

BERTRAND LEBICHOT, DATA SCIENTIST RESEARCHER & LECTURER

PERSONAL INFORMATION

Born in Belgium, January 14th, 1986

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GOAL

I am a post-doc researcher in data mining and machine learning. My research interest are big data, transfer learning, graph mining, fraud detection and concrete business case studies. I am now searching for new challenges.

WORK EXPERIENCE

<i>Part-time Lecturer</i>	<i>2017–Present</i>	UNIVERSITÉ CATHOLIQUE DE LOUVAIN – LSM MLSMM2154 Machine Learning and MLSMM2151 Data Mining.
<i>Post-doc researcher</i>	<i>2018–Present</i>	UNIVERSITÉ LIBRE DE BRUXELLES – MLG Study of concrete transfer learning cases in collaboration with Worldline SA/NV. It led to one patent so far. Funded by Innoviris.
<i>Research Assistant</i>	<i>2015–Present</i>	UNIVERSITÉ CATHOLIQUE DE LOUVAIN – ICTEAM Design of various graph-based fraud detection systems in collaboration with Worldline SA/NV. One of them is currently in production. Funded by Innoviris.
<i>Research & Teaching Assistant</i>	<i>2011–2015</i>	UNIVERSITÉ CATHOLIQUE DE LOUVAIN – LOURIM Organize & teach practical sessions at LSM-UCL (list available on my website).
<i>R&D Internship</i>	<i>Summer 2010</i>	GSK-BIO – EPL Setting of a bio-chemical & analytic device to quantify molecules in solutions.

EDUCATION

<i>Doctor of Engineering Science</i>	<i>2011–2018</i>	UNIVERSITÉ CATHOLIQUE DE LOUVAIN – EPL Thesis: <i>Network analysis based on bag-of-paths : classification, node criticality and randomized policies.</i> (Advisor: Prof. Marco SAERENS) The bag-of-paths framework defines a family of graph-based distances interpolating between the shortest path and the commute-time distances, taking into account both node proximity and amount of connectivity. Three applications are proposed. Two others, closely related, are also investigated.
<i>Biomedical Engineer (with honors)</i>	<i>2004–2011</i>	UNIVERSITÉ CATHOLIQUE DE LOUVAIN – EPL Thesis: <i>Traitement automatique du signal ECG pour l'aide au diagnostic de pathologies cardiaques.</i> (Advisor: Prof. Michel VERLEYSEN) Automatically detecting a few abnormal heart beats using ECG is a challenging problem. We developed an undersampling method based on k-NN to reduce the information loss, balance learning classes and enhance the prediction.

COMPUTER SKILLS

<i>Advanced</i>	PYTHON, R, MATLAB, JAVA, L ^A T _E X, Linux, GPU computing, Great expertise in Machine learning (supervised, unsupervised and semi-supervised) and Data mining, Big Data, Microsoft Office, Microsoft Windows
<i>Intermediate</i>	VBA, SAS EM, Android App development, Containerization (Docker)
<i>Basic</i>	SAS, SPSS

OTHER INFORMATION

<i>Languages</i>	FRENCH · Mothertongue
	ENGLISH · English TOEFL iBT Certificate (equivalent to C1 CEFR level)
	DUTCH · Intermediate (B1 CEFR level)
	GERMAN · Basic (A1 CEFR level)

PUBLICATIONS

<i>IEEE Transactions on Neural Networks and Learning Systems</i>	<i>June 2014</i> Semi-Supervised Classification through the Bag-of-Paths Group Betweenness We introduce a new betweenness and a group betweenness measure, for semi-supervised classification on weighted graphs. Experiments on real-world data sets show that it out-performs all compared state-of-the-art methods. Authors: B. LEBICHOT, I. KIVIMAKI, K. FRANCOISSE AND M. SAERENS
<i>Scientific Reports</i>	<i>Feb. 2016</i> Two Betweenness Centrality Measures based on Randomized Shortest Paths Two new betweenness centrality measures are introduced and tested on real world examples. They combine the ideas of using the shortest path and/or random paths for analyzing network nodes. Authors: I. KIVIMAKI, B. LEBICHOT, J. SARMAKI AND M. SAERENS
<i>International Conference on Complex Networks and their Applications</i>	<i>Dec. 2016</i> A Graph-Based, Semi-Supervised, Credit Card Fraud Detection System We propose several improvements to APATE, a graph-based fraud detection system, to fit to e-commerce field reality. This grandly improves the fraudulent cards detection, on a three months real-life e-commerce transactions dataset. Authors: B. LEBICHOT AND M. SAERENS
<i>International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems</i>	<i>June 2017</i> Improving Card Fraud Detection through Suspicious Pattern Discovery Can we find compromised credit cards by looking at shops appearing in their recent transaction records? We show that suspicious patterns can be identified and help to improve state-of-the-art aggregated transaction features. Authors: F. BRAUN, O. CAELEN, E. SMIRNOV, S. KELK, B. LEBICHOT AND M. SAERENS
<i>Neurocomputing</i>	<i>Jan. 2018</i> A Bag-of-Paths Node Criticality Measure To what extend is a node critical for a network? We introduce a new criticality measure (and a faster approximation) based on the Bag-of-Paths framework. Simulations show that it outperforms all other measures on generated graphs. Authors: B. LEBICHOT AND M. SAERENS

*INNS Big Data
and Deep Learning
conference*

Apr. 2019 **Deep-Learning Domain Adaptation Techniques
for Credit Cards Fraud Detection**

Fraud behavior strongly differs according to payment systems, countries,...
Given the high cost of data-driven fraud detection system design, transactional
companies want to reuse existing pipelines and adapt them to other domains.
Authors: B. LEBICHOT, Y-A. LE BROGNE, L. HE-GUELTON, F. OBLÉ AND G.
BONTEMPI

*Belgian Dutch
Conference on
Machine Learning*

Nov. 2019 **Understanding telecom customer churn with
machine learning: from prediction to causal inference**

Telecom companies want to prevent customer churn. In collaboration with
Orange, we design an accurate prediction model, discuss data-driven causal
inference and compare the impact of causally relevant variables.
Authors: T. VERHELST, O. CAELEN, J-C. DEWITTE, B. LEBICHOT AND G. BONTEMPI

*International
Conference on
Complex Networks
and their
Applications*

Dec. 2019 **Graph-based fraud detection with the free energy
distance**

A real-world application of the free energy distance for e-commerce fraud
detection. We divide the computation time by two while maintaining
state-of-the-art performance in term of fraudulent cards prediction.
Authors: S. COURTAINE, B. LEBICHOT AND M. SAERENS

*Knowledge And
Information
Systems*

Under review **Graph-based Semi-Supervised Classification with
Additional Nodes Information**

This paper focuses on classification using both regular plain data and structural
information coming from graph structures. Thirteen techniques are investigated
and compared. Furthermore, usage of dimensionality reduction is also studied.
Authors: B. LEBICHOT AND M. SAERENS

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In preparation **Optimally Randomized Markov Decision
Processes**

Extending the randomized shortest-path, an optimal, mixed, policy for solving
Markov decision is obtained and allows to balance exploitation and exploration.
Simulation results on simple, illustrative, examples are included.
Authors: B. LEBICHOT, G. GUÉX AND M. SAERENS