Juryrapport
KNVI/KIVI Scriptieprijzen voor Informatica en Informatiekunde 2020

Dit jaar waren er tweeëntwintig nominaties voor de KNVI/KIVI Scriptieprijzen. Alle tweeëntwintig kandidaten zijn in hun eigen universiteit zeer hoog beoordeeld en ook zeer enthousiast aanbevolen. Alle scripties waren zeer goed geschreven met in ieder geval een gedeelte dat ook begrijpbaar is voor niet-vakgenoten. Bij de beste scripties is er een grote diepgang bereikt.

De beoordeling is gedaan in twee ronden, waarbij in de eerste ronde een top zes geselecteerd is. De taak van de jury was dan ook niet eenvoudig. Dat is een zin die vaker wordt aangetroffen in een juryrapport, maar hier was deze zin echt van toepassing. Het niveau van de beste zes scripties uit de tweede ronde was uitzonderlijk hoog, zo hebben alle kandidaten al artikelen in vooraanstaande conferenties.

Maar u bent natuurlijk benieuwd naar de winnaars! Ik maak de winnaars bekend in het Engels.

1e prize
S. (Sindy) Löwe MSc, University of Amsterdam
Greedy InfoMax for Self-Supervised Representation Learning

The Royal Holland Society of Sciences and Humanities awards the first KNVI/KIVI Thesis Prize for Informatics and Information Science to Sindy Löwe for her impressive master thesis entitled “Greedy InfoMax for Self-Supervised Representation Learning”. Sindy Löwe completed her thesis at the Master program Artificial Intelligence of the University of Amsterdam.

The thesis of Sindy Löwe addresses a pressing challenge in artificial intelligence (AI) and data science. Deep neural network algorithms are responsible for breakthroughs in a large variety of application domains. However, these algorithms require huge labelled datasets and ever-increasing computational resources to be trained successfully. Progress in AI is hampered by these requirements. Inspired by biological principles, Löwe invented a solution that breaks up a deep neural network in smaller components that can be trained relatively independently without requiring labels. Surprisingly, her solution has a performance that is competitive with existing deep algorithms. Löwe’s self-supervised deep learning approach represents a highly original and biologically plausible approach to deep learning. The impact of her work is underscored by her paper on this topic that was accepted for an oral presentation of the most prestigious conference in the field, NeurIPS. Her contribution to this conference received an “outstanding new directions paper award”. The jury of the KNVI/KIVI Thesis Prizes for Informatics and Information Science recognizes the extra-ordinary talent of Sindy Löwe and was impressed by the clarity of the thesis and the associated open source approach.

There are two second prizes.

2e prize
P.L. (Lukas) Miedema MSc, University of Twente
QuickInterp - Improving interpreter performance with superinstructions

2e prize
M.D. (Matthew) Skrzypczyk MSc, Delft University of Technology
Dynamic Time-Division Multiple Access in Noisy Intermediate-Scale Quantum Device Networks

The first second prize is awarded to the thesis of Lukas Miedema. The title of his thesis is “QuickInterp - Improving interpreter performance with superinstructions”. Lukas Miedema studied Technical Computer Science at the University of Twente. The research described is in the core of Computer Science, and it is based on formal methods. In Computer Science, specifically in software engineering, formal methods are mathematically rigorous techniques for the specification, development and verification of software systems. The use of formal methods is motivated by the expectation that performing the appropriate mathematical analysis can contribute to the reliability and robustness of a design. The research question is well-motivated, and the goal is to improve the performance of Java Virtual Machine interpreters. The proposed algorithm finds near-optimal solutions for the NP-hard problem of constructing a super instruction set. The problem is viewed from many angles, and the writing style is clear. The implementation elements of super instructions are analyzed and prioritized step by step. It shows a deep understanding of what matters in software development. The jury is impressed by the results and awards the thesis of Lukas Miedema the first share of the second prize.

And the other second prize goes to the thesis “Dynamic Time-Division Multiple Access in Noisy Intermediate-Scale Quantum Device Networks” by Matthew Skrzypczyk obtained at the Delft University of Technology. The topic of the thesis is from the domain of quantum networks. Where networks between ordinary computers have reached high levels of sophistication, networks between quantum computers have to be reinvented from scratch due to the extraordinary character of the basic material computers are made of, namely their bits.
Quantum bits are very different from binary bits, and in computation and transport, they behave very differently. And, to the appreciation of the jury, the thesis takes time to explain these differences to professionals. In chapter 4, the introduction of a new algorithm to schedule quantum networks is simple yet convincing. The jury has an appreciation for the format and the delivery of the thesis. The jury is happy with the result, and therefore the jury awards the second share of the second prize to this thesis.

Prof. dr. J.N. (Joost) Kok, decaan faculteit elektrotechniek, wiskunde en informatica Universiteit Twente
Prof. dr. E.O. (Eric) Postma, hoogleraar kunstmatige intelligentie Tilburg University
Prof. dr. ir. A.W.M. (Arnold) Smeulders, hoogleraar computer vision Universiteit van Amsterdam, voorzitter directie COMMIT

De jury vergaderde op 27 oktober 2020 onder leiding van Ir. A. (Bert) Meerstadt MBA, directeur KHMW. Daarnaast waren ter vergadering aanwezig Prof. dr. A.P. (Ad) IJzerman, secretaris natuurwetenschappen en S. (Saskia) de Boer (verslag).