SIMON KUTSCHE

Experienced Machine Learning Engineer (M.S.) with a strong foundation in ML algorithms

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Miami, FL, USA

Citizenship: US, German

in www.linkedin.com/in/simon-kutsche

github.com/Simon1307

simonkutsche.com

WORK EXPERIENCE

Machine Learning Engineer

Robert Bosch LLC

1 01/2023 - 09/2023

- Developed a Deep Learning-based process monitoring system using LSTM-Autoencoder for real-time anomaly detection in multivariate sensor data, contributing to increased availability and prevention of damage to expensive workpieces
- Extended the LSTM-Autoencoder model's capabilities by training it on datasets from multiple identical CNC machines, achieving a remarkable average F1score of 0.96 across monitoring scenarios
- Utilized AWS SageMaker, EC2, and S3 for model deployment and integration

Python

PyTorch

Git AWS

Scrum

Deep Learning Engineer Intern – Multi-task learning Bosch Center for Artificial Intelligence (BCAI)

⋒ 03/2022 − 09/2022

Renningen, Germany

- Developed novel loss weighting methods for Multi-task learning that outperformed state-of-the-art methods
- Compared loss balancing methods from the literature on tasks such as semantic segmentation, object detection, depth, and surface normal estimation on scene understanding datasets such as Cityscapes and NYUv2
- Documented the results within a paper submitted to CVPR 2023 and the master thesis and registered two strategies as patents

Python

PyTorch

MTL

Git

IBM Spectrum LSF

Technical Solutions Specialist/Data Engineer Scalefree International GmbH

10/2020 - 01/2022

Hanover, Germany

- Led the internal BI development team as a Scrum Master
- Developed processes for loading the staging area and the raw data vault by employing AWS services such as S3, Lambda, and Batch
- Implemented vector database solutions, such as utilizing TimescaleDB for real-time analytics, enhancing performance in tracking and analyzing customer interactions in an e-commerce use case for an external customer

Jira

SQL

Python

Git

Scrum

AWS

Vector Database

ACADEMIC PROJECTS

Student Research Project

University of Hildesheim

12/2020 - 03/2022

♥ Hildesheim, Germany

- Conducted image-to-image translation between the domains of regular images and artworks with Deep Generative Adversarial Networks
- Enhanced CycleGAN by introducing a two-objective discriminator as regularization, incorporating an adversarial self-defense for better cycle-consistency, and applying differentiable augmentation on the target domain with less data
- Employed agile intercultural project management techniques to manage the project successfully
- Designed and developed a Flask-based web application to deploy and showcase the model, enabling users to generate art pieces based on their input images, enhancing user engagement and interactivity

Python

TensorFlow

Scrum

GANs

Git

Flask

Slurm

EDUCATION

M.S. Data Analytics

University of Hildesheim

GPA: 3.5/4.0

B.S. Business Information Systems

University of Applied Sciences and Arts Hanover

GPA: 3.5/4.0

SKILLS

Programming

• Python, SQL, C++, Shell (Linux), Java

Data Science Frameworks

 PyTorch, TensorFlow, PySpark, Flask, NumPy, SciPy, scikit-learn, Pandas, Keras, Matplotlib, NLTK, OpenCV

Distributed Computing

 Hadoop, MapReduce, Spark, Multi-threading, OpenMPI, mpi4py, NoSQL, CUDA

Development Tools

 Git, Docker, Pycharm, Visual Studio Code, Jupyter Notebook

Web Development

JavaScript, HTML, CSS

Cloud Services

 AWS Elastic Beanstalk, AWS Codepipeline, AWS Batch, AWS Lambda, AWS S3, AWS Sagemaker, MS Azure Databricks

CERTIFICATES

- Certified Data Vault 2.0 Practitioner (CDVP2)
- Professional Scrum Master (PSM I)

LANGUAGES

English Native proficiency

German Native proficiency

Spanish Conversational proficiency

INTERESTS

Backpacking

Music

Programming

COURSEWORK

Natural Language Processing

University of Hildesheim

10/2021 - 11/2022

- Developed a sentiment analysis model to automatically categorize customer reviews into positive, negative, or neutral sentiments
- Generated a dataset through efficient labeling with Azure Machine Learning Data Labeling and storage using Azure Blob Storage
- Conducted data preprocessing on Azure Databricks for text cleaning and feature extraction and utilized Azure NLP services for sentiment analysis model selection and fine-tuning.

Python Azure Databricks NLP

Machine Learning

University of Hildesheim

1 04/2020 - 09/2021

♥ Hildesheim, Germany

- Implemented various machine learning models such as ridge regression with SGD, LASSO with coordinate descent, least-angle regression, logistic regression with newton method, gradient boosted decision tree, and AdaBoost from scratch in Python and NumPy on real-world datasets like Rossmann sales and Wine quality data. Employed data preprocessing techniques such as one-hot encoding, stratified sampling, PCA, and KNN data imputation
- Conducted performance comparison of the implemented models with scikit-learn implementation
- Performed exploratory data analysis on various real-world datasets using Pandas and Matplotlib
- Developed a recommender system by applying matrix factorization with SGD on movielens 100k dataset

Python NumPy Pandas scikit-learn Matplotlib

Deep Learning/Computer Vision

University of Hildesheim

1 04/2021 - 09/2021

- Trained a CNN end-to-end on a self-driving dataset (camera view from the car) using regularization techniques such as cutout and mixup, and implemented a custom batch normalization layer and residual connections to predict the steering angle in PyTorch
- Computed the saliency map for an input image using an ImageNet pretrained model
- Compared metric learning techniques such as learned embedding of a simple classification model, contrastive loss, and triplet loss with an embedding layer for MNIST data using TensorFlow
- Implemented transfer learning for training a U-Net model on a real-world weed field image dataset with a custom categorical cross-entropy loss. Pretrained the first half of the model on the classification dataset DeepWeeds using TensorFlow, improving the test accuracy by 1.5% compared to a vanilla U-net model and visualized the predicted segmentation map
- Generated adversarial examples using the Carlini-Wagner attack against a CNN trained on MNIST data and created sparse perturbations with the Hoyer-Square regularizer using PyTorch
- Implemented YoloV1 from scratch for object detection on a real-world urban street scenes dataset to detect pedestrians

Python PyTorch TensorFlow

Distributed Computing

University of Hildesheim

1 04/2020 - 03/2021

♥ Hildesheim, Germany

- Performed exploratory data analysis using PySpark on the movielens 10m dataset and used the Hadoop MapReduce framework on BTS flight data
- Conducted distributed K-means clustering and distributed linear regression using SGD on KDD Cup 1998 dataset and VirusShare executables with OpenMPI, including a performance analysis on the speed-up with different numbers of used cores
- Implemented Naive Bayes and SVM classifiers from scratch to categorize news items on 20 newsgroups text dataset using preprocessing techniques such as bag-of-words and TF-IDF feature representation and the Hadoop MapReduce framework
- Employed distributed matrix factorization using coordinate descent with the Hadoop MapReduce framework on the movielens 10m dataset

Python Hadoop MapReduce PySpark OpenMPI mpi4py

Reinforcement Learning

University of Hildesheim

10/2022 - 03/2023

♥ Hildesheim, Germany

• Utilized PyTorch to develop both the Deep Q-Learning model and the REINFORCE algorithm with policy gradients from scratch to solve the Gym environment Mountain Car

Python PyTorch



Faculty 4 Mathematics, Natural Sciences, Economics and Computer Science

Diploma

The University of Hildesheim and Faculty 4 award this diploma upon passing the Master's examination in the degree programme

International Master in Data Analytics*

to Mr Simon Kutsche born on 13 July 1996 in Memphis, TN

awarding the degree of

Master of Science

(M.Sc.)

Hildesheim, on 07 February 2023

Dean

(Prof. Dr. K. Schmid)

Head of the Examination
Board

(Prof. Dr. Dr. L. Schmidt-Thieme)

^{*} Study option in the Information Management and Information Technology programme



Faculty 4
Mathematics, Natural Sciences, Economics and Computer Science

Certificate for the Master's examination

Mr Simon Kutsche

born on 13 July 1996 in Memphis, TN

passed the Master of Science (M.Sc.) examination on 10 January 2023 in the International Master in Data Analytics* programme.

Overall evaluation:** very good (1.5)

The subject of the degree thesis:
"Extending loss balancing methods in multi-task learning"

The overall grade for course examinations***: = very good (1.5)

Master's thesis: = very good (1.3)

Master's colloquium: = very good (1.3)

Hildesheim, on 07 February 2023



Head of the Examination Board (Prof. Dr. Dr. L. Schmidt-Thieme)

^{*}Study option in the Information Management and Information Technology programme

^{**}Evaluation levels: Very Good, Good, Satisfactory, Sufficient

^{***}Attached to this certificate is a list of all attended modules/submodules and, when applicable, additional examination results (Transcript of Records)



Transcript of Records

Universität Hildesheim

Dezernat für Studienangelegenheiten Prüfungsamt Universitätsplatz 1 31141 Hildesheim

www.uni-hildesheim.de/dez3/pruefungsamt/

Name, Vorname	Kutsche, Simon
Geschlecht	männlich
Geburtsdatum, -ort und -land	13.07.1996, Memphis, TN, Deutschland
Studiengang	M.Sc. Data Analytics
Matrikelnummer	308870

Тур	Art	Zeit/Dauer	Note	LP
М	PF			120,0
М	PF		BE	54,0
TM LV	PF	WiSe 2020/2021 k.A.	1,7*	15,0
TM LV	PF	SoSe 2021 4	2,3*	6,0
LV	PF	WiSe 2020/2021 4	1,7*	6,0
TM LV	PF	WiSe 2021/2022 4	2,7	6,0
ТМ	PF	WiSe 2020/2021 4	1,3*	6,0
TM LV	PF	SoSe 2021 2	1,3*	3,0
TM LV	PF	WiSe 2020/2021 4	1,0*	6,0
ТМ	PF	WiSe 2020/2021 4	1,3*	6,0
М	PF		BE	12,0
TM LV	PF	WiSe 2020/2021 4	1,7*	6,0
LV	WP	SoSe 2021 2	1,7*	6,0
М	PF		BE	12,0
LV	PF	SoSe 2021 2	1,0*	4,0
LV	PF	WiSe 2021/2022 2	1,7*	4,0
LV	PF	WiSe 2021/2022 2	1,7*	4,0
М	WP			6,0
TM LV	WP	SoSe 2021 4	2,3*	6,0
М	PF			6,0
TM LV	WP	WiSe 2021/2022 k.A.	2,7	6,0
	M	M PF M PF M PF LV PF LV PF TM PF LV PF TM PF LV PF M PF LV PF M WP M WP M PF TM WP TM WP TM WP	M PF M PF TM PF LV PF LV PF WiSe 2020/2021 LV PF WiSe 2021/2022 LV PF WiSe 2020/2021 LV PF WiSe 2020/2021 LV PF WiSe 2020/2021 LV PF WiSe 2020/2021 LV WP LV PF WiSe 2021/2022 W WP TM WP TM WP Wise 2021/2022	M PF BE TM PF Wise 2020/2021 1,7* k.A. TM PF Wise 2020/2021 2,3* k.A. LV PF Wise 2020/2021 1,7* k.A. TM PF Wise 2020/2021 1,7* k.A. TM PF Wise 2020/2021 1,7* k.A. TM PF Wise 2020/2021 1,3* k.A. LV PF Wise 2020/2021 1,3* k.A. LV PF Wise 2020/2021 1,0* k.A. LV PF Wise 2020/2021 1,3* k.A. LV PF Wise 2020/2021 1,7* k.A. LV WP Sose 2021 1,7* k.A. LV PF Wise 2021/2022 2,3* k.A. M PF WP TM WP Sose 2021 2,3* k.A. LV PF Wise 2021/2022 2,7* k.A.

Titel (Modul, Teilmodul, Lehrveranstaltung)	Тур	Art	Zeit/Dauer	Note	LP
Degree Examination	М	PF		BE	30,0
Master's Thesis	TM	PF	SoSe 2022 k.A.	1,3*	27,0
Master's Colloquium	TM	PF	WiSe 2022/2023 k.A.	1,3*	3,0

Gesamtnote

Titel (Modul, Teilmodul, Lehrveranstaltung)	Тур	Art	Zeit/Dauer	Note	LP
Final Grade of Master Degree Exams				1,5	120,0

Letzte Prüfung abgelegt am: 10.01.2023

Nur die mit * gekennzeichneten Noten gehen zusammen mit der Note aus der Abschlussprüfung in die Berechnung der Gesamtnote ein.

Erläuterungen zum Transcript of Records

Modulinhalte

Die Lerninhalte und Kompetenzziele der einzelnen Module sind dem Modulhandbuch zu entnehmen.

Тур

M = Modul TM = Teilmodul LV = Lehrveranstaltung

Art

PF = Pflichtmodul / Pflichtveranstaltung / Pflichtfach WP/WA = Wahlpflichtmodul / Wahlpflichtveranstaltung / Wahlfach ZF = Zusatzfach BA = Bachelorarbeit MA = Masterarbeit

Zeit / Dauer

Angabe, wann in welchem Semester das Teilmodul bzw. die Lehrveranstaltung besucht wurde und jeweils die Semesterwochenstunden.

WiSe = Wintersemester (01.10.-31.03.) SoSe = Sommersemester (01.04.-30.09.)

LP (= Leistungspunkte; Credits)

1 Studienjahr = 60 Leistungspunkte 1 Semester = 30 Leistungspunkte Bachelor = 180 Leistungspunkte Studienvariante Bachelor Plus = 240 Leistungspunkte Master = 120 Leistungspunkte

Benotungssystem (Lokale Note)

Bewertungen von Prüfungsleistungen erfolgen auf Grundlage des folgenden Benotungssystems:

- 1 = sehr gut; eine Leistung, die den Anforderungen in besonderem Maße entspricht
- 2 = gut; eine Leistung, die den Anforderungen voll entspricht
- 3 = befriedigend; eine Leistung, die im Allgemeinen den Anforderungen entspricht
- 4 = ausreichend; eine Leistung, die zwar Mängel aufweist, aber im Ganzen den Anforderungen noch entspricht
- 5 = nicht ausreichend; eine Leistung, die den Anforderungen nicht entspricht

Zur differenzierten Bewertung der Prüfungsleistungen können Zwischennoten durch Vermindern oder Erhöhen der einzelnen Noten um 0,3 gebildet werden; die Noten 0,7; 4,3; 4,7 und 5,3 sind dabei ausgeschlossen.

Bei nicht benoteten Leistungen wird anstatt einer Note der Vermerk "BE" (für "bestanden") bzw. "NB" (für "nicht bestanden") vermerkt.

In Klammern aufgeführte Noten werden nicht in die Modul-, Fach- bzw. Gesamtnote eingerechnet.

Notenskala (Modul-, Fach-, bzw. Gesamtnote):

1,0 - 1,5 =sehr gut

1,6 - 2,5 = gut

2,6 - 3,5 = befriedigend

3,6 - 4,0 = ausreichend

5,0 = nicht ausreichend

HOCHSCHULE **HANNOVER** UNIVERSITY OF APPLIED SCIENCES AND ARTS

Fakultät IV Wirtschaft und Informatik

Zeugnis über die Bachelor-Prüfung

Certificate of the Final Examination for the Bachelor's Degree

Herr Simon Kutsche

geboren am 13. Juli 1996 in Memphis, TN born on / in

hat die Bachelor-Prüfung im Studiengang

has passed the final examination for the Bachelor's degree in

Wirtschaftsinformatik

Business Information Systems

an der Fakultät IV - Wirtschaft und Informatik

at the Department of Business and Computer Science

mit der Gesamtnote - sehr gut - (1,5) bestanden.* with the overall grade*.

Bachelor-Arbeit über das Thema

Bachelor Thesis

Entwicklung einer prototypischen Churn Analyse und Bewertung von geeigneten

cloudbasierten Services für das Deployment

Hannover, den 19. Juni 2020 Datum / Date Ort / City

Siegel der Hoch

Der Dekan Dean

Der Vorsitzende des Prüfungsausschusses Head of the Examination Board

Prof. Dr. Friedrich Lohmann

Prof. Dr. Michael L. Bienert

Hannover

Hanover

Ганновер

Hanovre

Pflichtmodule erster Studienabschnitt

Compulsory modules first phase of program

Module	Note	Credits
BWL 1	3,0	6
Business Administration 1		
BWL 2	1,7	6
Business Administration 2		
BWL 3	1,7	6
Business Administration 3		
Wirtschaftsmathematik	1,7	6
Business Mathematics		
Statistik	1,0	6
Statistics		
Diskrete Mathematik	1,3	6
Discrete Mathematics		
Wirtschaftsinformatik - Grundlagen	2,0	6
Basics of Business Information Systems		
Projektmanagement	3,0	6
Project Management		
Anforderungsanalyse	1,0	6
Requirements Analysis		
Informatik - Grundlagen	1,3	6
Fundamentals of Computer Science		
Programmieren	2,0	6
Programming		
Datenbanksysteme	1,3	6
Database Systems		
Betriebssysteme und Netzwerke	2,0	6
Operating Systems and Networks		
Schlüsselqualifikationen der WI	2,1	6
Transferable Skills for IT Professionals		
Wirtschaftsenglisch (B2)	1,3	6
Business English (B2)		



Pflichtmodule zweiter Studienabschnitt Compulsory modules second phase of program

Module	Note	Credits
Anwendungsprogrammierung Application Programming	1,3	6
Software Engineering Software Engineering	1,7	6
Verteilte Anwendungen Distributed Applications	1,8	6
Electronic Business and Electronic Commerce Electronic Business and Electronic Commerce	1,3	6
Informationssicherheit Information Security	1,3	6
Unternehmensprozesse und ERP-Systeme Business Processes and ERP Systems	2,3	6
Praxisphase Internship Phase	BE	18
Bachelor-Arbeit Bachelor Thesis	1,3	12

Schwerpunkt Business Intelligence Specialization modules Business Intelligence

Module	Note	Credits	
Data Warehousing Data Warehousing	2,3	6	
Business Intelligence Business Intelligence	1,0	6	
Vertiefende Themen des BI Advanced Topics of BI	1,0	6	
BI-Projekt BI Project	1,0	6	

Ergänzungsmodule zweiter Studienabschnitt

Required elective modules second phase of program

Module	Note	Credits
Betriebswirtschaftliche Standardsoftware Enterprise Application Systems	1,7	6
Einführung SAP ERP Introduction to SAP ERP	1,0	6
Finanz- und Versicherungsmathematik Mathematics of Finance and Insurance	1,0	6
Mobile Computing Mobile Computing	1,3	6
CRM-Prozesses	1,7	6

^{*)} Notenstufen: bis 1,5 sehr gut, very good
über 1,5 bis 2,5 gut, good
über 2,5 bis 3,5 befriedigend, satisfactory
über 3,5 bis 4,0 ausreichend, sufficient
mit Auszeichnung: Gesamtnote 1,0 bis 1,2 excellent
BE: Bestanden, passed



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Jan Mathias Koehler, CR/AIR2.1 Telefon +49 711 811-49404, Telefax +49 711 811-0 Jan.Koehler@de.bosch.com, Lukas.Schott@de.bosch.com 05. Dezember 2022

Internship and master thesis of Mr. Simon Kutsche

The Bosch Center for Artificial Intelligence (BCAI) is a competence center for artificial intelligence within the Bosch Research. We enable Bosch to apply cutting-edge AI technologies in products and services, creating solutions that are truly "invented for life". We leverage all of our outstanding and historical expertise and world-class AI methodologies to drive applied AI projects from the initial idea to the final implementation.

Mr. Simon Kutsche completed a one-month internship and his master thesis on the topic of "Extending loss balancing methods" remotely at BCAI from 1^{st} of March to 30^{th} of September 2022.

Building on different approaches to loss weighting in Multi Task Learning (MTL), he identified weaknesses and implemented extension approaches to overcome them.

His work led to two patent applications and a paper submission to the highly recognized CVPR 2023 scientific conference.

In MTL, different tasks are trained with a network. Here, the proportions of each task loss can be weighted differently. Based on an existing solution, Mr. Kutsche investigated different extensions of his own and validated them extensively on different datasets to confirm the goodness of the best approach. To implement the ideas, he extensively supplemented the existing code (Python, PyTorch) from GitHub. In the process, he also significantly contributed his own ideas.



He always evaluated and visualized his results in a clear and intuitive way and discussed and explained them in a weekly meeting. With his support, the team worked out the results in a scientific publication (CVPR 2023 under review).

05. Dezember 2022 Seite 2 von 2

Mr. Kutsche worked his way into the subject area extremely quickly and impressive with his quick comprehension and his extensive and extremely well-founded specialist knowledge. He applied this very efficiently and always achieved clearly above-average success. He was highly motivated and showed an exceptionally high degree of initiative, independence and willingness to perform. He always worked very efficiently, purposefully and carefully and demonstrated outstanding organizational skills. He communicated and discussed his results in a very comprehensible and solution-oriented manner. He always impressed with qualitatively and quantitatively outstanding results. Mr. Kutsche was always characterized by a high level of resilience and goal orientation.

His results make an important contribution to preparing the investigated method for scientific publication and his work and ideas supported the preparation of two patent applications in the investigated subject area.

Mr. Kutsche has always performed his tasks to our complete satisfaction and has optimally met our expectations in every respect. This means he has achieved the best grading and we strongly support any of his application.

Mr. Kutsche always behaved in an exemplary manner towards superiors and colleagues. He contributed to excellent and efficient teamwork and always worked very efficiently.

We would like to thank Mr. Kutsche for his consistently outstanding performance and are convinced that he will continue to achieve extraordinary success in the future. We wish him all the best and continued success for his future career and life.

If you have any questions, feel free to reach out to us. We are happy to support Mr Kutsche in his future career.

Yours sincerely,

Jun. Ja Red

Jan Koehler, Lukas Schott



14.01.2022 CERTIFICATE OF EMPLOYMENT

Mr. Simon Kutsche, born on 13.07.1996 in Memphis, TN, was employed from 01.10.2020 to 31.01.2022 as an Technical Solutions Specialist in our company.

Scalefree International GmbH is a growing IT consulting company with a focus on training and consulting for Data Vault 2.0 and other Big Data topics. The company serves major international customers from a variety of industries. Leading experts from the business intelligence industry are part of the employees of Scalefree International GmbH.

While working for our company, Mr. Kutsche was responsible for the following tasks:

- · Collaboration on the EDW
- Development of loading processes for the data lake of the EDW
- Automation of the loading process using AWS in Python
- Development of loading processes for the Data Lake in Python
- Modeling of Data Vault entities for Pivotal Greenplum
- Documentation of the solution in the internal wiki
- Development of a meta data repository in AWS

Mr. Kutsche has comprehensive, solid expertise that he confidently and successfully applies in handling his assigned duties. Mr. Kutsche was always a motivated employee. He approached difficult tasks with élan and always found rational and practical solutions.

Scalefree International

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Amtsgericht Hannover

GmbH

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89341

HRB 213578

Bahnhofstraße 8

89349

CEO: Michael Olschimke & Christof

30159 Hannover,

info@scalefree.com www.scalefree.com Wenzeritt

Germany

@scalefree.com CTO: Dan Linstedt



He was extremely reliable and his work style was always characterized by very careful planning and was systematic. He always impressed us with the quality and quantity of his extraordinary results. He was able to handle the highest deadline pressure and workloads with ease.

Mr. Kutsche always completed the duties assigned to him to our fullest satisfaction. His conduct with respect to superiors, colleagues and external parties was always impeccable.

Mr. Kutsche is leaving our company on 31.01.2022.

We thank Mr. Kutsche for his consistently outstanding performance and very much regret his departure. We are convinced that he will achieve extraordinary success in the future.

Hanover, 14 Januar 2022

Christof Wenzeritt

CEO

SCALEFREE

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info@scalefree.com www.scalefree.com Amtsgericht Hannover

HRB 213578

CEO: Michael Olschimke & Christof

Wenzeritt

CTO: Dan Linstedt





PROFESSIONAL CERTIFICATION

PROFESSIONAL SCRUM MASTER I

Simon Kutsche

has demonstrated a fundamental level of Scrum mastery, including the concepts of applying Scrum, and proven an understanding of Scrum as described in the Scrum Guide. This individual has also demonstrated a consistent use of terminology and approach to Scrum.

In recognition of this achievement, Scrum.org is pleased to award this certification.

March 6, 2021

Certification Date



Ken Schwaber, founder Scrum.org

https://scrum.org/certificates/639337

