

Sustainable computer vision for autonomous machines

Bartosz Zieliński

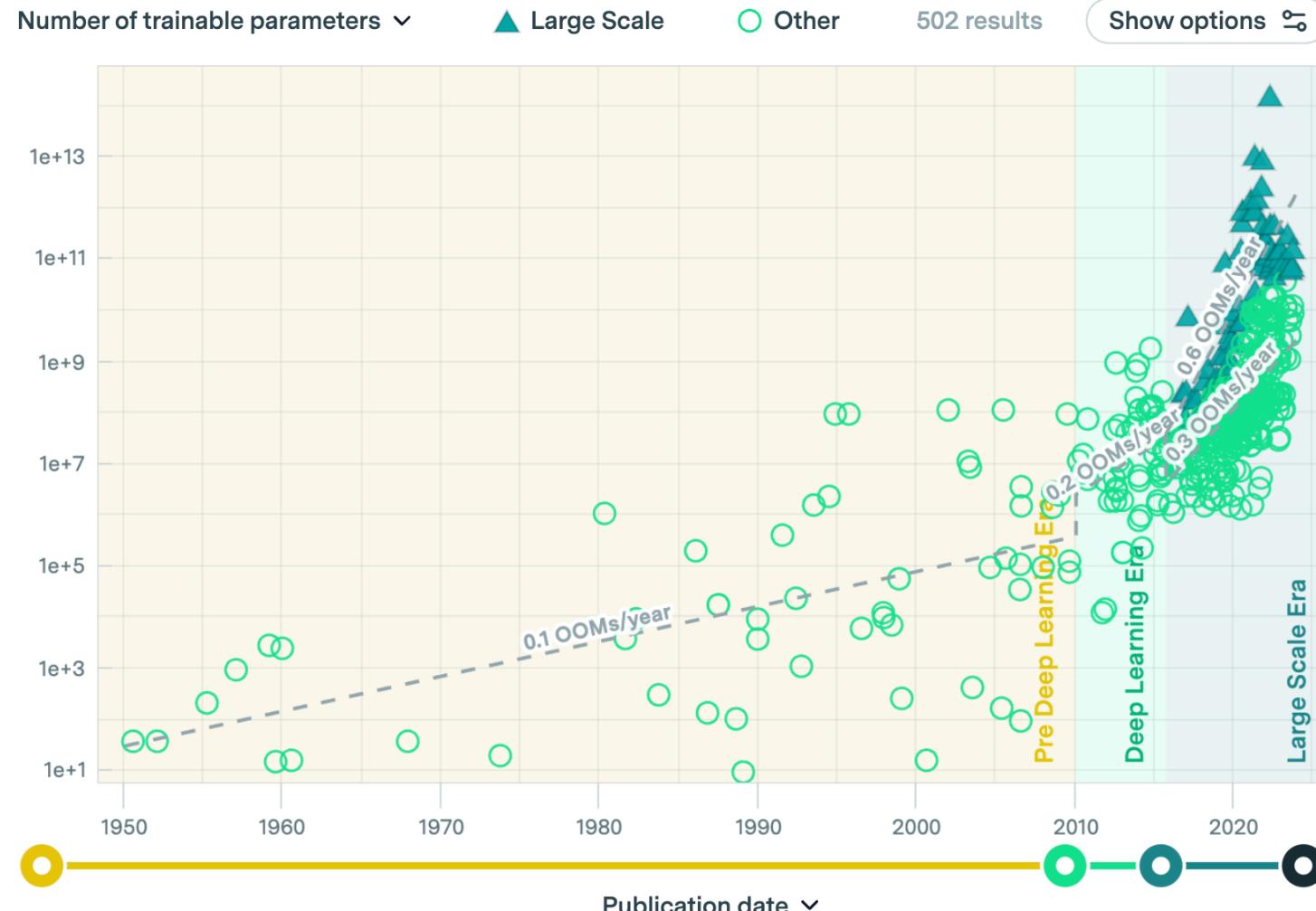


IDEAS
NCBR

- + Occupation
 - + Associate Professor @ JU (SINN, GMUM)
 - + Research Team Leader @ **IDEAS NCBR**
- + Education
 - + PhD @ IPPT PAN
 - + Habilitation @ PWr
- + Two research teams
 - + Sustainable and interpretable neural networks (JU)
 - + **Sustainable computer vision for autonomous machines (IDEAS)**

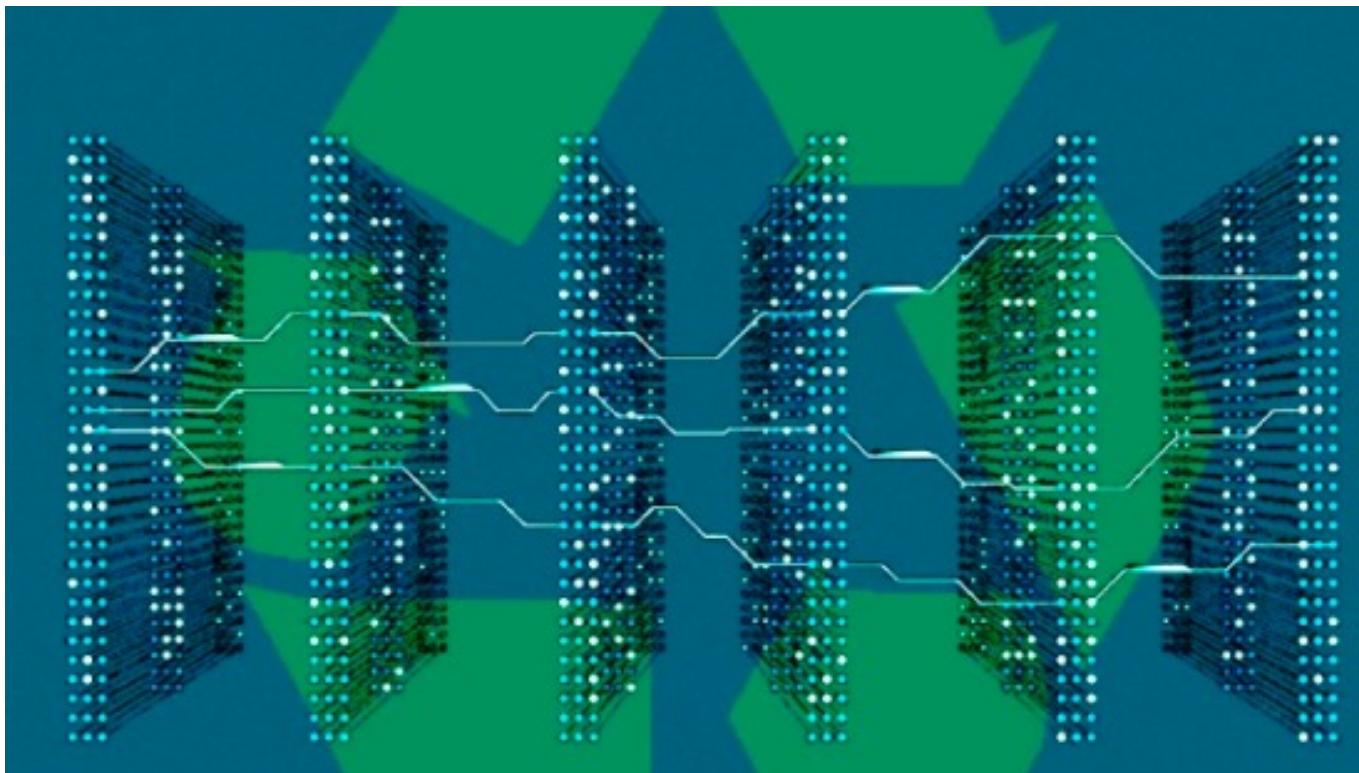


ML uses more and more computational resources

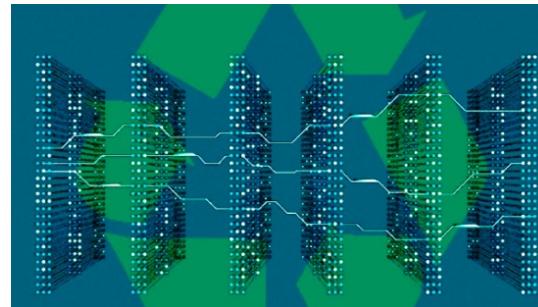


Sustainable machine learning

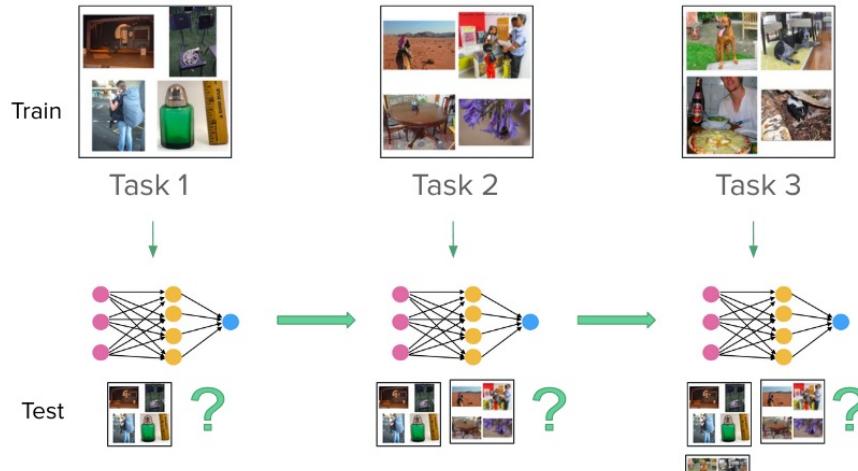
- + Sustainable AI deals with the problem of the ecological impact of AI development.
- + Research in this area focuses on reducing this impact, e.g. by recycling models trained so far.



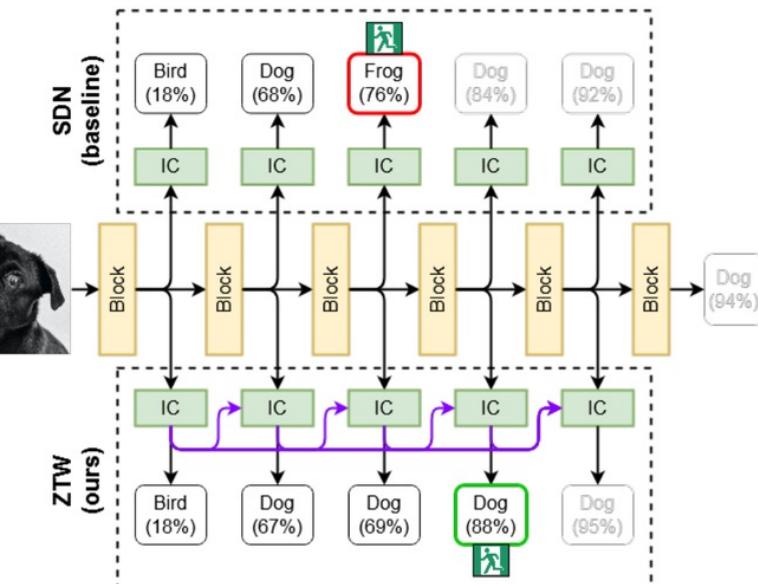
Zero-waste machine learning in computer vision



continual learning



conditional computations

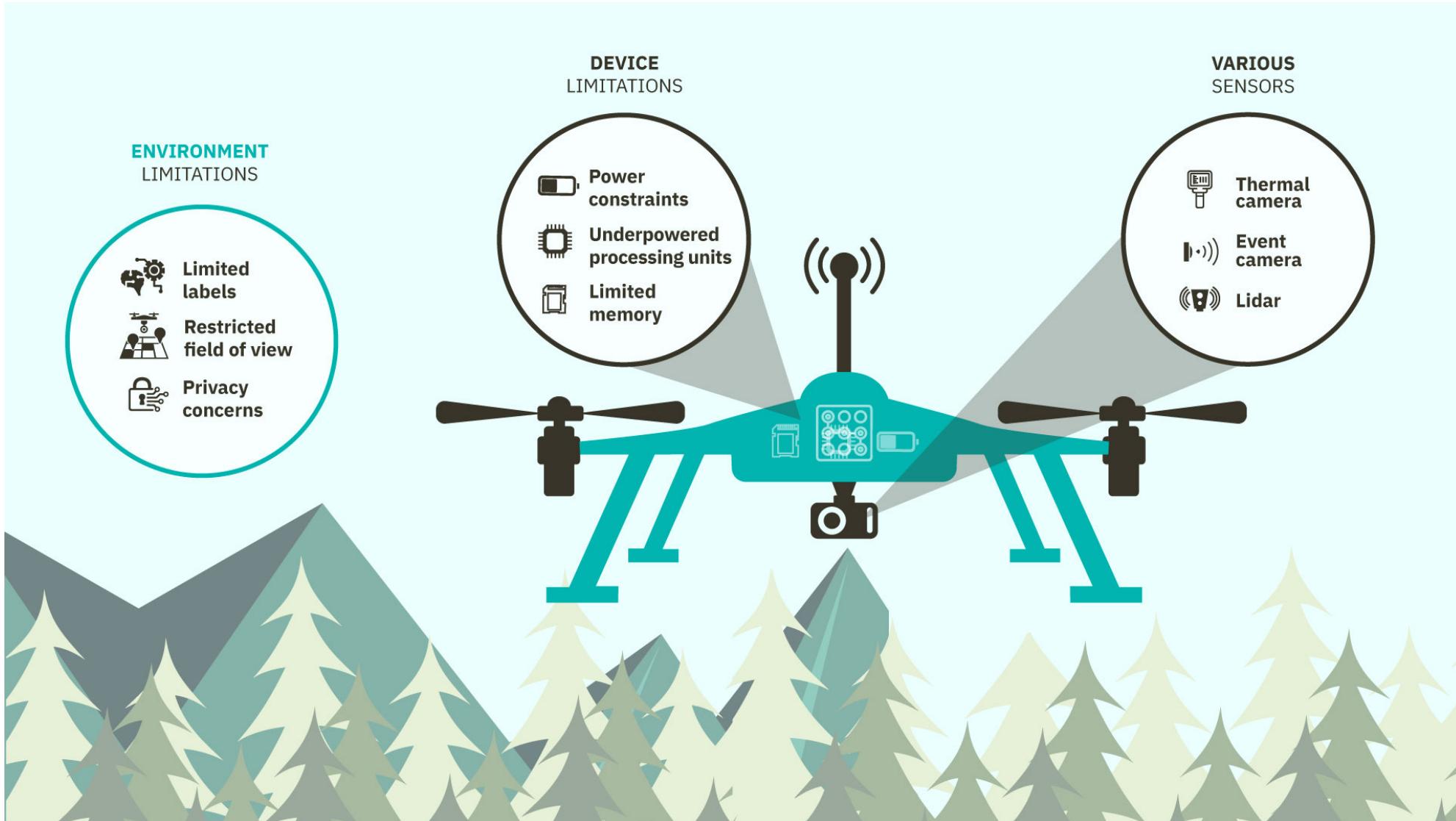


How far we are from reality (autonomous machines)?

- + Do setups we consider, e.g. in continual learning, are realistic?
- + What is the real energy consumption of our conditional methods?
- + What are the other open questions in autonomous machines related to sustainable computer vision?



Sustainable computer vision for autonomous machines

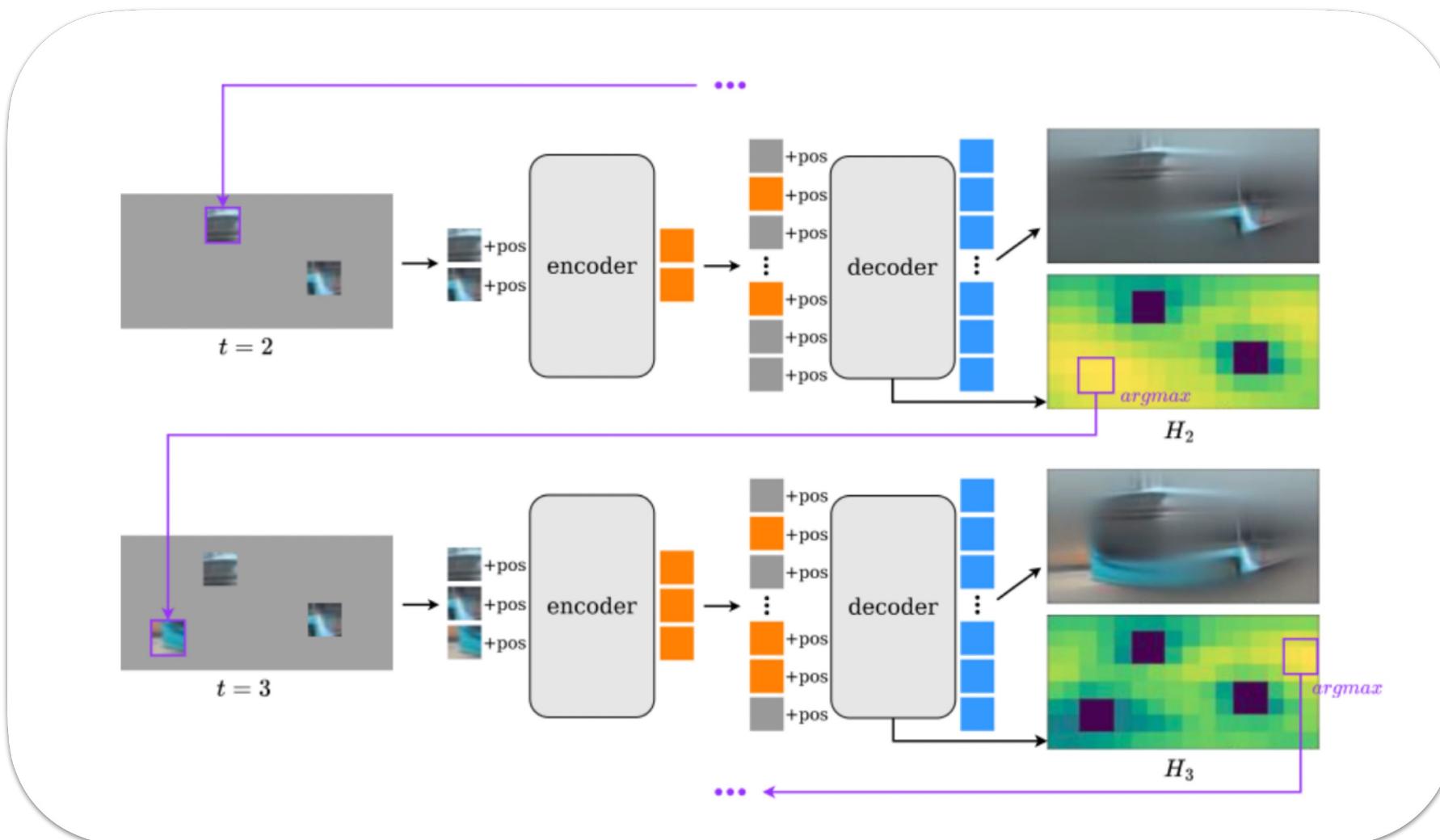


Active visual exploration

- + Adam Pardyl, Grzegorz Rypeść, Grzegorz Kurzejamski, Bartosz Zieliński and Tomasz Trzciński
- + Active visual exploration based on attention-map entropy
- + IJCAI 2023

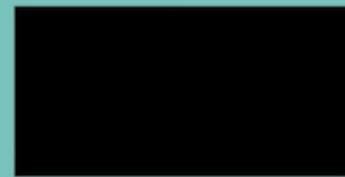


Active Visual Exploration



How it works

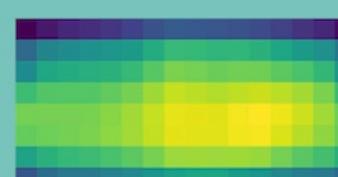
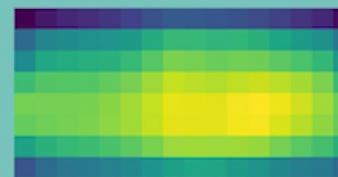
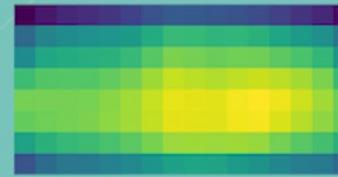
Input



Prediction

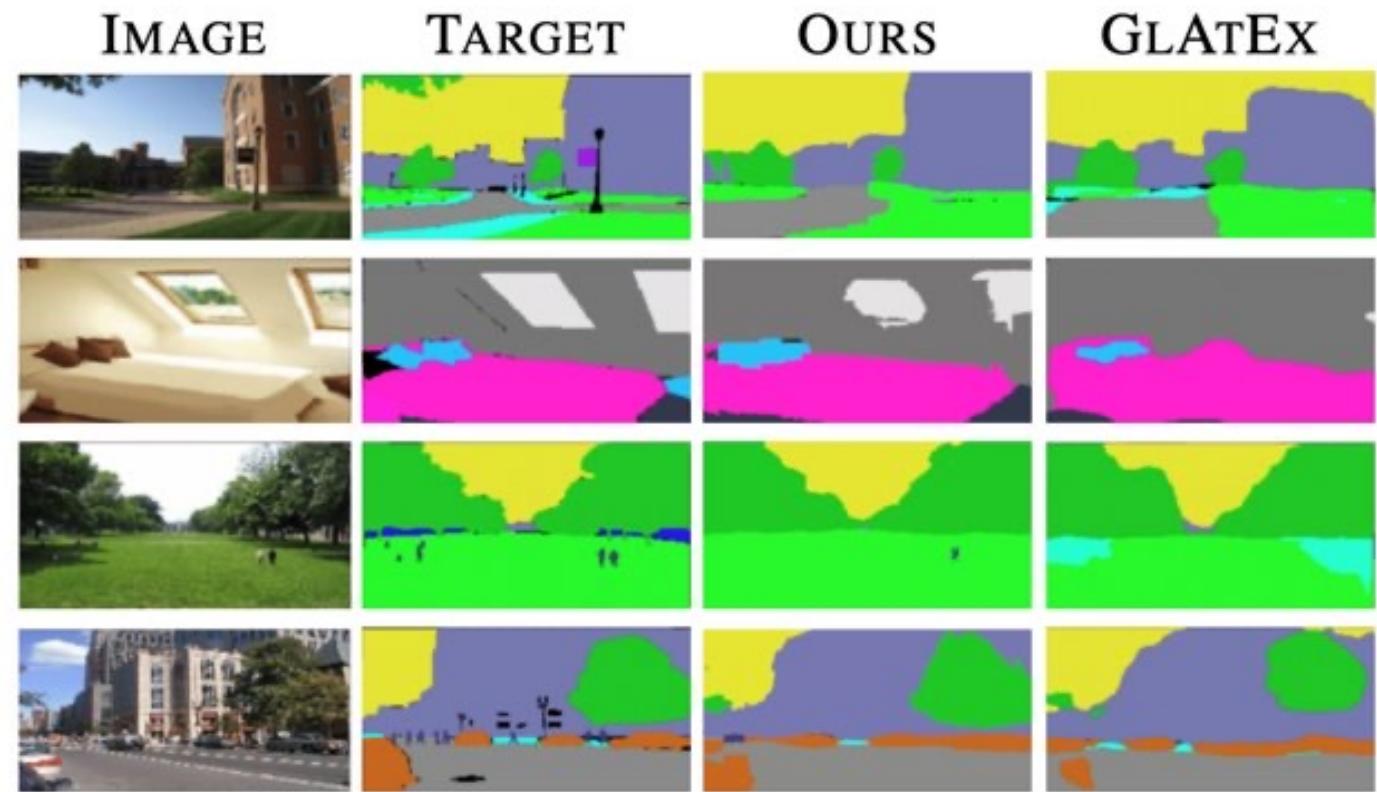
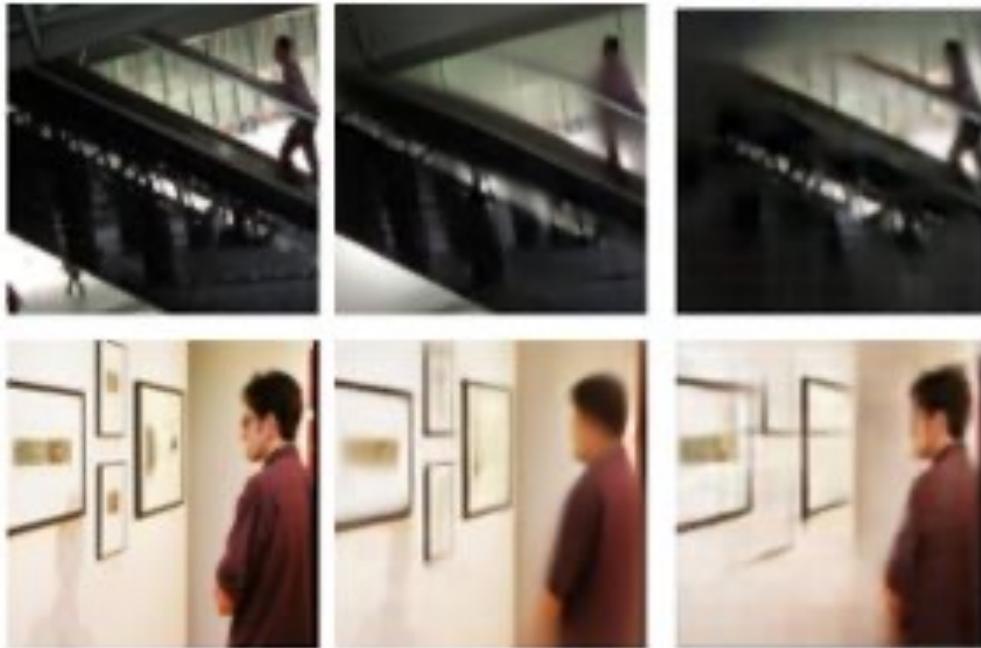


Uncertainty



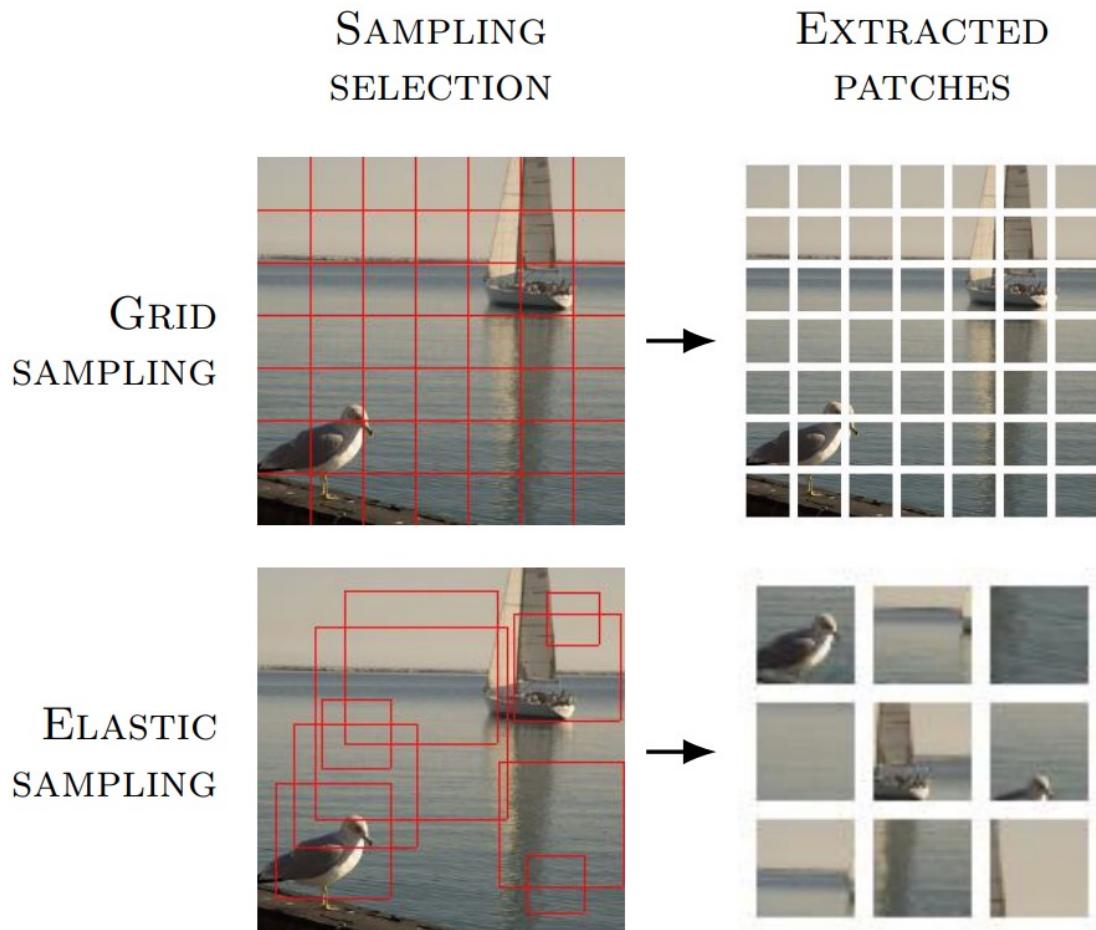
Active Visual Exploration

INPUT OURS SIMGLIM

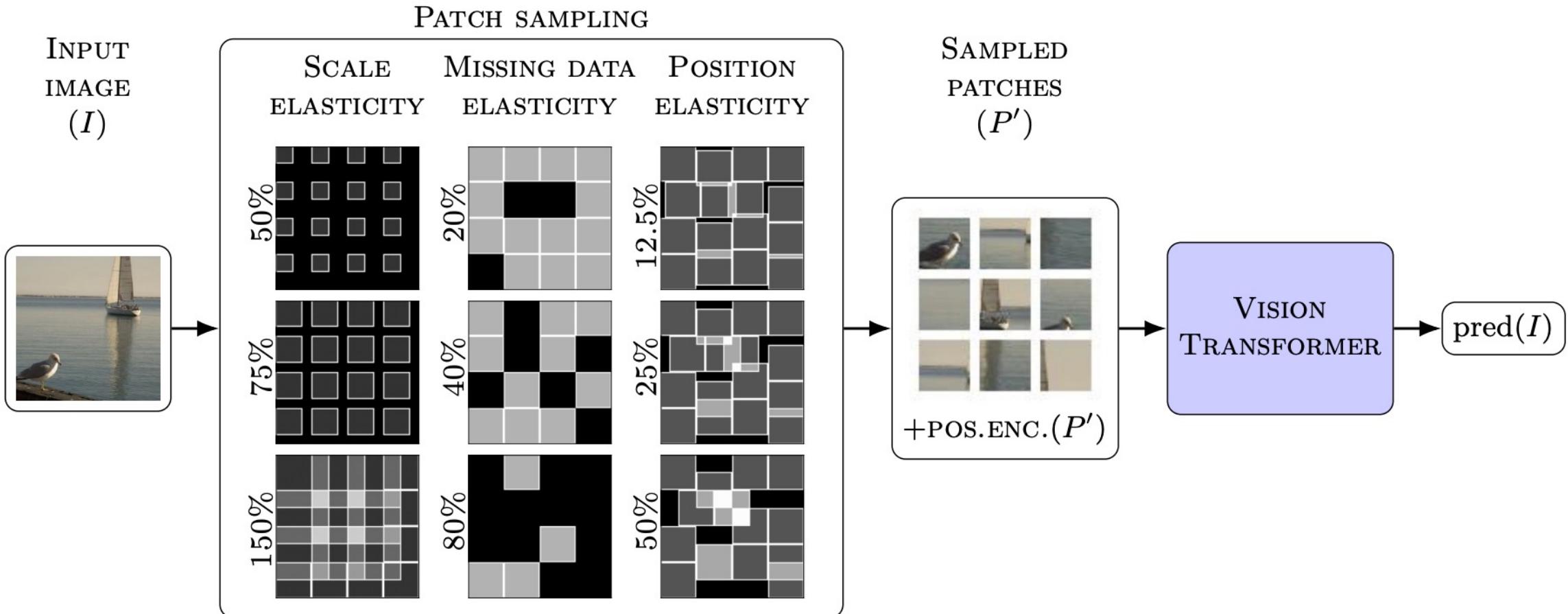


Transformers beyond grids

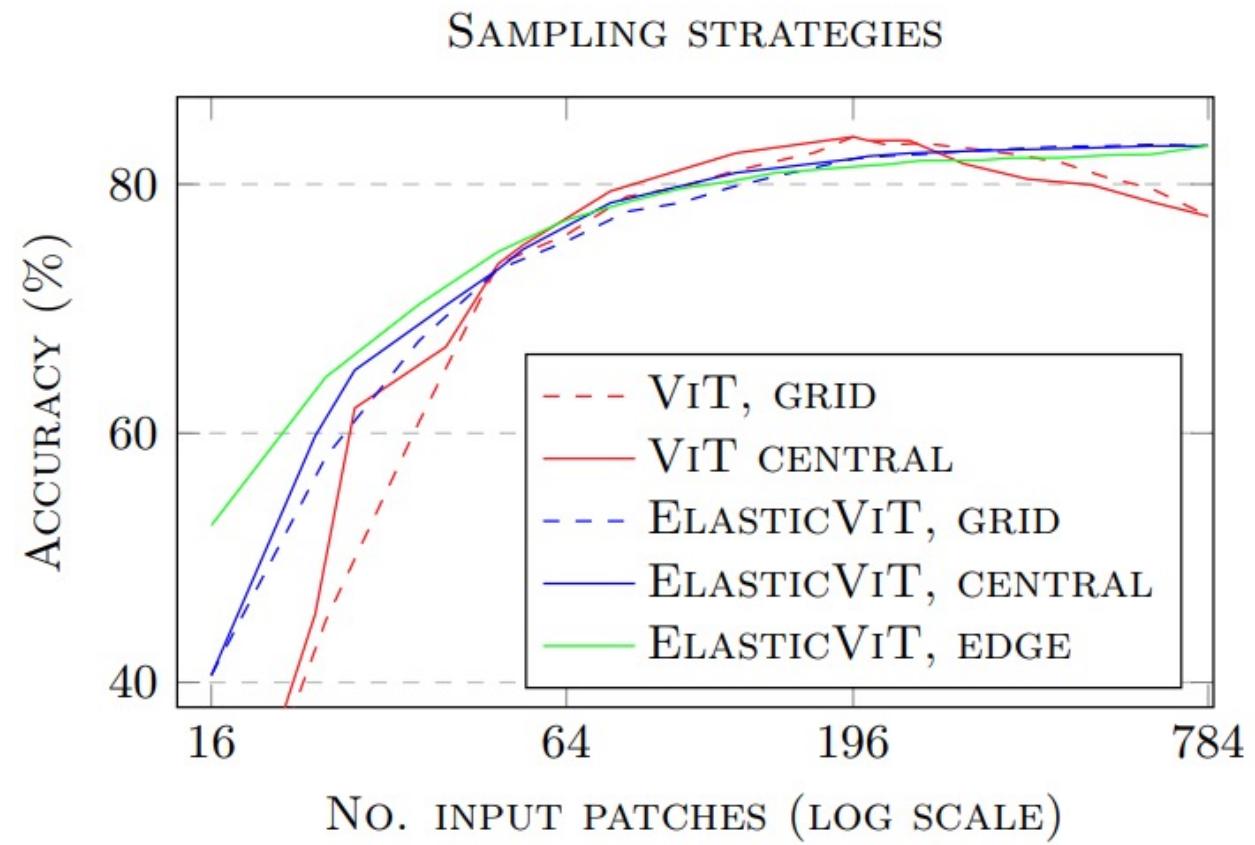
- + Adam Pardyl, Grzegorz Kurzejamski, Jan Olszewski, Tomasz Trzcinski and Bartosz Zieliński
- + Beyond Grids: Exploring Elastic Input Sampling for Vision Transformers
- + SDM submission



Transformers beyond grids

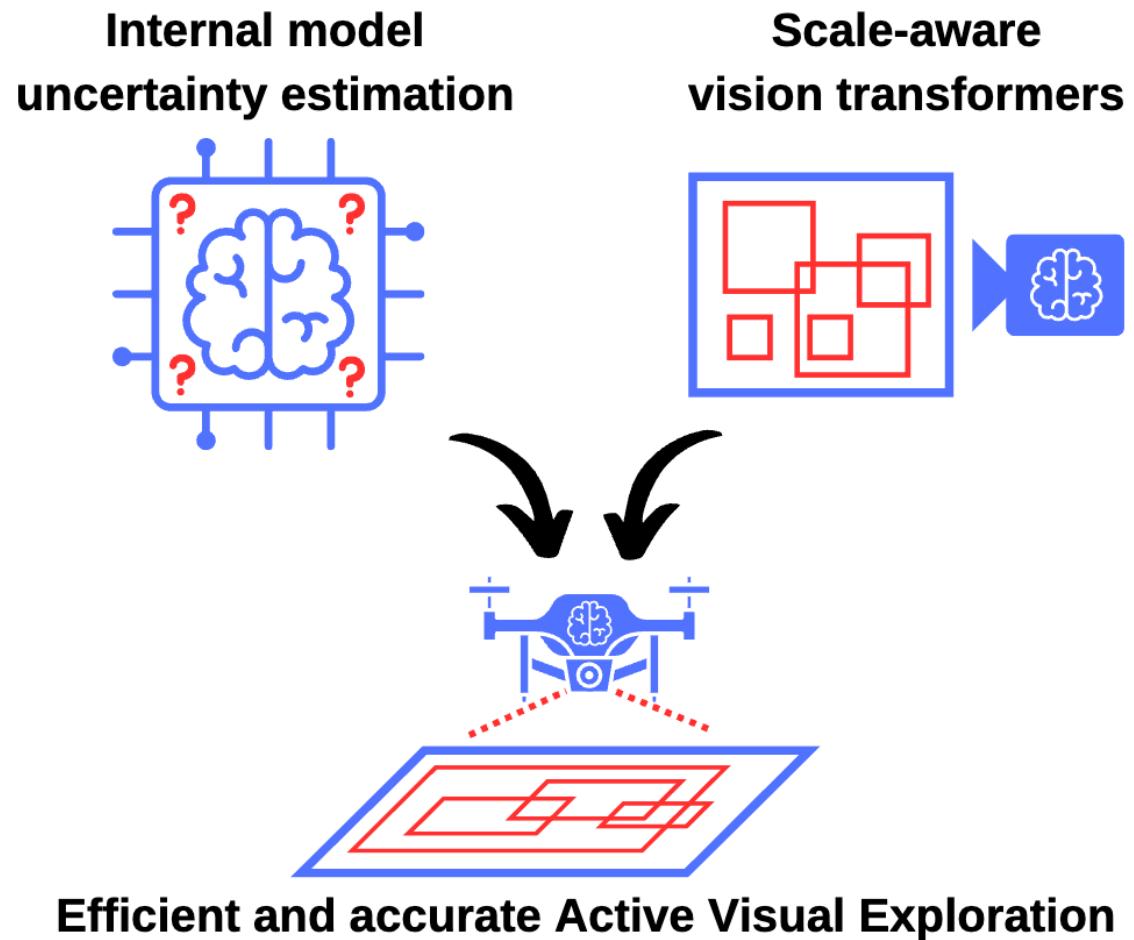


Transformers beyond grids



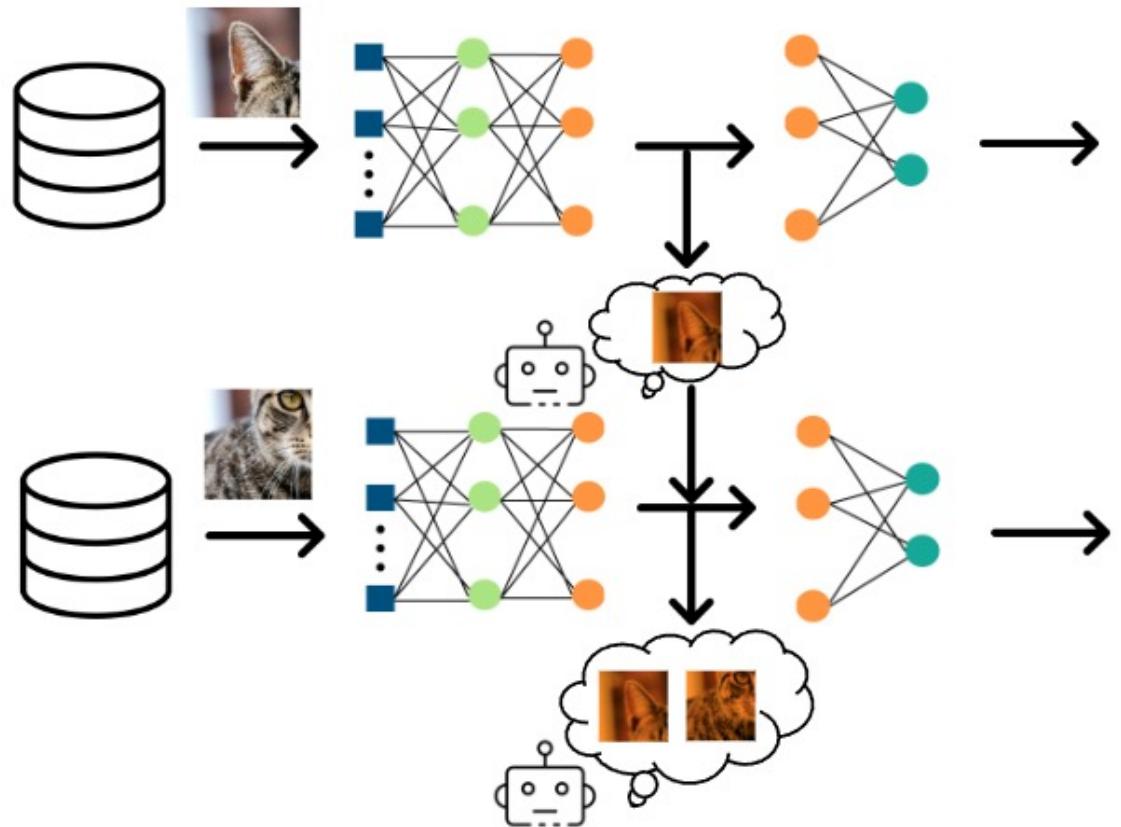
Active visual exploration beyond grids

+ Adam Pardyl, Bartosz Zieliński and Kamil Adamczewski

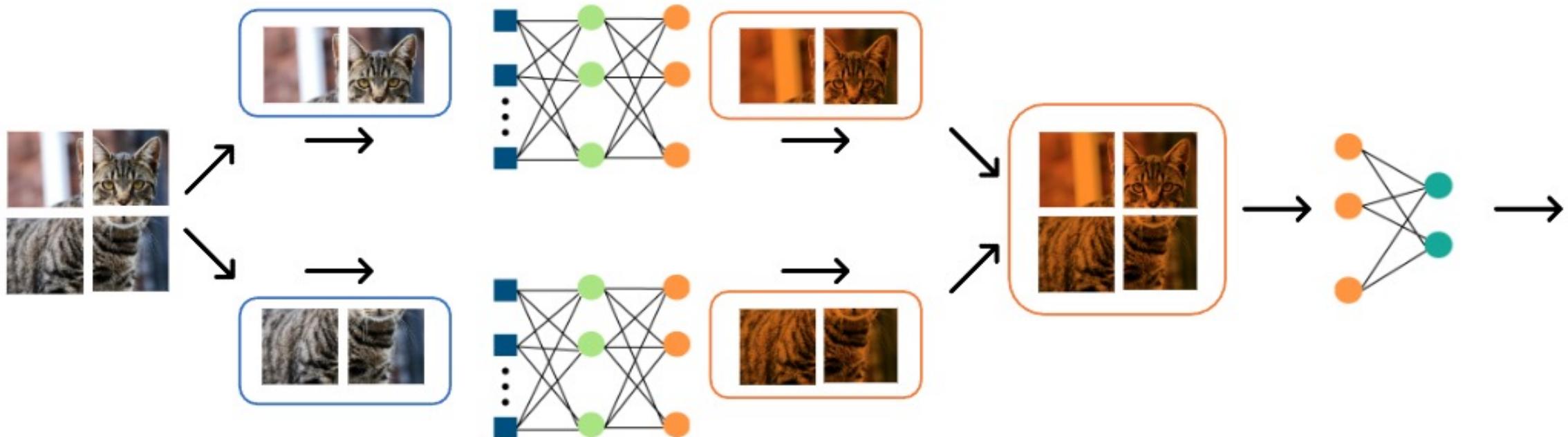


Token recycling

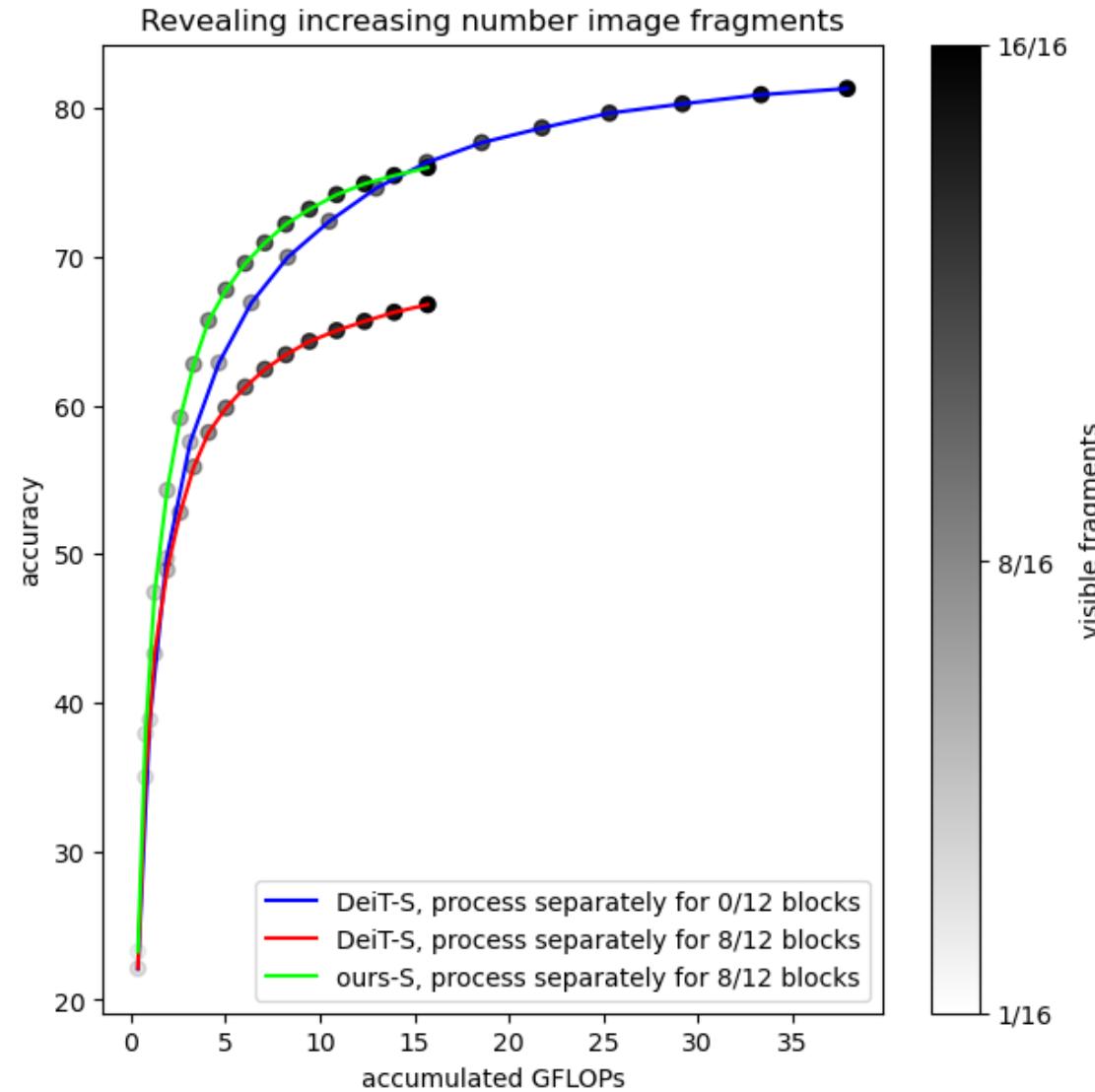
- + Jan Olszewski, Piotr Wójcik, Dawid Rymarczyk and Bartosz Zieliński
- + Token Recycling for Efficient Sequential Inference with Vision Transformers
- + CVPR submission



Token recycling

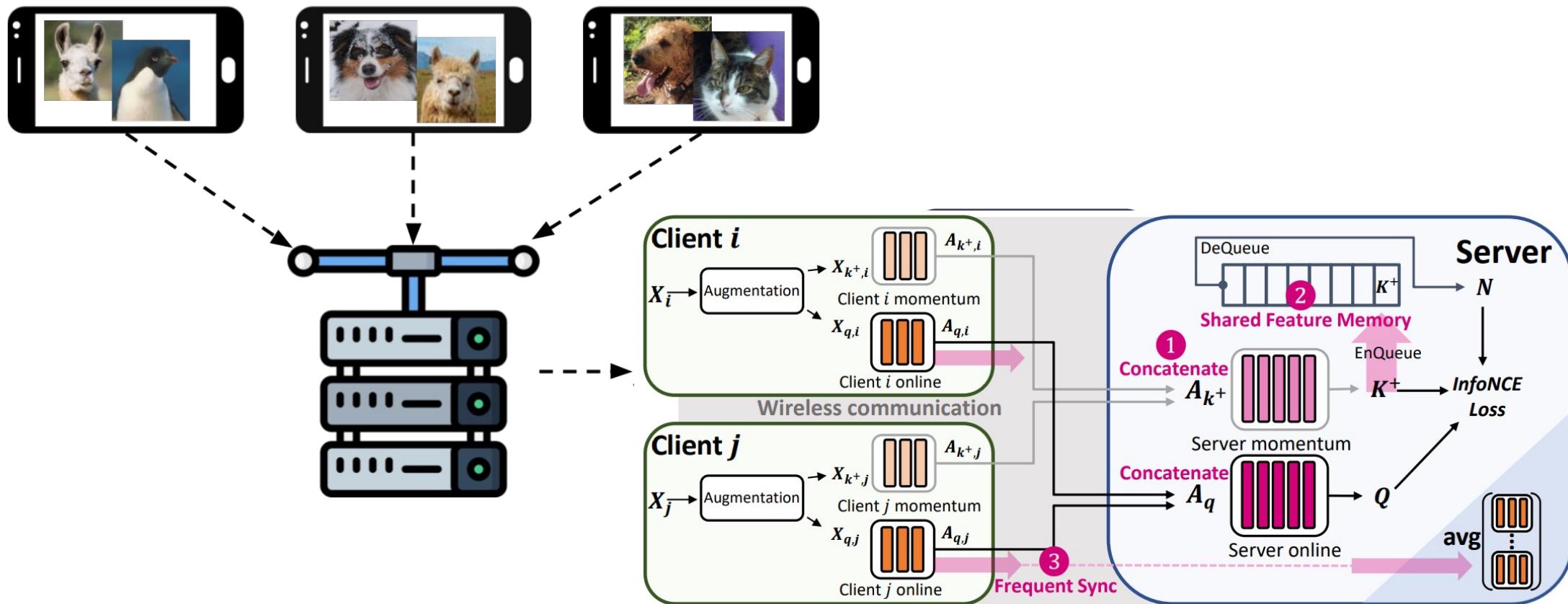


Token recycling



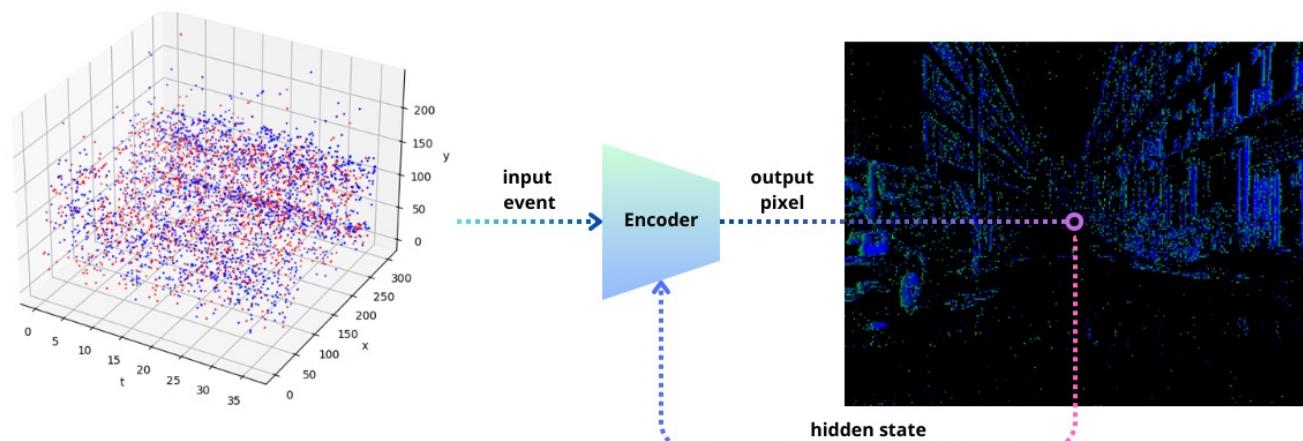
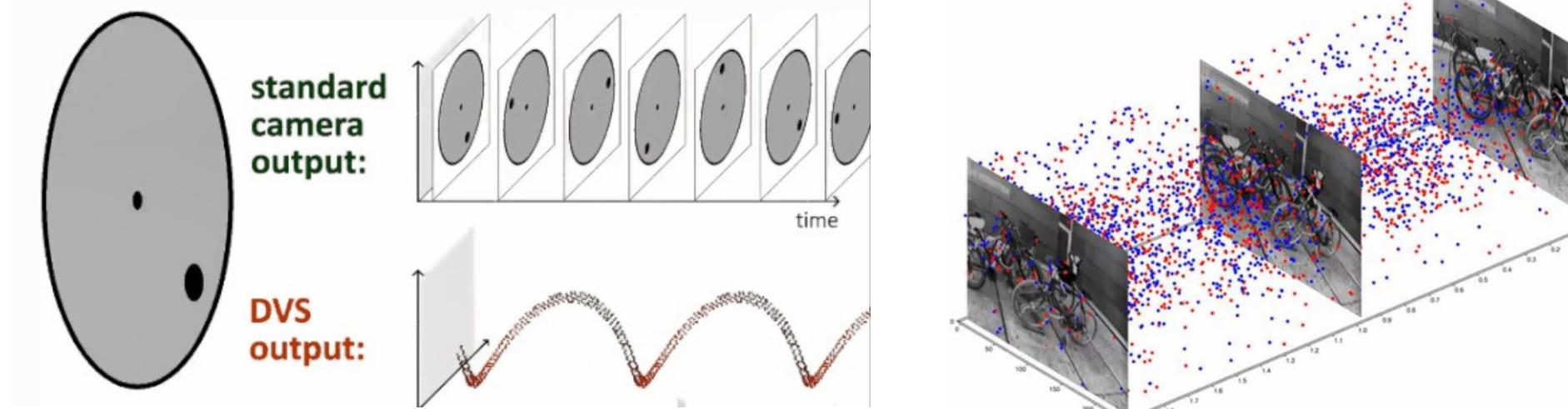
Federated representation learning

+ Marcin Przewięźlikowski, Marcin Osial, Marek Śmieja and Bartosz Zieliński



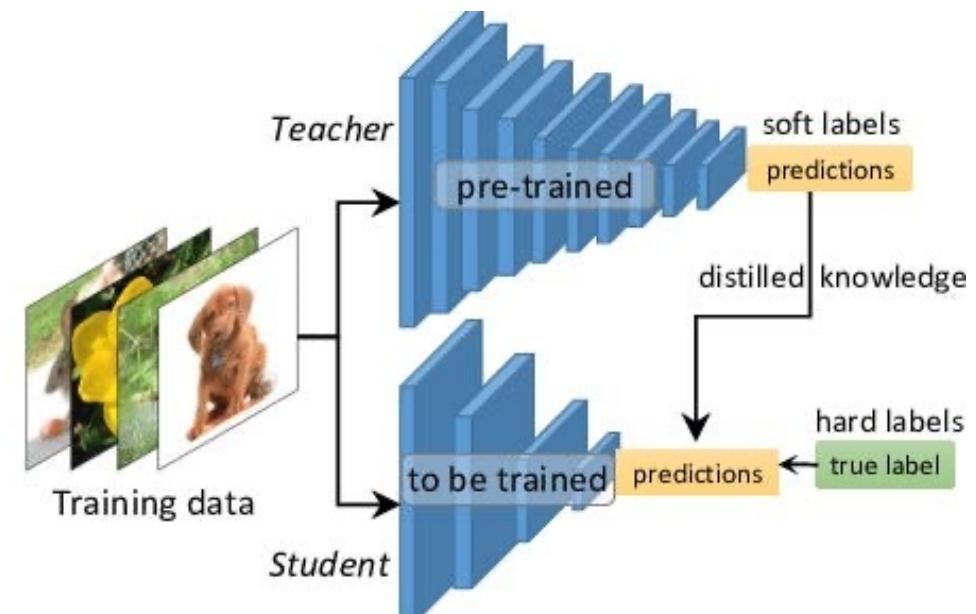
Learning representation of events

+ Kamil Jeziorek, Adam Pardyl, Tomasz Kryjak and Bartosz Zieliński



Cross-modal distillation

+ Marcin Osial, Dawid Migacz, Maciej Zięba, Bartosz Zieliński and Kamil Adamczewski



<https://www.cs.princeton.edu/~fheide/AdverseWeatherFusion/>

<https://towardsdatascience.com/knowledge-distillation-simplified-dd4973dbc764>

Thank you!

- + Contact me if you are interested in cooperation on any of the presented topics:
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- + Check out my websites:
 - + <https://bartoszzielinski.github.io>
 - + <https://ideas-ncbr.pl/badania/sustainable-computer-vision-for-autonomous-machines>
 - + <https://sinn.edu.pl>
 - + <https://gmum.net>