**Jury report**
**Kees Schouhamer Immink Prize 2022**

### Dr. T.S. (Taco) Cohen
*Equivariant Convolutional Networks*
Universiteit van Amsterdam 9 juni 2021

The jury of the Kees Schouhamer Immink Prize 2022 has been enjoyed and honored to select the winning nomination. The prize is handed out every two years to a younger researcher that completed his/her research in the last four years in the field of computer science and telecommunication. The prize awards the best groundbreaking and original research, and is named after Kees Schouhamer Immink, who is well known for his pioneering contributions to video, audio, and data recording technology (e.g., the development of the Compact Disc, DVD and Blu-ray Disc). The jury has received truly excellent nominations, but after careful deliberations, the jury members agreed that there was one nomination that clearly stood out and should be the undisputed winner because of its prominent level of research and possibilities for re-use in multiple areas. This year's Kees Schouhamer Immink Prize will go to Taco Cohen for his work on Equivariant convolutional networks. The work is truly exceptional in many respects, as is elaborated in the remainder.

Dr. Taco Cohen did his PhD work under the supervision of Prof. Max Welling at the University of Amsterdam, and has defended his thesis in June 2021. The work leverages symmetries to improve the ability of convolutional neural networks to generalize from relatively small amounts of data samples for learning. The work focuses on applying group theory to deep learning and has opened the field of equivariance in neural networks. The techniques developed are evaluated on problems such as image classification and segmentation in vision and medical imaging, 3D model classification, quantum chemistry, protein structure classification, and the detection of extreme weather events. The work has been presented at the top conferences and published in the leading journals of the field, and is broadly considered as groundbreaking. The jury recognized that the work is communicated and discussed at intercontinental level because of its relevance and the possibilities for re-use.

The research work is highly cited. Half a year after the PhD defense, his work already collected more than 4000 citations. Taco Cohen has already an H-index of 22. Both numbers are exceptional considering his (scientific) age and are probably even higher when at this moment when we hand out the award at ICT.OPEN 2022. DBLP lists 23 conference papers and three journal papers. These papers illustrate and confirm that Taco Cohen has worked on a range of different topics.

His work has been awarded several times. He graduated cum laude for BSc, MSc and PhD, was named as one of the MIT 35 innovators under 35 Europe in 2018, won the best ICLR 2018 Best Paper Award for "Spherical CNNs", won a Google PhD Fellowship in 2017, and received awards for his review work at ICLR 2017, ICML 2018, and NeurIPS 2021.

He has a very strong international network and collaborated with the leading people in the field. For example, he worked with Turing award winner Prof. Geoffrey Hinton on semi-supervised learning of equivariant representations when working at Google DeepMind. Hinton was also on his PhD committee and deeply impressed by the work. His promotor writes "It is rarely that a PhD student cracks open a whole new field, but that is precisely what happened here. The implication of his ideas ranges from engineering to science, from computational neuroscience, to computational biology and chemistry to theoretical physics. In a way, one can say that Taco invented the standard model for deep learning: a new way to organize and structure deep architectures using group theory and symmetries." This quote nicely illustrates the exceptional nature of the work.

The presented description here illustrates that the jury had this time a relatively easy job. The members all agreed that this was by far the premium candidate.

The jury members and the Royal Holland Society of Sciences and Humanities would like to congratulate Taco Cohen for winning this award and his amazing achievements. We also sincerely congratulate the people that worked with him, in particular his promotor Prof. Max Welling.


*Prof. dr. ir. Wil van der Aalst, hoogleraar Process and Data Science RWTH Aachen University, chief scientist Celonis, deeltijdhoogleraar Informatiesystemen Technische Universiteit Eindhoven*
*Prof. dr. ir. Peter de With, hoogleraar video coding and architectures Technische Universiteit Eindhoven*


The jury meeting took place 11 January 2022, was chaired by KHMW-directeur Mr. M. (Mieke) Zaanen, and also attended by Prof. dr. A.P. (Ad) IJzerman, secretaris natuurwetenschappen KHMW and Drs. S. (Saskia) van Manen, secretaris KHMW (minutes).