

# Pavel Tokmakov

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## Research

- 2020-now **Senior Research Scientist**, *Toyota Research Institute*, Los Altos, USA.  
Leading the video representation learning research direction. Acting as both an individual contributor, as well as participating in larger, collaborative projects within the team and across teams. Co-advising interns and PhD students as a part of several university collaborations.
- 2018-2020 **Project Scientist**, *CMU Robotics Institute*, Pittsburgh, USA.  
Working on problems related to video understanding and learning under limited supervision. Co-directing research projects, as well as conducting research individually and in collaborations with others.
- 2014-2018 **PhD student with Dr. Cordelia Schmid and Dr. Karteek Alahari**, *Inria THOTH team*, Grenoble, France.  
Studying the role of motion in object recognition. The research resulted in both new methods for motion estimation and a novel approach for exploiting motion as a supervisory signal.
- 2013-2014 **MSc student with Prof. Dr. Kristian Kersting**, *Technical University of Dortmund*, Germany.  
Development of Relational Linear Programming (RLP), a novel paradigm for combining linear and logic programming. Designing a language for defining RLPs and implementation of a lifted solver for the language.
- 2012-2014 **Research assistant to Dr. Mario Boley**, *Fraunhofer IAIS*, Germany.  
Development of a novel approach for interactive knowledge discovery. Utilizing co-active learning to capture user preference through interaction and automatically adapt data-mining algorithms to it.

## Education

- 2014-2018 **PhD in Computer Science**, *University of Grenoble*, France.  
Topic: Weakly-Supervised Learning for Object Recognition
- 2012-2014 **MSc in Computer Science**, *University of Bonn*, Germany, *GPA – 4.0*.  
Emphasis on Intelligent Systems
- 2009-2011 **MTech in Automation and Control**, *ITMO University*, Saint-Petersburg, Russia, *GPA – 3.64*.
- 2005-2009 **BTech in Automation and Control**, *ITMO University*, Saint-Petersburg, Russia, *GPA – 3.69*.

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## Selected Publications

- 2023 **Understanding Video Transformers via Universal Concept Discovery.**  
In submission  
Matthew Kowal, Achal Dave, Rares Ambrus, Adrien Gaidon, Konstantinos Derpanis, Pavel Tokmakov
- 2023 **pix2gestalt: Amodal Segmentation by Synthesizing Wholes.**  
In submission  
Ege Ozguroglu, Ruoshi Liu, Didac Suris, Dian Chen, Achal Dave, Pavel Tokmakov, Carl Vondrick
- 2023 **Analyzing Question Complexity in Video QA via Visual Program Generation.**  
In submission  
Cristobal Eyzaguirre, Igor Vasiljevic, Achal Dave, Jiajun Wu, Thomas Kollar, Juan Carlos Niebles, Pavel Tokmakov
- 2023 **Zero-1-to-3: Zero-shot One Image to 3D Object.**  
International Conference on Computer Vision (ICCV)  
Ruoshi Liu, Rundi Wu, Basile Van Hoorick, Pavel Tokmakov, Sergey Zakharov, Carl Vondrick
- 2023 **Breaking the “Object” in Video Object Segmentation.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Pavel Tokmakov, Jie Li, Adrien Gaidon
- 2023 **Object Discovery from Motion-Guided Tokens.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Zhipeng Bao, Pavel Tokmakov, Yu-Xiong Wang, Adrien Gaidon, Martial Hebert
- 2023 **Standing Between Past and Future: Spatio-Temporal Modeling for Multi-Camera 3D Multi-Object Tracking.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Ziqi Pang, Jie Li, Pavel Tokmakov, Dian Chen, Sergey Zagoruyko, Yu-Xiong Wang
- 2022 **Object Permanence Emerges in a Random Walk along Memory.**  
International Conference on Machine Learning (ICML)  
Pavel Tokmakov, Allan Jabri, Jie Li, Adrien Gaidon
- 2022 **Discovering Objects that Can Move.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Zhipeng Bao, Pavel Tokmakov, Allan Jabri, Yu-Xiong Wang, Adrien Gaidon, Martial Hebert
- 2021 **Learning to Track with Object Permanence.**  
International Conference on Computer Vision (ICCV)  
Pavel Tokmakov, Jie Li, Wolfram Burgard, Adrien Gaidon
- 2020 **TAO: A Large-Scale Benchmark for Tracking Any Object (spotlight).**  
European Conference on Computer Vision (ECCV)  
Achal Dave, Tarasha Khurana, Pavel Tokmakov, Cordelia Schmid, Deva Ramanan
- 2019 **Learning Compositional Representations for Few-Shot Recognition.**  
International Conference on Computer Vision (ICCV)  
Pavel Tokmakov, Yu-Xiong Wang, Martial Hebert
- 2019 **Towards Latent Attribute Discovery from Pairwise Similarities.**  
International Conference on Computer Vision (ICCV)  
Ishan Nigam, Pavel Tokmakov, Deva Ramanan
- 2019 **A Structured Model For Action Detection.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Yubo Zhang, Pavel Tokmakov, Cordelia Schmid, Martial Hebert

- 2018 **Learning to Segment Moving Objects.**  
International Journal of Computer Vision (IJCV)  
Pavel Tokmakov, Cordelia Schmid, Karteek Alahari
- 2017 **Learning Video Object Segmentation with Visual Memory (oral).**  
International Conference on Computer Vision (ICCV)  
Pavel Tokmakov, Karteek Alahari, Cordelia Schmid
- 2017 **Learning Motion Patterns in Videos.**  
Conference on Computer Vision and Pattern Recognition (CVPR)  
Pavel Tokmakov, Karteek Alahari, Cordelia Schmid
- 2016 **Weakly-Supervised Semantic Segmentation using Motion Cues.**  
European Conference on Computer Vision (ECCV)  
Pavel Tokmakov, Karteek Alahari, Cordelia Schmid

## Teaching

- 2022-now **Co-advising students, Columbia University, USA.**  
Co-advising master and PhD students. Directing research, preparing publications.
- 2018-now **Co-advising students, Carnegie Mellon University, USA.**  
Co-advising master and PhD students. Directing research, preparing publications.
- 2013-2014 **Student project co-supervision, University of Bonn, Germany.**  
Co-supervising a master student's semester project in Development and Application of Data Mining and Learning Systems. Suggesting directions of research, providing ongoing advice, reviewing the manuscript.

## Service to the community

- 2019-2020 **CMU MSCV admission committee member:**  
Evaluating students' applications for a Masters in Computer Vision program at CMU.
- 2015-now **Reviewer in journals and conferences:**  
TPAMI, IJCV, CVPR, ICCV, ECCV, NIPS, ICML, ICRA.

## Organizational activities

- 2023 **5th LSVOS Workshop, ICCV, Paris, France.**  
Organizing of a workshop and an accompanying challenge on video object segmentation. Recruiting speakers, coordinating program, moderating invited talks and a round table discussion.
- 2023 **2nd TAO Workshop, CVPR, Vancouver, Canada.**  
Co-organizing of a workshop and an accompanying challenge on open-world tracking. Preparing a proposal, recruiting speakers, coordinating program.
- 2021 **RVSU Workshop, CVPR, Virtual.**  
Co-organizing of a workshop and an accompanying challenge on robust video scene understanding. Preparing a proposal, recruiting speakers, coordinating program.
- 2020 **TAO Workshop, ECCV, Virtual.**  
Organizing of a workshop and an accompanying challenge based on a newly collected dataset. Recruiting speakers and co-organizers, coordinating program, moderating round table discussions.

2018-2020 **DIVA project**, *Carnegie Mellon University*, USA.  
Coordinating the work of CMU team in an IARPA project on spatio-temporal action localization.

## Professional experience

2011-2012 **Senior software engineer**, *Kentor East*, Saint Petersburg, Russia.  
Outsource development of Java Enterprise applications for Tele2 mobile operator, Sweden.

2008-2010 **Software engineer**, *Exigen Services*, Saint Petersburg, Russia.  
Outsource development of Java Enterprise applications for T-Mobile Germany.

## Languages

English **Fluent**  
German **Upper intermediate**  
French **Intermediate**  
Russian **Mothertongue**