ALEKSEI PETRENKO

Computer science Ph.D. student with background in deep reinforcement learning, machine learning, algorithms and software design

OBJECTIVE

Summer 2019 — Internship in machine learning and/or robotics leading to a peer-reviewed publication

PERSONAL INFORMATION

Address: 870 W Adams Blvd, Los Angeles, CA, 90007
Phone: +1 (323) 961-17-12
e-mail: petrenko@usc.edu
Website: https://alex-petrenko.github.io
Date of birth: April 19, 1991

EDUCATION & RESEARCH

2018-present, Los Angeles, USA — Computer science Ph.D. student at University of Southern California, funded by USC Provost Fellowship
Advisor: Prof. Gaurav Sukhatme, USC Robotics and Embedded Systems Lab

2008-2012 — B. Sc. in Computer Science at Nizhny Novgorod State Technical University
2012-2014 — M. Sc. in Computer Science at Nizhny Novgorod State Technical University

Research interests: deep reinforcement learning, autonomous exploration and intrinsic motivation, RL with sparse rewards, using predictive models for decision making
Current projects:

- Autonomous exploration based on topological landmark-based environment maps
- Imagination-augmented agents (I2A) for stochastic environments

EMPLOYMENT HISTORY

2015-2018, Nizhny Novgorod, Russia — **Tech Lead at itSeez3D**

Lead algorithms and systems developer in the computer vision startup. My main project with itSeez3D was the AI-based 3D human digitization engine called Avatar SDK.

- Development of a deep learning-based method for accurate 3D reconstruction of the human head from a single portrait photo
- R&D for the automatic generator of full-body characters (3D, animation, rendering, deep learning)
- Optimized deep neural networks for deployment (quantization, compression, etc.)
- Worked on various applications for the avatar engine: mobile, desktop and virtual reality. Developed and deployed demos for major conferences and exhibitions: SIGGRAPH, GDC, VRX.

My avatar automatically created from a single photo by the Avatar SDK deep learning pipeline: https://skfb.ly/6FUYY

Key technologies:

- C++11/14 and OpenCV for the algorithms
- TensorFlow and Keras for deep learning
- Python & numpy for ML research and scripting
- OpenGL, Unity & Unreal for 3D rendering, Oculus SDK + Unity for VR

2013-2015
Nizhny Novgorod
Russia

Senior Software Engineer at itSeez

Computer vision startup and for many years a company behind the OpenCV library. At itSeez I was involved in the development of a new product: the first portable consumer 3D scanner.

- 3D scanning algorithms for various depth sensor platforms: Intel RealSense, Google Tango, Structure Sensor and a lot of other devices
- Developed a cloud backend for the 3D reconstruction pipeline
- Created mobile and desktop 3D scanning applications
- Implemented algorithms for polygonal mesh and point cloud processing, filtering and refinement of noisy 3D data, algorithms that prepare meshes for 3D printing: mesh "hollowisation" (polygon offset), ensuring manifoldness, etc.

My full-body scan made by itSeez3D software: https://skfb.ly/CzyX

Technologies: C++, OpenCV, C# & Xamarin, Python+numpy, Django, AWS, Docker, Linux, Android

2010-2013
Nizhny Novgorod
Russia

Software Engineer at Tecom

Developed a big real-time (frame perfect) massively multithreaded broadcast automation system with many levels of redundancy. Position in Tecom allowed me to acquire expertise in many areas of software engineering, from architecture to low-level optimization.

Technologies: C++ and Qt, C#, Java, Javascript, Python, Linux

SKILLS

Programming languages:

- C++ (highly advanced). C++ is my favorite language for it's speed, portability, and weird elegance. C++11/14, STL, Qt, CMake
- Python (advanced). My language of choice for research, prototyping or automation
- C#, Java, Javascript (proficient)

Other skills:

- Software development and architecture. Created multiple successful software projects from ground up (mobile, desktop, server, VR, plugins). Multithreading, data binding, patterns, loose coupling, APIs, UI, etc.
- Deep learning, deep reinforcement learning. Supervised and unsupervised setting, CNNs, RNNs, ResNets, UNets, GANs, etc. Implemented multiple RL methods from scratch: DQN, Vanilla Policy Gradient, A2C, PPO.
- Algorithms. Solid background from industry and programming competitions. Graph algorithms, computational complexity, data structures, etc.
- Computer vision & OpenCV, mostly in the context of 3D scanning
- Cloud, scalable services (AWS API, Docker)
- 3D rendering (OpenGL, Unity3D) and VR (Oculus)

OPEN-SOURCE PROJECTS & REPOSITORIES

2018 https://github.com/alex-petrenko/curious-rl intrinsic motivation in deep RL, implementation of a method called "Curiosity-driven Exploration by Self-supervised Prediction" for hard exploration tasks in 3D pixel-based environments

2018 https://github.com/alex-petrenko/tf-reinforce Tensorflow implementation of classic policy gradient algorithms for continuous control tasks

2017 https://github.com/alex-petrenko/rl-experiments deep RL algorithms (Double DQN, A2C) in the context of the gridworld environment called MicroTbs

2016 https://github.com/alex-petrenko/4dvideo open-source volumetric video recorder and player for Intel RealSense and Google Tango. It can capture and playback "4D" clips like this in real time with a single mobile device. Features a very fast Delaunay triangulation

algorithm based on modified Guibas-Stolfi method.
Visit my personal website to find more code and projects.

ACHIEVEMENTS

2018-2020	Provost PhD Fellowship from University of Southern California
2012	Scholarship of the President of the Russian Federation
2012	Winner of "Osipovsky Cup 2012" programming contest held in Kovrov State Technological Academy
2012	Winner of the Code Game Challenge at ACM ICPC Southern Subregional Contest
2011-2012	Participant of the ACM ICPC, World Semifinals (NEERC)
2010-2012	Prize winner of the ACM ICPC, World Quarterfinals (NEERC Southern Subregional)

OTHER INTERESTS

- Futurology, transhumanism, AGI, singularity. Authors: E. Yudkowsky, G. Egan, R. Kurzweil, K. Eric Drexler, V. Vinge
- Fundamental science: physics, cosmology, evolutionary biology
- Entrepreneurship
- Hobbies: motor racing, karting