Dr. Carl-Johann SIMON-GABRIEL

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Projects and Work Experience

ETH Zürich, PostDoc, Aug 19 – present | Zürich, Switzerland

Group: Learning and Adaptive Systems – Mentor: Prof. A. Krause - "Foundations of Data Science" program
Topics: Robustness of image classifiers, kernel methods, reinforcement learning and causality

MPI for Intelligent Systems, PhD & PostDoc, Jun 14 – Jul 19 | Tübingen, Germany

Group: Empirical Inference, Supervisor: **Prof. B. Schölkopf**
Topics: Adversarial Examples, Generative Models (GANs, VAEs), Kernel Methods, Causality (Exoplanet Detection)

Facebook AI Research, Jul 17 – Oct 17 | Paris, France

Working together with **David Lopez-Paz, Yann Ollivier, Léon Bottou**
Topic: Understanding and defending against adversarial examples in convolutional nets

MPI for Intelligent Systems, Sep 13 – May 14 | Tübingen, Germany

Group: Machine Learning and Computaional Biology Research, Supervisor: **Prof. K. Borgwardt**
Topic: Population structure correction for rare variants in genome wide association studies and sub-phenotyping techniques for personalized medicine (also with Prof. Dr. Dr. Kristel van Steen)

Institut Curie - Mines ParisTech, Jan – Jun 13 | Paris, France

Group: Center for Computational Biology, Supervisor: **Prof. J.-P. Vert**
Topic: Statistics and machine learning methods applied to the study of phenotypic and genotypic properties of different yeast cell strains. Work summarized in my Master thesis.

Heinrich Walter Bau - Eiffage Travaux Publics, Jun – Sep 12 | Borkern, Gemrany

Development of a pricing program to evaluate the cost of standard depots; Deputy Site Manager for the building of a depot near Hamburg (10 000 m^2)

École Normale Supérieure, Sep 11 – Jan 12 | Paris, France

Group: Complex Networks and Cognitive Systems, Supervisor: **Prof. V. Hakim**
Part-time research semester in Theoretical Neuroscience while at Mines ParisTech

Collaboration with the CNRS, Oct 09 – May 10 | Strasbourg, France

Group: MCube research team, Supervised by Dr. C. Marques and his team
Study of the erosion of pebbles as part of a project in the Classes Préparatoires

Education

MPI for Intelligent Systems, Sep 13 – Aug 19| Tübingen, Germany

PhD Student - Empirical Inference Department - Supervisor: Prof. B. Schölkopf
Awarded a **Google European Doctoral Fellowship - CLS Associated Fellow**
PhD defended on Dec. 17, 2018; Title of thesis: "Distribution-Dissimilarities in Machine Learning"

Mines ParisTech, Sep 10 – Jul 13 | Paris, France

Master in Science and Executive Engineering
Minoring in Geostatistics and Applied Probabilities
Master Thesis in Computational Biology ("From Phenotype to Genotype")

Lycée Kléber ("Prépa"), Sep 07 – Jul 10 | Strasbourg, France

Intensive foundation course preparing the competitive examinations for entry to the French "Grandes Écoles"

Majoring in maths, physics and computer science

Classes and Skills

- Attended Classes:
  Differential Calculus, Integral Calculus, Probabilities, Statistical Models and Decisions, Automatic, Optimization, Geostatistics, Machine Learning, Neuroscience (at the ENS), Synthetic Biology, Functional Analysis, Ergodic Theory, Empirical Inference

- Computer science and software :
  - Main coding language: **Python**; Also used: R, JAVA, C, Caml Light, Matlab, Maple
- Attended Summer Schools:
  - Machine Learning for Personnalized Medicine, Sep. 2013 (Tübingen) and Sep 2014 (Paris)
  - Gaussian Process Winter School, Jan. 2014 (Sheffield)
  - Machine Learning Summer School, Jul. 2015 (Tübingen)
- Languages :
  - **German/French : native,** English : fluent, Russian : intermediate (7 years), Japanese : basics (2 years)

Other activities

Diploma of Musical Studies (DEM)

Majoring in **piano, chamber music and musical culture** at the Strasbourg Conservatory for Music and Dance (CRR); Also obtained/practiced : **End-of-musical studies certificate in composing, counterpoint and musical analysis**; organ ("2nd cycle" course); improvisation

Member of the Student Union and of the Ski Club, April 2011 - 2012

In charge of the entire renovation of the common room at the students' hall of residence (25 000 €); Co-organizer of the reception, dinner and ball in honor of the first year students at the "Maison des Polytechniciens" (Paris) (30 000 €)

Sports

Skiing (competition), tennis, volleyball

Publications and Reports

- **Simon-Gabriel**, Sheikh, Krause, *PopSkipJump: Decision-Based Attack for Probabilistic Classifiers*, ICML, 2021
- **Simon-Gabriel,** Barp, Schölkopf, Mackey, *Metrizing Weak Convergence of Maximum Mean Discrepancies*, 2020, under review
- **Simon-Gabriel**, Ollivier, Bottou, Schölkopf, Lopez-Paz, *First-order Adversarial Vulnerability of Neural Networks and Input Dimension*, ICML, 2019
- **Simon-Gabriel**, PhD Thesis: Distribution-Dissimilarities in Machine Learning, 2018
- **Simon-Gabriel**, Schölkopf, *Kernel Distribution Embeddings: Universal Kernels, Characteristic Kernels and Kernel Metrics on Distributions*, JMLR, 19(44), 1-29, 2018
- Bousquet, Gelly, Tolstikhin, **Simon-Gabriel**, Schölkopf, *From optimal transport to generative modeling: the VEGAN cookbook*, arXiv:1705.07642, 2017
- Tolstikhin, Gelly, Bousquet, **Simon-Gabriel**, Schölkopf, *AdaGAN: Boosting Generative Models*, NIPS, 2017
- Huang, Peloso, Howrigan, Rakitsch, **Simon-Gabriel**, Goldstein, Daly, Borgwardt, Neal, *Bootstrap: Population Informed Bootstrapping for Rare Variant Tests*, bioRxiv, doi:10.1101/068999
- **Simon-Gabriel**, Scibior, Tolstikhin, Schölkopf, *Consistent Estimation of Functions of Random Variables*, NIPS, 2016
- Schölkopf, Hogg, Wang, Foreman-Mackey, Janzig, **Simon-Gabriel**, Peters, *Modeling Confounding by Half-Sibling Regression*, PNAS, 2016
- Schölkopf, Hogg, Wang, Foreman-Mackey, Janzig, **Simon-Gabriel**, Peters, *Removing Systematic Errors for Exoplanet Search via Latent Causes*, ICML, 2015
- **Simon-Gabriel**, *From Genotype to Phenotype,* Master Thesis, unpublished

Teaching Experience

- **Sommerakademie Braunschweig 2016**, Deutsche Schüler Akademie, "Vom Schall zum Klang!", Course Instructor together with G. Böhriger
- **Sommerakademie Neubeuern 2015**, Studienstiftung des Deutschen Volkes, "Kausalität, Exoplaneten und Black Jack: Wie lernt man aus Daten", Invited by Prof. Dr. J. Peters and Prof. Dr. B. Schölkopf to tutor an Exoplanet Detection project
- **Tutoring:**
  - **Machine Learning Theory**, Karl Eberhardt Universität, Tübingen, WS 2016/2017
  - **Intelligente Systeme I**: Empirische Inferenz, Karl Eberhardt Universität, Tübingen, SS 2015
  - **Introduction to ML; Probabilistic AI**: ETH Zürich, WS/SS 2019-2021