Nikita Dvornik

PhD in Computer Vision and Machine Learning

Education

2016–2019 **PhD in Computer Vision and Machine Learning**, *Thoth team*, Inria Grenoble.
Studying object-level scene understanding and learning with limited annotated data. Supervised by Julien Mairal and Cordelia Schmid.

2015–2016 **Masters in Data Science**, *University of Grenoble & Ensimag*, Grenoble, France.

2010–2014 **Bachelor in Applied Math**, *Moscow Institute of Physics and Technology*, Moscow, Russia.

Experience

Nov 2021 – present **Senior Research Scientist**, *Samsung AI Center*, Toronto, Canada.
Building AI systems for procedure understanding from video and language.

Jan 2021 – Nov 2021 **Joint Postdoctoral Fellow**, *University of Toronto, PAIR Lab*, Toronto, Canada.
Working on Video Understanding and ML for robotics. Joint postdoc with Samsung AI Centre Toronto.

Sep 2020 – Dec 2020 **Research Scientist Intern**, *Uber ATG*, Toronto, Canada.
Improving perception and prediction simulation for autonomus driving.

Jan 2020 – Oct 2020 **Research Engineer**, *Inria*, Grenoble, France.
Developing new methods for training deep neural networks with little annotated data.

May 2017 – July 2017 **Computer Vision Engineer**, *Teleport inc*, Moscow, Russia.
Designing and implementing methods for real-time semantic video segmentation.

Feb 2016 – June 2016 **Research Internship in Computer Vision**, *Inria*, Grenoble, France.
Applying deep learning method to image retrieval.

Jun 2014 – Dec 2014 **Summer Intern**, *Deloitte*, Moscow, Russia.
Working in Legal & IT department. Optimizing database uploading system.

Publications

preprint **SlotFormer: Unsupervised Visual Dynamics Simulation with Object-Centric Models**.
by Ziyi Wu, Nikita Dvornik, Klaus Greff, Thomas Kipf, Animesh Garg

BMVC 2022 **SAGE: Saliency-Guided Mixup with Optimal Rearrangements**.
by Avery Ma, Nikita Dvornik, Ran Zhang, Leila Pishdad, Konstantinos G. Derpanis, Afsaneh Fazly

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ECCV 2022 (**Oral**) **Graph2Vid: Flow graph to Video Grounding for Weakly-supervised Multi-Step Localization**.
by Nikita Dvornik, Isma Hadji, Hai Pham, Dhaivat Bhatt, Brais Martinez, Afsaneh Fazly, Allan D. Jepson

CVPR 2022 (**Oral**) **P3IV: Probabilistic Procedure Planning from Instructional Videos with Weak Supervision**.
by He Zhao, Isma Hadji, Nikita Dvornik, Konstantinos G. Derpanis, Richard Wildes, Allan D. Jepson

NeurIPS 2021 **Drop-DTW: Aligning Common Signal Between Sequences While Dropping Outliers**.
by Nikita Dvornik, Isma Hadji, Konstantinos G. Derpanis, Animesh Garg, Allan D. Jepson

ECCV 2020 **Selecting Relevant Features from a Universal Representation for Few-shot Classification**.
by Nikita Dvornik, Cordelia Schmid and Julien Mairal

ICCV 2019 **Diversity with Cooperation: Ensemble Methods for Few-Shot Classification**.
by Nikita Dvornik, Cordelia Schmid and Julien Mairal

TPAMI 2019 **On the Importance of Visual Context for Data Augmentation in Scene Understanding**.
by Nikita Dvornik, Julien Mairal and Cordelia Schmid

ECCV 2018 **Modeling Visual Context is Key to Augmenting Object Detection Datasets**.
by Nikita Dvornik, Julien Mairal and Cordelia Schmid

ICCV 2017 **BlitzNet: A Real-Time Deep Network for Scene Understanding**.
by Nikita Dvornik, Konstantin Shmelkov, Julien Mairal and Cordelia Schmid

Software

For each research project I have open sourced the code. It allows to reproduce published results and easily use our methods for further research.

- **BlitzNet: Real-time Object Detection and Semantic Segmentation**.
  — `github.com/dvornikita/blitznet`
  A real-time scene understanding pipeline with state-of-the-art performance. The repo includes the code for training, inference and a demo with interface.
- **Drop-DTW: Sequence Alignment with Outlier Rejection**.
  — `https://github.com/SamsungLabs/Drop-DTW`
  Using this repo, one can run Drop-DTW to align sequences that contain common signal interspersed with outliers or train video representation end-to-end via alignment.
- **Copy-paste Data Augmentation with Context Modeling**.
  — `github.com/dvornikita/context_da`
  The repo implements copy-paste data augmentation with context guidance and provides plug-and-play data augmentation module for training a scene understanding model.
- **Diversity with Cooperation: Ensemble Methods for Few-Shot Classification**.
  — `github.com/dvornikita/fewshot_ensemble`
  The full pipeline to train and distill ensembles for few-shot learning. The repo contains the diversity- and cooparation-based training and robust prototype classifiers implementation.

- **Selecting Relevant Features from a Universal Representation for Few-shot Classification**.
  — `github.com/dvornikita/SUR`
  The repo contains the code to train a universal representation and implements feature selection mechanism.

Skills

Languages	Russian (Native), English (Fluent), French (Basic)
Programming	Python, Matlab, C++, Bash, Unix
Fremeworks	PyTorch, Tensorflow