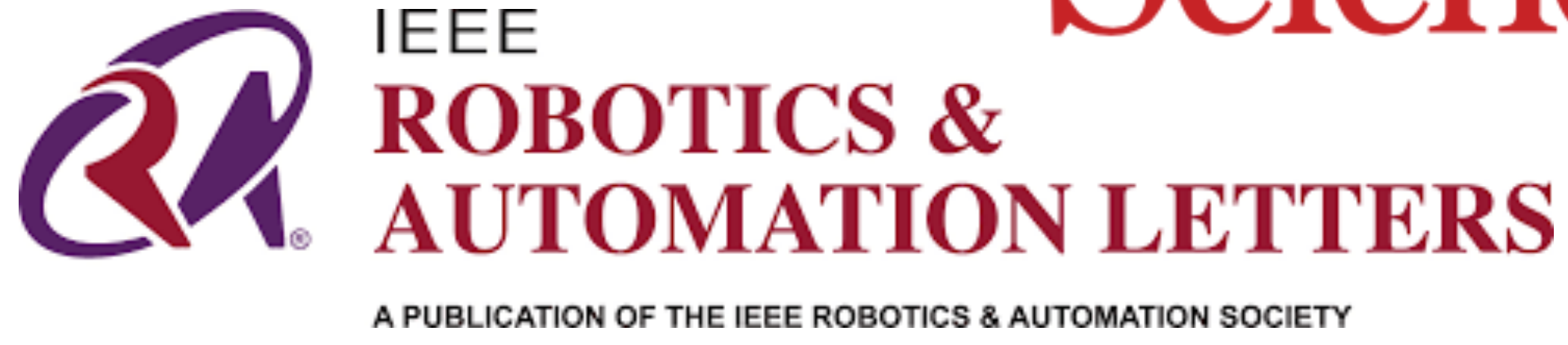


**DeepRob**

Discussion 3  
 How to Read Deep Learning Research Papers  
 University of Michigan and University of Minnesota



# Science Robotics



# Today's Agenda

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- The importance of reading papers
- How to approach research papers in deep learning
- Discussion of AlexNet, PoseCNN and NeRF

# Reading Papers is an Important Skill

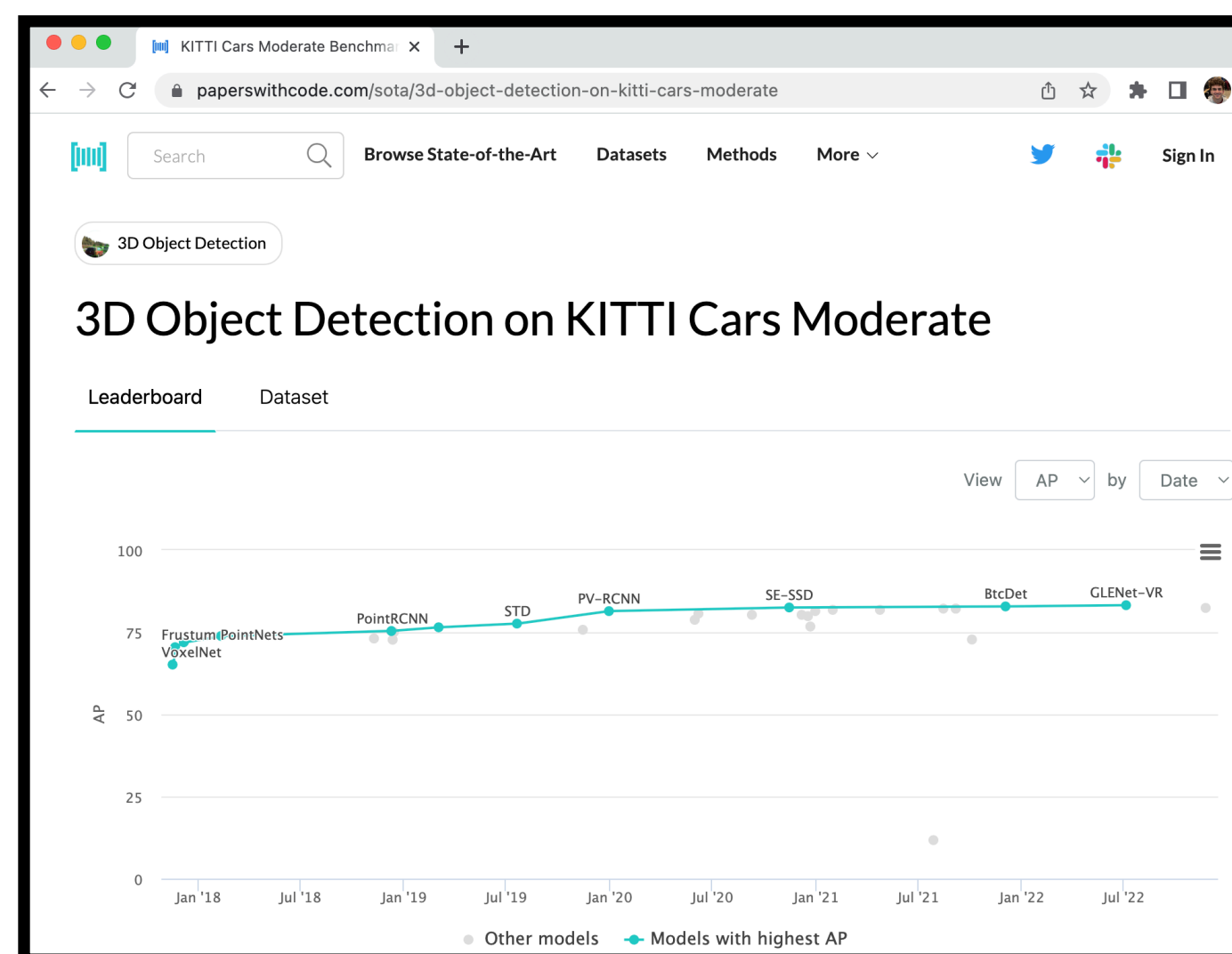
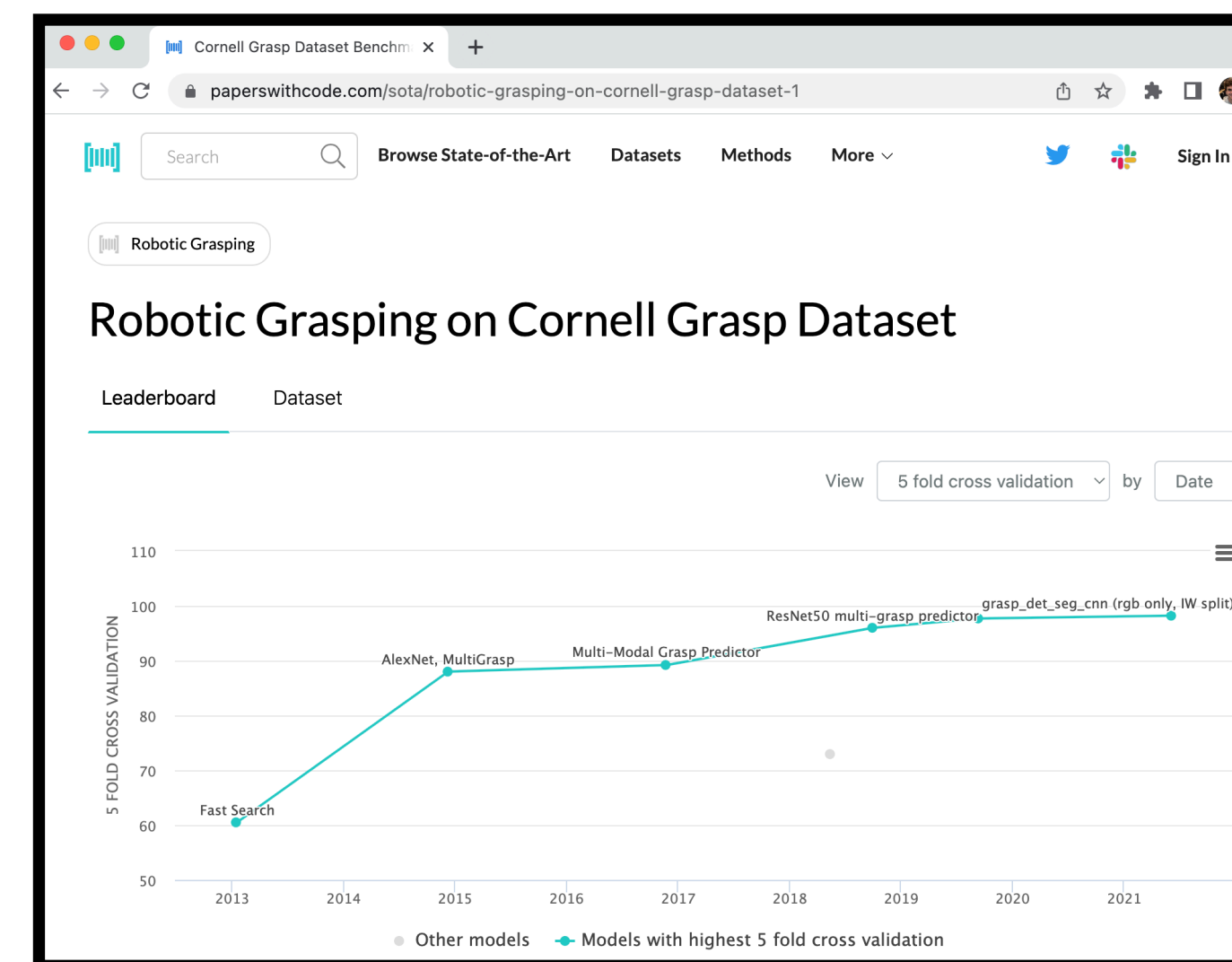
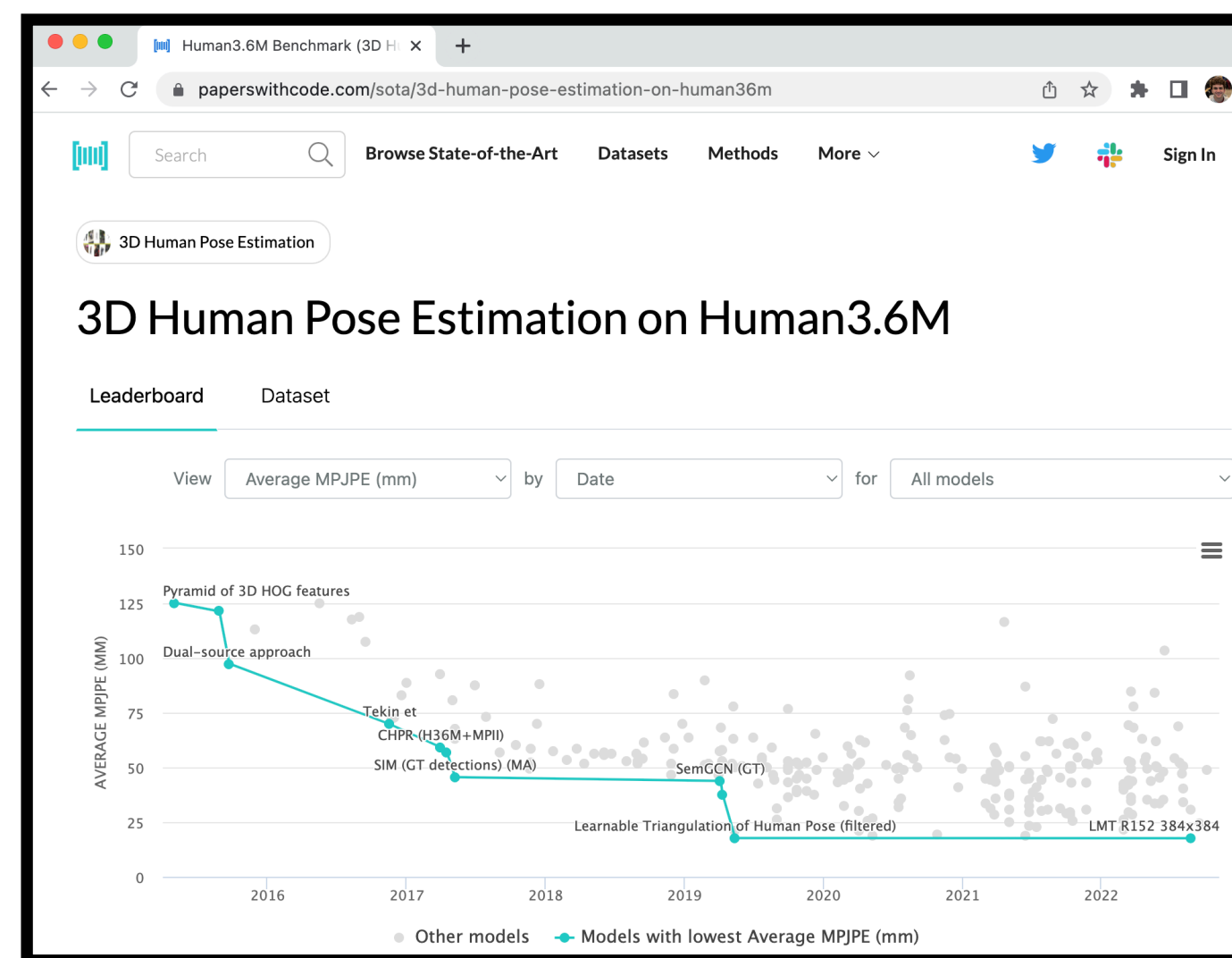
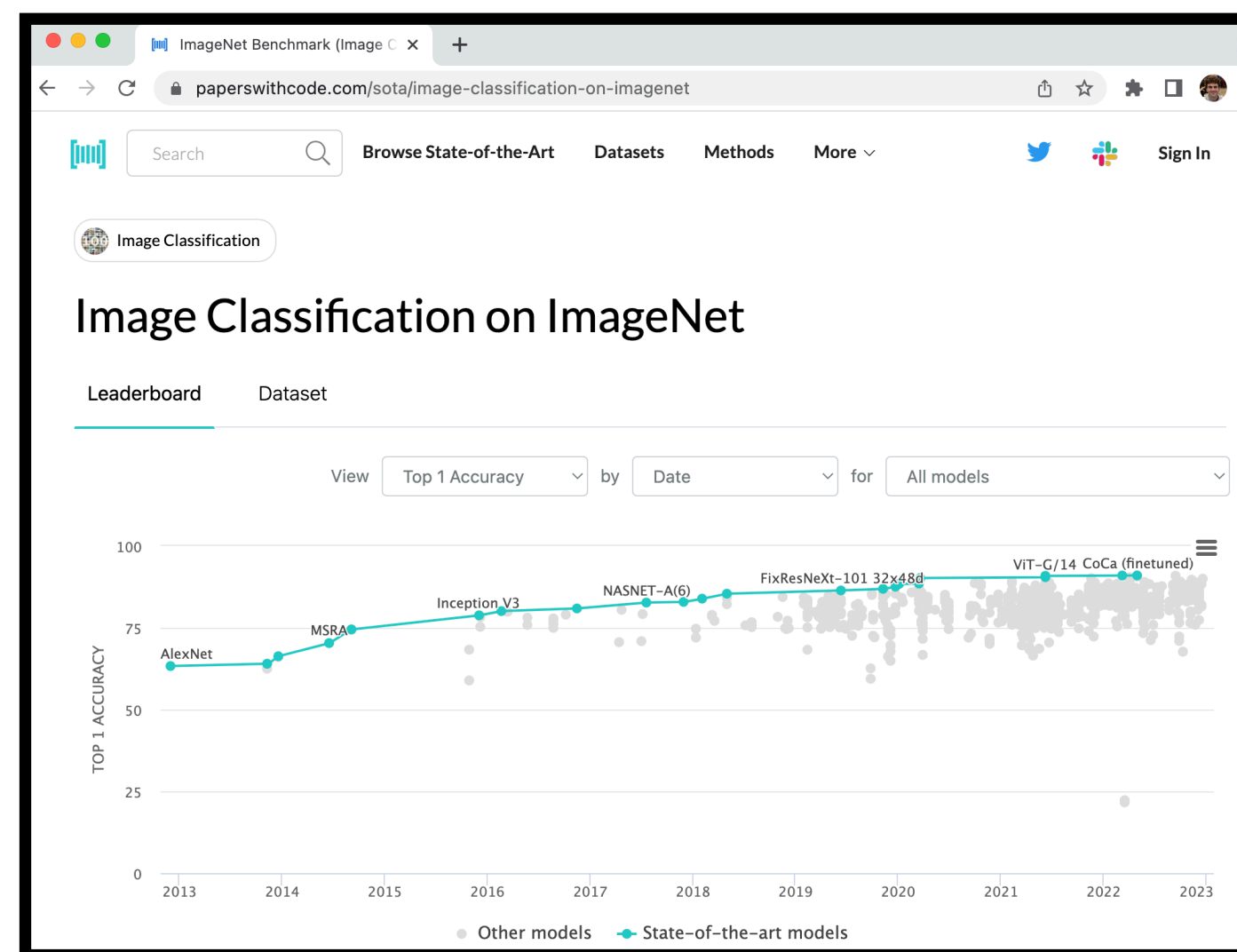
---

- Applied Side
  - Practitioners want state of the art performance
  - Look to academia for what exists and how it can be replicated
- Research Side
  - Understand the field as a way to find ideas for contributing
  - New datasets, techniques, methods defined by research community





# State of the Art is Always Changing



Machine Learning Datasets | 7,656 machine learning datasets

Filter by Modality:

- Images: 2214
- Texts: 2048
- Videos: 707
- Audio: 458

Filter by Task:

- Question Answering: 323
- Semantic Segmentation: 250

7656 dataset results:

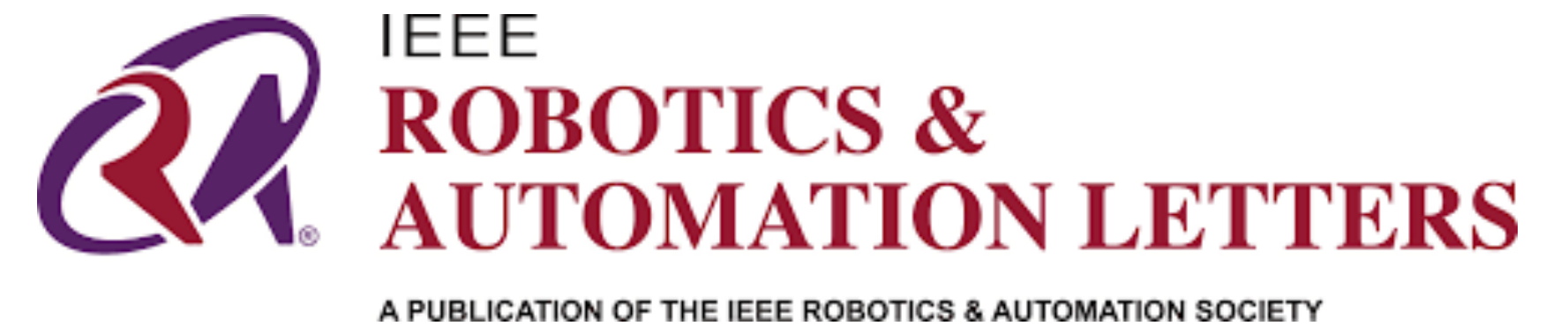
- CIFAR-10**: The CIFAR-10 dataset (Canadian Institute for Advanced Research, 10 classes) is subset of the Tiny Images dataset and consists of 60000 32x32 color images. T. 10,339 PAPERS • 65 BENCHMARKS
- ImageNet**: The ImageNet dataset contains 14,197,122 annotated images according to the WordNet hierarchy. Since 2010 the dataset is used in the ImageNet Large Scale. 9,846 PAPERS • 96 BENCHMARKS
- COCO (Microsoft Common Objects in Context)**: The MS COCO (Microsoft Common Objects in Context) dataset is a large-scale object detection, segmentation, key-point detection, and captioning dataset. Th.



# Where to Look for Deep Learning Papers in Robotics?



Science Robotics



iROS is in Detroit this year!



# Where to Look for Deep Learning Papers in Robotics?

arXiv.org e-Print archive

arxiv.org

Cornell University

We gratefully acknowledge support from the Simons Foundation and University of Michigan

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- **High Energy Physics - Lattice** ([hep-lat new](#), [recent](#), [search](#))
- **High Energy Physics - Phenomenology** ([hep-ph new](#), [recent](#), [search](#))





# Publishing Never Stops

The screenshot shows a web browser window with the University of Michigan Mail interface. The address bar shows 'mail.google.com'. The email header includes the University of Michigan logo and the subject 'cs daily Subj-class mailing 90400c0 1'. The sender is 'send mail ONLY to cs <no-reply@arxiv.org>' and the date is 'Fri, Jan 20, 2023 at 3:40 AM'. The recipient is 'topipari@umich.edu'. The email body contains instructions for submitting comments and links to archives. It lists submission categories: Computer Vision and Pattern Recognition, Computers and Society, Machine Learning, Neural and Evolutionary Computing, and Robotics. The message was received from 'Wed 18 Jan 23 19:00:00 GMT to Thu 19 Jan 23 19:00:00 GMT'. The main content is an arXiv preprint with ID 'arXiv:2301.07805', dated 'Wed, 18 Jan 2023 22:27:08 GMT (2520kb,D)'. The title is 'Multi-target multi-camera vehicle tracking using transformer-based camera link model and spatial-temporal information'. The authors are 'Hsiang-Wei Huang, Jenq-Neng Hwang' and the category is 'cs.CV'. The abstract begins with 'Multi-target multi-camera tracking (MTMCT) of vehicles, i.e. tracking vehicles across multiple cameras, is a crucial application for the development of smart city and intelligent traffic system. The main challenges of MTMCT of vehicles include the intra-class variability of the same vehicle and inter-class similarity between different vehicles and how to associate the same'.





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>190 new papers in the last 24 hours

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# How to Read Deep Learning Research Papers?

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Everyone develops their own style over time

**DR**

# Questions I Consider When Reading a Paper

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What problem are the authors trying to address?

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# Questions I Consider When Reading a Paper

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**What is the primary field and subfield of the work?**

**What problem are the authors trying to address?**

**What progress have other researchers made on this problem?**

**What are the primary claims and contributions?**

# Questions I Consider When Reading a Paper

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**What are the key results?**

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**What progress have other researchers made on this problem?**

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**What are the key results?**

**How were these results achieved? Using which techniques evaluated under which methods?**



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**What progress have other researchers made on this problem?**

**What are the primary claims and contributions?**

**What are the key results?**

**How were these results achieved? Using which techniques evaluated under which methods?**

**What problems, questions, or findings could be expanded on as future work?**

# Discussion: AlexNet

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## ImageNet Classification with Deep Convolutional Neural Networks

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**Alex Krizhevsky**

University of Toronto

kriz@cs.utoronto.ca

**Ilya Sutskever**

University of Toronto

ilya@cs.utoronto.ca

**Geoffrey E. Hinton**

University of Toronto

hinton@cs.utoronto.ca

# Discussion: PoseCNN

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## PoseCNN: A Convolutional Neural Network for 6D Object Pose Estimation in Cluttered Scenes

Yu Xiang<sup>1,2</sup>, Tanner Schmidt<sup>2</sup>, Venkatraman Narayanan<sup>3</sup> and Dieter Fox<sup>1,2</sup>

<sup>1</sup>NVIDIA Research, <sup>2</sup>University of Washington, <sup>3</sup>Carnegie Mellon University  
yux@nvidia.com, tws10@cs.washington.edu, venkatraman@cs.cmu.edu, dieterf@nvidia.com



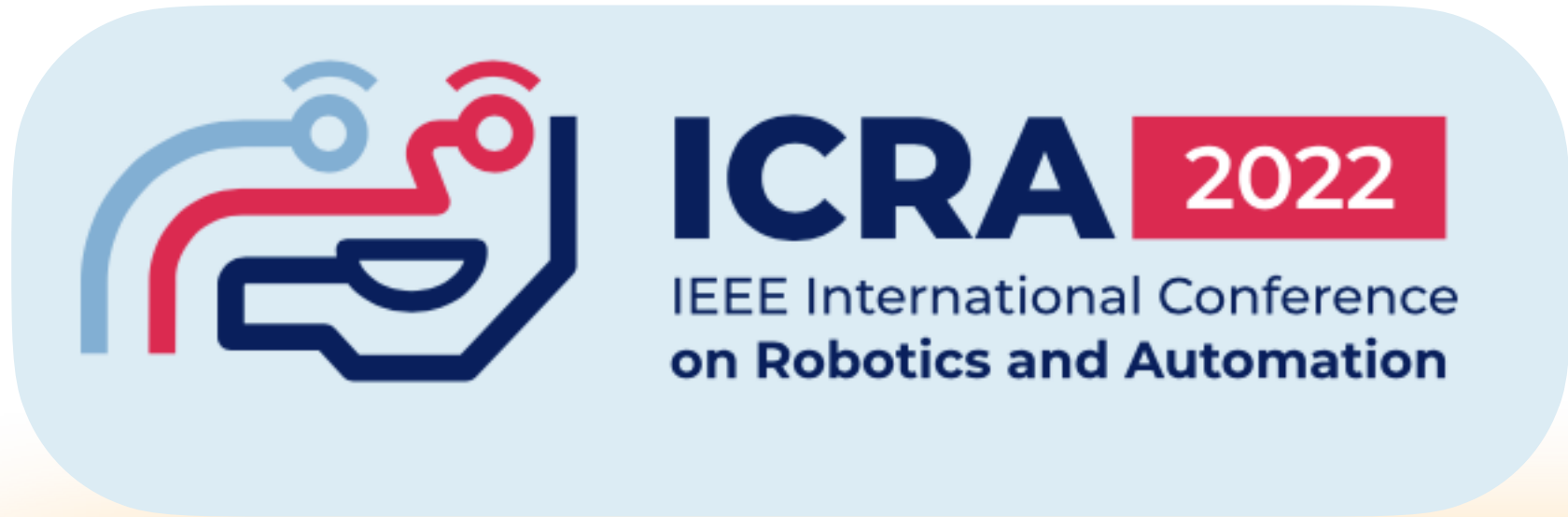
# Discussion: NeRF

## NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis

Ben Mildenhall<sup>1\*</sup>   Pratul P. Srinivasan<sup>1\*</sup>   Matthew Tancik<sup>1\*</sup>  
Jonathan T. Barron<sup>2</sup>   Ravi Ramamoorthi<sup>3</sup>   Ren Ng<sup>1</sup>

<sup>1</sup>UC Berkeley   <sup>2</sup>Google Research   <sup>3</sup>UC San Diego





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