Oleh Rybkin

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Research Interests

- Video Prediction, Deep Learning, Computer Vision, Learning for Control.

Education

- **University of Pennsylvania** — Philadelphia, PA
  Ph.D. in Computer Science advised by Kostas Daniilidis. — *2017 – Present*
- **Czech Technical University in Prague** — Prague, Czechia
  Bachelor's with Honours in Computer Science, minor in Mathematics. GPA: 3.95. — *2014 – 2017*

Experience

- **GRASP lab, University of Pennsylvania** — Philadelphia, PA
  Doctoral Student advised by Kostas Daniilidis — *Aug 2017 - Present*
  - Developing methods for predictive reasoning from videos, such as understanding actions of other agents [3,6] and discovering hierachy in time [4, 7]. Applying predictive reasoning methods to planning and control.
  - Developing methods for curious exploration via predictive models, including exploration via Bayesian reasoning [5], sponsored by the Honda Research Institute Curious Minded Machine project.
  - Developing methods for distilling exploratory behaviour into skills.
  - Developing methods for understanding human behaviour via predictive models, such as understanding how the environment affects future human motion.
- **RAIL lab, University of California, Berkeley** — Berkeley, CA
  Visiting Student Researcher advised by Sergey Levine and Chelsea Finn — *Feb – Oct 2019*
  - Developed a hierachical deep predictive model that predicts in terms of *events* instead of frames and can be used for very long term video prediction [7].
  - Developed a learning-based robotic planning method that learns with guidance from human data instead of learning purely from scratch with robotic data [6], based on my earlier work on action representations [3].
- **Okutomi-Tanaka lab, Tokyo Institute of Technology** — Tokyo, Japan
  Visiting Student Researcher advised by Akihiko Torii — *Jun – Aug 2017*
  - Worked on Structure from Motion, Computer Vision.
  - Developed a novel algorithm for robust Structure from Motion by performing overlapping reconstructions.
- **Center for Machine Perception, Czech technical university in Prague** — Prague, Czechia
  Undergraduate Research Assistant advised by Tomas Pajdla — *Sep 2015 - Jun 2017*
  - Worked on Algebraic Geometry and Computer Vision.
  - Investigated application of techniques from Algebraic Geometry such as fast Groebner basis construction for chordal graphs for middle-scale Structure from Motion problems.
  - Investigated conventional methods of focal length computation. Based on this research, proposed and evaluated an algorithm for robust focal length computation in presence of noisy data and errors in calibration [1].
- **Willow team, INRIA** — Paris, France
  Visiting Student Researcher advised by Josef Sivic — *Aug – Sep 2016*
  - Worked on Algebraic Geometry, Machine Learning and Computer Vision.
  - Investigated application of Machine Learning techniques to the problem of camera focal length estimation.

Achievements

- **Ranked 1st of 287 graduates by GPA; Dean's Outstanding Thesis Award,** FEE CTU in Prague. *2017*
- **Merit scholarship** for academic excellence, FEE CTU in Prague. *2014 – 2017*
- **B2 Czech language certificate,** Institute for language and preparatory studies, Charles University. *2013 – 2014*
- **Among top 0.1% of 180 000 participants** in the Ukrainian college entrance exam (EIT) in mathematics. *2013*

Publications

[7] Karl Pertsch*, **Oleh Rybkin***, Frederik Ebert, Chelsea Finn, Dinesh Jayaraman, Sergey levine, "HEDGE: Hierarchical Event-Drived Generation", *Workshop on Model-Based Reasoning at ICML, 2019.*

[6] Karl Schmeckpeper, David Han, Kostas Daniilidis, **Oleh Rybkin**, "Visual Planning with Semi-Supervised Stochastic Action Representations", *Workshop on Model-Based Reasoning at ICML, 2019.*

[5] Bernadette Bucher, Anton Arapin, Ramanan Sekar, Feifei Duan, Marc Badger, Kostas Daniilidis, **Oleh Rybkin**, "Perception-Driven Curiosity with Bayesian Surprise", *Workshop on Learning and Reasoning at RSS, 2019.*

[4] Karl Pertsch*, **Oleh Rybkin***, Jingyun Yang, Konstantinos G. Derpanis, Joseph Lim, Kostas Daniilidis, Andrew Jaegle, "KeyIn: Discovering Subgoal Structure with Keyframe-based Video Prediction", *Workshop on Task-Agnostic Reinforcement Learning at ICLR, 2019.*

[3] **Oleh Rybkin***, Karl Pertsch*, Konstantinos G. Derpanis, Kostas Daniilidis, Andrew Jaegle, "Learning what you can do before doing anything", *International Conference on Learning Representations (ICLR) 2019.*

[2] Andrew Jaegle, **Oleh Rybkin**, Konstantinos G. Derpanis, Kostas Daniilidis, "Predicting the Future with Transformational States", *ArXiv 2018.*

[1] **Oleh Rybkin**, Tomas Pajdla, "Robust Focal Length Estimation", *Bachelor's Thesis, 2017.*

Teaching Experience

- **"Deep Learning in Computer Vision"**, CIS680, Fall 2018, taught by Jianbo Shi. Led the Teaching Assistant team of three people. Managed the team, created and graded homework, held office hours and review sessions.

Mentoring and Supervision

- **Present**: Ramanan Sekar, Shenghao Zhou.
- **Past**: Anton Arapin (now UChicago), Karl Schmeckpeper (now PhD student at UPenn).

Invited Talks and Lectures

- **Predictive Models of Videos for Understanding the World**, invited talk at Google, Mountain View, May 2019.
- **Generative Adversarial Networks**, guest lecture in "Deep Learning in Computer Vision", UPenn, Nov 2018.

Selected Class Projects

- Developed a Generative Adversarial Network that generates driving scene images from scratch via first generating segmentation masks. Team project for CIS680 (3 people).
- Developed perceptual, planning and navigation systems for a Kobuki TurtleBot to navigate between 3 landmarks, and gave a live demo. Team project for ARO (2 people).

Relevant Coursework

- At UPenn: Deep Computer Vision, Deep Learning Theory, Advanced Machine Learning, Advanced Geometry.
- Attended the International Computer Vision Summer School in Sicily, 2018.
- At CTU, graduate-level: Advanced Robotics, Mathematics for Cybernetics, Autonomous Robotics.
- At CTU, undergraduate-level: Machine Learning, Artifical Intelligence, Optimization, Statistics.

Reviewing Service

- International Conference on Computer Vision (ICCV), 2019.
- International Conference on Learning Representations (ICLR), 2019.
- IEEE Transactions on Image Processing (TIP), 2019.

Languages

- **Native:** Russian, Ukrainian.
- **Fluent:** English, Czech.

Programming Skills

- **Currently using:** PyTorch, Python, LaTeX, Git.
- **Other experience:** TensorFlow, C/C++, Matlab, C#, Java, Maple.

* indicates authors that contributed equally