Henry E. Clausen

henry.clausen@ed.ac.uk • hc2116.github.io/ • hc2116

Education

University of Edinburgh — **Edinburgh, UK**
Ph.D. in Computer Science — *4/2018 – 2021*
Contextual Anomaly Detection in Computer Networks

Imperial College — **London, UK**
M.S. in Statistics, high Distinction (81/100) — *10/2016 – 9/2017*
Thesis: 'Modelling human behaviour in computer networks' (86/100)

Swiss Fed. Institute of Technology — **Zurich, Switzerland**
M.S. in Physics, GPA – 5.5 (excellent) — *2/2014 – 2/2016*
Thesis: 'Tri-Criteria Optimization for Scenario-Based Risk Measures'

Swiss Fed. Institute of Technology — **Zurich, Switzerland**
B.S. in Physics, GPA – 4.9 (good) — *9/2010 – 9/2013*
Presentation: 'Cross-sections, decay rates and Feynman rules'

Work Experience

BT Group — **Ipswich, UK**
Student placement — *08/2019 – 10/2019*

- Attack implementation and data generation
- Design of *convolutional neural networks* for attack detection
- Strategy planning for large-scale data capture

OLZ & Partners — **Zurich, Switzerland**
Technical consultant — *6/2016 – 9/2016*

- Implementation of optimization algorithms for complex constraints
- Advice and comparison of computational solvers
- Technical talk in front of entire company

Swiss Fed. Institute of Technology — **Zurich, Switzerland**
Research Assistant — *2/2016 – 6/2016*

- Designing and testing of optimization algorithms for mixed-integer problems
- Numerical algorithms for large-scale financial optimization
- Cooperations with Stoxx Index Provider

Relevant Technical Projects

Contextual Anomaly Detection in computer networks — **University of Edinburgh**
Ph.D thesis — *4/2018 – 2021*

- Data-driven anomaly detection for enterprise cyber-security
- Development of *LSTM-encoder* language models to identify contextual structures in TCP commections
- Automatised dataset creation for ground truth network and system data
- Industry cooperation with BT Research

Modeling human behaviour in computer networks — **Imperial College**
Master thesis (86/100) — *5/2017 – 9/2017*

- Development of sequential *Unsupervised learning* methods for enterprise network logs
- Extensive usage of *Spark* for data assessment and model fitting
- Publication of results in *World Scientific*

Relevant Skills

Programming Skills

Working knowledge: Python, R, PyTorch, Tensorflow, C++, Spark, Hadoop MapReduce
Basic knowledge: Scala, Java, MySQL, PostgreSQL

Other IT Skills

Working knowledge: Unix shell, Networking protocols, Docker, AMPL

Languages

German: Mother tongue
English: Fluent, TOEFL: 104/120
Spanish: Good command

Publications

- **Clausen, H.**, Grov, G., Aspinall, D. (2021): 'Flows in a back-and-forth context: Detecting access attacks with bidirectional anomaly models', textit(under review).
- **Clausen, H.**, Aspinall, D. (2021): 'Controlling network traffic microstructures for machine-learning model probing', textit(under review).
- **Clausen, H.**, Aspinall, D. (2021): 'Examining traffic micro-structures to improve model development', Workshop on Traffic Measurements for Cybersecurity (WTMC) at IEEE S&P conference, 2021.
- **Clausen, H.**, Gibson, M., Aspinall, D. (2020): 'Evading stepping-stone detection with enough chaff', In "Proceedings of the International Conference on Network and System Security (NSS)", Melbourne, Australia, November 25-27, 2020
- **Clausen, H.**, Sabate, M., Grov, G., Aspinall, D. (2020): 'Better anomaly detection for access attacks using deep bidirectional LSTMs', In "Proceedings of the 3rd International Conference on Machine Learning for Networking (MLN'2020)", Paris, France, November 24-26, 2020
- **Clausen, H.**, Flood, R., Aspinall, D. (2019): 'Traffic generation using Containerization for Machine Learning', In "Proceedings of the Dynamic and Novel Advances in Machine Learning and Intelligent Cyber-Security Workshop", San Juan, PR, USA, December 9-10, 2019
- **Clausen, H.**, Adams, N.M., Briers, M. (2018): 'A Bayesian Approach to Modelling Human Behaviour in Computer Networks', In Heard, N.A., Adams N.M., Rubin-Delanchy, P.G.T, and Turcotte, M.J.M (eds), Data Science for Cyber-Security, *World Scientific*

Additional Experience

Greenpeace — **Zurich/Edinburgh**
from 2011
Local group leader

- Decision-making and coordination of campaign activities for local group
- Communication of campaign goals/achievements between local group and Greenpeace London headquarter
- Campaigning for political campaigns on renewable energies, plastic pollution, and deforestation

Swiss Fed. Institute of Technology — **Zurich, Switzerland**
from 2/2014
Member of the Students' Music Association

- Extensive engagement in harmonic theory, the piano, and music production
- Teaching younger students first steps in music production

References

Prof. David Aspinall	*Ph.D. supervisor*	david.aspinall@ed.ac.uk
Dr. Michael Gibson	*Project supervisor at BT Group*	michael.s.gibson@bt.co.uk