

# Matthias De Lange

PHD RESEARCHER · ESAT-PSI

KU Leuven - Center for Processing Speech and Images, Department Electrical Engineering

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Incentivized by biological systems, I am highly motivated to improve the field with fundamental new ideas and to foster a foundation for continual learners in real-world applications. *The world we live in evolves continually, and so should the systems we build for it.*

## Education

### PhD — Final (4th) year

Leuven, Belgium

ESAT-PSI (COMPUTER VISION) - KU LEUVEN

Oct. 2018 - PRESENT

- PhD topic on *Incremental and Adaptive machine learning*, with focus on continual learning in computer vision.
- *First author publications* (click for embedded arxiv links):
  - CVPR 2020 De Lange et al. *"Unsupervised Model Personalization while Preserving Privacy and Scalability: An Open Problem"*
    - Extending continual learning towards scalable and privacy preserving user-specific neural networks.
  - TPAMI 2021 De Lange et al. *"A continual learning survey: Defying forgetting in classification tasks"* DOI: 10.1109/TPAMI.2021.3057446.
    - Devising a principled framework to dynamically determine the stability-plasticity trade-off of the continual learner.
    - First large-scale study of state-of-the-art in continual learning, with 3 large-scale datasets, 11 methods, 4 baselines.
    - Scrutinizing previously unexplored effects of model capacity, regularization and task ordering.
  - ICCV 2021 De Lange et al. *"Continual Prototype Evolution: Learning Online from Non-Stationary Data Streams"*
    - Online continual learner with continually evolving prototypes enables learning and prediction at any point in time.
    - Novel Pseudo-Prototypical Proxy loss incorporates batch information to surpass SOTA by high margin.
    - Our *learner-evaluator* framework unifies the fields of continual learning and concept drift.
  - ICCV 2021 Verwimp and De Lange et al. *"Rehearsal revealed: The limits and merits of revisiting samples in continual learning"*
    - Fundamental analysis of rehearsal dynamics in the context of loss landscapes.
- *Management and community:*
  - PSI-lab Responsible for internal scientific communication in PSI-lab organized in the format of seminars.
    - Experienced (3 years) in clear presentation for audiences of scientific and industrial partners.
  - CVPR 2021 General chair Continual Learning in Computer Vision (CLVision) workshop, 2nd edition, at CVPR 2021.
    - Great success with nearly 600 unique viewers over 8 hours of live content.
  - CVPR 2022 Main general chair Continual Learning in Computer Vision (CLVision) workshop, 3rd edition, at CVPR 2022.
  - ICCV 2021 Co-organizer Continual learning challenge at Huawei's self-supervised learning workshop on Autonomous Driving.
  - Software Library Co-author CVPR workshop paper and one of the main contributors of the open-source Avalanche Continual learning library.
- Reviewer at IEEE TPAMI, CVPR 2021, IJCAI 2021 and Workshop on Continual Learning (ICML2020) and Lifelong Machine Learning (ICML2020).
- Certificate International Computer Vision Summer School (ICVSS) 2019 and course Academic Writing 2019.
- Eager to learn continually, taking additional courses on uncertainty in AI, cognitive science and neural networks.

### Master (Summa cum laude & Laureate)

Ghent, Belgium

ENGINEERING TECHNOLOGY ELECTRONICS AND ICT, SPECIALISATION ICT - KU LEUVEN

Sep. 2017 - Aug. 2018

- Laureate awarded for highest score.
- Master thesis on speech recognition for cleanroom environments.
- Courses and projects on machine learning, expert systems and optimization techniques.

### Academical Bachelor (Summa cum laude)

Ghent, Belgium

ENGINEERING TECHNOLOGY ELECTRONICS AND ICT, SPECIALISATION ICT - KU LEUVEN

Sep. 2014 - Aug. 2017

- Programming experience: JavaSE, Python, C, C++, SQL, HTML, javascript and Matlab.

### High School

Ghent, Belgium

SCIENCE-MATHEMATICS (ASO) - DON BOSCO COLLEGE ZWIJNAARDE

Sep. 2008 - Aug. 2014

## Professional Experience

### Huawei, Noah's Ark Lab

Leuven, Belgium

PHD

2018 - 2019

- Cooperation with industrial partner on a large scale Continual Learning survey (TPAMI) and privacy-preserving user adaptation (CVPR2020).
- Main contributor for open-source Continual Learning framework developed in Pytorch.
- Experienced team player in a fast-paced research environment with frequent presentation of results and leading discussion.

## STADIUS & MyCellHub

Leuven, Belgium

### MASTER THESIS

2017 - 2018

- Development of a noise robust *automatic speech recognition* (ASR) system for cleanroom environments.
- Experience with GMM- and DNN systems in the Kaldi framework, and beamforming for noise-cancellation in MATLAB.
- Mastered Technologies: Python, Kaldi, Bash, MATLAB

## XPlore Group

Ghent, Belgium

### SOFTWARE DEVELOPER

Aug. 2017

- Full stack development of a flexible web application to enhance company's internal workflow for job applications.
- Technologies: Spring Boot, jQuery, Git, Thymeleaf, Spring Data JPA, REST

## KU Leuven & Televic

Ghent, Belgium

### BACHELOR THESIS

2016 - 2017

- Industry 4.0 project with anomaly detection for cyberphysical train systems.
- JavaEE backend to process sensordata of trains with dynamic data management, and native Android interoperating as REST-client.
- Technologies: JavaEE 6, JSF, REST, jQuery, Git, Android, SQLite, Volley

## Languages

### English

Fluent writing and speaking: main language in research group, and weekly reporting results to industrial partner.

Proficient and enthusiastic reading: academic papers and English literature in spare time.

### French

Good reading. Basic writing and speaking.

### Dutch

Native Language.

## References

### Prof. Tinne Tuytelaars

Leuven, Belgium

ESAT - PSI (KU LEUVEN)

- PhD Promotor.
- Specialized research in computer vision, deep learning and image processing.
- Contact: [Tinne.Tuytelaars@esat.kuleuven.be](mailto:Tinne.Tuytelaars@esat.kuleuven.be)

### Prof. Gregory Slabaugh

London, UK

HUAWEI, NOAH'S ARK LAB

- Collaboration industrial Huawei project on Continual Learning.
- Former founder and leader of Huawei London's Computer Vision team, currently Professor at Queen Mary University of London.
- Contact: [greg.slabaugh@gmail.com](mailto:greg.slabaugh@gmail.com)

### Prof. Toon van Waterschoot

Leuven, Belgium

ESAT - STADIUS (KU LEUVEN)

- Promotor master thesis automatic speech recognition.
- Specialized research in dynamic systems, signal processing and data analysis.
- Contact: [toon.vanwaterschoot@kuleuven.be](mailto:toon.vanwaterschoot@kuleuven.be)

### Prof. Greet Vanden Berghe

Ghent, Belgium

CODES (KU LEUVEN)

- Senior lecturer teaching MSc courses AI, optimization and datastructures & algorithms.
- Specialized research in optimization techniques.
- Contact: [greet.vanden.berghe@kuleuven.be](mailto:greet.vanden.berghe@kuleuven.be)