision, machine learning, calibration, egomotion. Implementation and presentaion of the modules internally.
- PhysX/Apex SDK - physics simulation, graphical special effects. Internal implementation and communication with extra cusomters (Blizzard).
- cuDNN/cuBLAS libraries - GPU computation, machine learning. Implementation and collaboration with Mathworks.
- RAPIDS project - GPU based classical Machine Learning Framework, Internal implementatin.
- In my free time, I provided suggestions and prototypes for novel projects for a company.

CUDA | GLSL | C++ | SSE2/ARM NEON | Linux | Windows | PS4 | XBox | OpenGL | Google Tests | GitLab | Perl | Python | CMake | Make | Qt | Git | TensorFlow | Computer Vision | Graphics | Deep Learning | CppCheck

July 2014 – May 2013 — **Senior Developer Engineer | Yandex Video Team, YANDEX, Moscow**

Yandex is one of the available general-purpose web search engines in the world. I worked on a video internet search team.

- Text and statistical machine learning features for Yandex video search `http://video.yandex.ru`
- Infrastructure to store static aspects web document with embedded video
- Statistical analysis in several billions web documents with embedded video in MapReduce
- Infrastructure to show plots for internal team's processes
- In my free time, I provided suggestions and prototypes for new small (sub)projects for a company.

C++ | Google Protobuf | JavaScript | Bash | Python | Computer Science | HTML/JS/CSS | SVN | MapReduce | ML

April 2013 – March 2012 — **Lead Physics Engine Developer, FITTING REALITY, Moscow**

CEO Inga Nakhmanson can provide information that I brought big value to the project and company and that I have left the company when the financial support of a startup company start to be a problem.

- Develop library for clothing simulation started with CUDA
- Custom render engine for clothing visualizatio `https://yadi.sk/d/ytygxSIYP62Tr`
- Migrate cloth simulation library to OpenCL, adapt to use with Ogre renderer
- Prepare elements of the demo to investors. Carry internal math/cs/physics trainings

C++ | C | OpenGL | GLSL | Qt | Posix | WinAPI | QMake | CUDA | OpenCL | Physics | Graphics | gDebugger | C#

March 2012 – September 2010 — **Software Developer Engineer, ACRONIS, Moscow**

Acronis invited B.Stroustroup, author of C++ to give an advanced series of lectures about C++. Since 2010 I discuss C++ language/runtime relation questions with Bjarne offline.

- Low-level debugging in a big codebase
- Key member of GUI team for Acronis Backup and Recovery 2011 Enterprise

C++ | C | WinAPI | WinDbg | VmWare | Specialized GUI library | SVN | SysInternals Suite | AppVerifer | CppCheck

September 2010 – March 2009 | **Senior Software Developer Engineer, CAPITAL RESEARCH, Moscow**
Left company due to that financial support of startup have starts be problematical. CEO Kirill Garanzha can provide information that I was up to last moments with a company.
- Developed Firefox plugin to create the three-dimensional HTML view for basics HTML elements

Firefox | C++ | WinAPI | HTML/JS/CSS | Windows | OpenGL | GLSL | SVN

June 2009 – December 2006 | **C++ Programming Engineer, FLINT AND CO, Moscow**
- Created several computer games with computer vision and graphics part, hardware drivers
- Spend time in the factory for test real game machines. Carry trips to customers.

C++ | SDL | Posix | WinApi | Development Image Library | Low level programming | Computer Vision | OpenGL | SVN

November 2006 – March 2006 | **C++ Programming Engineer, ASTRASOFT TECHNOLOGY, Moscow**
Left company due no interconnection with my education in 2006
- Developed visual elements of management system based on Qt and OpenGL

C++ | Qt | Windows | OpenGL | SVN

Selected personal projects

Math Optimization Research Studio — 2020
Project report - Math Optimizaiton Research Studio | Project description | bitbucket repo
CS380 : Math Optimization Research Studio.
C++ | Linux | Windows | CUDA | CMake

Experimental Neural Net Framework — 2019
http://cs230.stanford.edu/projects_spring_2019/reports/18676711.pdf
Project description | Poster Presentation Session, CS230 - 2019 | bitbucket repo | 4 minute presentation
CS230 : Experimental Neural Net Framework done under mentoring of Steven Ziqiu Chen (stevenzc@stanford.edu)
C++ | Linux | Windows | CUDA | Python | CMake

Convex optimization solvers with leveraging into GPU/CPU power for AI/ML — 2018
Project description | Poster Presentation Session, CS221 - 2018 | bitbucket repo
CS221 : Convex optimization solvers with leveraging into GPU/CPU power for AI/ML under mentoring of Steven Diamond
`http://web.stanford.edu/~stevend2/`
C++ | Linux | Windows | CUDA | Python | CMake | Convex Optimization

Convex Optimization for Machine Learning — 2017
http://cs229.stanford.edu/proj2017/final-posters/5164974.pdf | Project description | 4 minute presentation
Stanford, CS229 : Convex Optimization for Machine Learning
C++ | Visual Studio | Numerical Linear Algebra | Convex Optimization | Python | CMake

Advacned tool to plot data — 2017
github.com/burlachenkok/plotter_plusplus | 40 minute presentation
This is an advanced plotter tool that receives commands over the network TCP connection. The goal is to assist debugging and development process. It has been written in C++, and it uses Qt Framework 5.7.* as only one external library.
C++ | Linux | Windows | Embedded Systems | Qt | Python

Lane detection using Fourier based line detector — 2016
http://web.stanford.edu/class/cs231a/prev_projects_2016/final_konstantin_burlachenko.pdf
10 minute presentation
Lane detection from several image input videostream.
Matlab

References

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