

# Daniel Lemire, Ph.D.

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Canadian citizen  
bilingual (English and French)

## Experience

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- 2004–...* Computer Science Professor  
Université du Québec (TELUQ)  
Promoted to Full Professor in 2009  
Department Chair (2017–2020)
- 2002–2004* Research Officer in eBusiness  
National Research Council of Canada (NRC)  
Team Leader of the e-Health Research Group in 2002–2003
- 2001–2002* Assistant Professor  
Acadia University
- 1999–2001* Entrepreneur  
TechElements Inc. and Ondelette.com
- 1998–1999* Post-doctoral fellow  
Institut de génie biomédial

## Education

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- 1995–1998* Ph.D.—“Iterative Schemas”  
**École Polytechnique de Montréal** and **Université de Montréal**  
Supervisors: Gilles Deslauriers and Serge Dubuc
- 1994–1995* M.Sc.—“A Priori Approximations for Nonlinear Systems”  
**University of Toronto**  
Supervisor: Catherine Sulem
- 1990–1994* B.Sc. with “High Distinction”  
**University of Toronto**

## Competitive scholarships and prizes as a student

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- FCAR scholarship (Ph.D.) and NSERC scholarship (M.Sc. and Ph.D.);
- C. D. Howe Memorial for 4 years ( $\approx$ \$50,000);
- NSERC Canada Scholarship for 4 years (\$4,000);
- St. Michael’s College Dean’s medal (class of 1994);
- 3T0 Scholarship (UofT).

### **Secondary affiliations**

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- I am an adjunct professor at the University of New Brunswick and at the Université du Québec à Montréal where I supervise graduate students.

### **Recent Teaching Experience**

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Undergraduate (in French):

- INF 1250 - Introduction aux bases de données;
- INF 6460 - Recherche et filtrage d'informations;
- INF 6450 - Gestion de l'information avec XML;
- INF 9002 - Évaluation et analyse des systèmes d'information;
- INF 9004 - Informatique des entrepôts de données.

Graduate (in French):

- INF 6104 - Recherche d'informations et web;
- INF 6107 - Le Web social;
- INF 6408 - Informatique de l'analyse multidimensionnelle.

Moreover, I have chaired and cochaired several programs: two certificates, one bachelor degree, and four graduate programs including the master in Information Technology.

I supervise dozens of M.Sc. students. Furthermore, several of my Ph.D. students have recently graduated:

- Jing Li, computer science (graduated in 2016);
- Samy Chambi, computer science (graduated in 2016);
- Hazel Webb, computer science (graduated in 2010).

### **Professional Membership**

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- Association for Computing Machinery (ACM) since 2002.

### **Research program**

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#### **Individual Research Funding (external agencies, competitive grants)**

- NSERC Discovery Accelerator Supplement 2017–2020 (\$120,000);
- NSERC Discovery Grant 2017–2022 (\$210,000);
- NSERC Discovery Grant 2012–2017 (\$140,000);
- NSERC Discovery Grant 2007–2012 (\$75,000);
- NSERC Discovery Grant 2003–2007 (\$48,000);
- FQRNT New Researcher Grant 2006–2008 (\$54,249).

#### **Team-Based Research Funding (external agencies, competitive grants)**

- CFI Grant 2016–2017 (\$797,481) with N. Bélanger (lead) and E. Filotas;
- CAA Foundation (2013–2014, \$189 994) with E. Vallières (lead);
- CFI Grant 2008–2009 (\$999,618) with G. Paquette (lead) and P. Valtchev;
- New Brunswick Innovation Fund 2007–2008 (\$10,000) with O. Kaser (lead).

## Services (external)

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### Blog

- I run a blog at <http://lemire.me/>. It was featured on Reddit, Hacker News and Slashdot. It has over 25 000 unique visitors a month. It is part of the blogs recommended by the ACM as part of their blogroll.

### Program committees (incomplete list)

- ACM Conference on Information Retrieval (SIGIR) 2015;
- ACM Conference on Recommender Systems (RecSys) 2009–2014, 2017;
- ACM Conference on Information and Knowledge Management (CIKM) 2012–2017;
- ACM Conference on Web Search and Data Mining (WSDM) 2013–2015;
- World Wide Web Conference (WWW) 2017, 2018;
- ACM/IEEE Joint Conference on Digital Libraries (JCDL) 2011–2017.

### Funding Agencies

- At NSERC, I am a member of the Computer Science Evaluation Group (EG 1507) for the Discovery Grants Program (2018-2020).
- At the FQRNT, I have been a member of the review committee 03F (Theoretical Computer Science) since 2007.
- Still at the FQRNT, I was member of the review committee 309 (Computer Science team projects) in 2006–2007, in 2013–2014, 2014–2015 and 2016–2017.
- At NSERC, I was a member of the Computer Science Research Tools and Instruments (RTI) Review Committee in 2012–2013, in 2013–2014 and in 2014–2015.

### External examiner/referee

- External examiner for Ph.D. thesis:
  - Mohammed Shaaban from Université Pierre et Marie Curie, France (2017) — supervised by Patrick Garda;
  - Mehdi Boukhechba from UQAC, Canada (2016) — supervised by Abdenour Bouzouane and Charles Guin-Vallerand;
  - Hicham Assoudi from UQAM, Canada (2016) — supervised by Hakim Lounis;
  - Khaled Dehdouh from Lyon 2, France (2015) — supervised by Omar Boussaid;
  - Martin Leginus from Aalborg University, Denmark (2015) — supervised by Peter Dolog;
  - Ahmad Taleb from Concordia University, Canada (2011) — supervised by Todd Eavis.
- External referee for habilitation:  
Sabine Loudcher Rabaseda from Lyon 2 University, France (2011).
- External referee for promotion:
  - Jason Sawin from the University of St. Thomas (2015);
  - Amer Nizar AbuAli from Philadelphia University (2013);
  - Ken Pu from the Ontario Institute of Technology (2011);

– Jinan Fiaidhi from Lakehead University (2005).

### Under Review

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- [1] Daniel Lemire, Owen Kaser, Nathan Kurz, Luca Deri, Chris O’Hara, François Saint-Jacques, Gregory Ssi-Yan-Kai, Roaring Bitmaps: Implementation of an Optimized Software Library

### Peer-Reviewed Journal Articles

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Impact factors of some journals: *Information Sciences* (2.8), *Pattern Recognition* (2.6), *Journal of the Association for Information Science and Technology* (2.0), *Data & Knowledge Engineering* (1.7), *ACM Transactions on Database Systems* (1.4), *Computer Speech and Language* (1.4), *Information Retrieval* (1.3), *ACM Transactions on Information Systems* (1.3) and *Information Systems* (1.2).

- [2] Wojciech Muła, Nathan Kurz, Daniel Lemire, Faster Population Counts Using AVX2 Instructions, *Computer Journal* (to appear) <https://doi.org/10.1093/comjnl/bxx046>
- [3] Antonio Badia and Daniel Lemire, On Desirable Semantics of Functional Dependencies over Databases with Incomplete Information, *Fundamenta Informaticae* (to appear) <https://arxiv.org/abs/1703.08198>
- [4] Dmytro Ivanchykhin, Sergey Ignatchenko, Daniel Lemire, Regular and almost universal hashing: an efficient implementation, *Software: Practice and Experience* (to appear) <http://dx.doi.org/10.1002/spe.2461>
- [5] Daniel Lemire, Nathan Kurz, Christoph Rupp, Stream VByte: Faster Byte-Oriented Integer Compression. *Information Processing Letters* **130**, 2018. <https://doi.org/10.1016/j.ipl.2017.09.011>
- [6] Daniel Lemire, Christoph Rupp, Upscaledb: Efficient Integer-Key Compression in a Key-Value Store using SIMD Instructions, *Information Systems* **66**, 2017. <http://dx.doi.org/10.1016/j.is.2017.01.002>
- [7] Jing Li, Yuhong Yan, Daniel Lemire, Full Solution Indexing for top-K Web Service Composition, *IEEE Transactions on Services Computing* **99**, 2016. <http://dx.doi.org/10.1109/TSC.2016.2578924>
- [8] Samy Chambi, Daniel Lemire, Robert Godin, Vers de meilleures performances avec des Roaring bitmaps, *Technique et Science Informatiques* **35** 3, 2016.

- [9] Daniel Lemire, Gregory Ssi-Yan-Kai, Owen Kaser, Consistently faster and smaller compressed bitmaps with Roaring, *Software: Practice & Experience* **46** 11, 2016. <http://dx.doi.org/10.1002/spe.2402>
- [10] Daniel Lemire, Owen Kaser, Faster 64-bit universal hashing using carry-less multiplications, *Journal of Cryptographic Engineering* **6** 3, 2016. <http://dx.doi.org/10.1007/s13389-015-0110-5>
- [11] Daniel Lemire, Nathan Kurz, Leonid Boytsov, SIMD Compression and the Intersection of Sorted Integers, *Software: Practice & Experience* **46** 6, 2016. <http://dx.doi.org/10.1002/spe.2326>
- [12] Samy Chambi, Daniel Lemire, Owen Kaser, Robert Godin, Better bitmap performance with Roaring bitmaps, *Software: Practice & Experience* **46** 5, 2016. <http://dx.doi.org/10.1002/spe.2325>  
Cited at least **58 times**.
- [13] Owen Kaser and Daniel Lemire, Compressed bitmap indexes: beyond unions and intersections, *Software: Practice & Experience* **46** 2, 2016. <http://dx.doi.org/10.1002/spe.2289>
- [14] Adina Crainiceanu and Daniel Lemire, Multidimensional Bloom Filters, *Information Systems* **54**, 2015. <http://dx.doi.org/10.1016/j.is.2015.01.002>
- [15] Antonio Badia and Daniel Lemire, Functional dependencies with null markers, *Computer Journal* **58** 5, 2015. <http://dx.doi.org/10.1093/comjnl/bxu039>
- [16] Wayne Xin Zhao, Xudong Zhang, Daniel Lemire, Dongdong Shan, Jian-Yun Nie, Hongfei Yan, Ji-Rong Wen, A General SIMD-based Approach to Accelerating Compression Algorithms, *ACM Transactions on Information Systems* **45** 1, 2015. <http://dx.doi.org/10.1145/2735629>
- [17] Xiaodan Zhu, Peter Turney, Daniel Lemire, Andre Vellino, Measuring academic influence: Not all citations are equal, *Journal of the Association for Information Science and Technology* **66** 2, 2015. <http://dx.doi.org/10.1002/asi.23179>  
Cited at least **56 times**.
- [18] Daniel Lemire and Leonid Boytsov, Decoding billions of integers per second through vectorization, *Software: Practice & Experience* **45** 1, 2015. <http://dx.doi.org/10.1002/spe.2203>  
Cited at least **114 times**.

- [19] Owen Kaser and Daniel Lemire, Strongly universal string hashing is fast, *Computer Journal* **57** 11, 2014. <http://dx.doi.org/10.1093/comjnl/bxt070>
- [20] Hazel Webb, Daniel Lemire, Owen Kaser, Diamond Dicing, *Data & Knowledge Engineering* **86**, 2013. <http://arxiv.org/abs/1006.3726>
- [21] Zoltán Prekopcsák and Daniel Lemire, Time Series Classification by Class-Specific Mahalanobis Distances, *Advances in Data Analysis and Classification* **6** 3, 2012. <http://arxiv.org/abs/1010.1526>
- [22] Daniel Lemire, Owen Kaser, Eduardo Gutarra, Reordering Rows for Better Compression: Beyond the Lexicographic Order, *ACM Transactions on Database Systems* **37** 3, 2012. <http://arxiv.org/abs/1207.2189>
- [23] Daniel Lemire, The universality of iterated hashing over variable-length strings, *Discrete Applied Mathematics* **160** (4-5), 2012. <http://arxiv.org/abs/1008.1715>
- [24] Antonio Badia and Daniel Lemire, A Call to Arms: Revisiting Database Design, *SIGMOD Record* **40** 3, 2011. <http://arxiv.org/abs/1105.6001>
- [25] Daniel Lemire and Owen Kaser, Reordering columns for smaller indexes, *Information Sciences* **181** 12, 2011. <http://arxiv.org/abs/0909.1346>
- [26] Daniel Lemire and Owen Kaser, Recursive n-gram hashing is pairwise independent, at best, *Computer Speech and Language* **24** 4, 2010. <http://arxiv.org/abs/0705.4676>
- [27] Daniel Lemire, Owen Kaser, Kamel Aouiche, Sorting improves word-aligned bitmap indexes, *Data & Knowledge Engineering* **69** 1, 2010. <http://arxiv.org/abs/0901.3751>  
Cited at least **109 times**.
- [28] Daniel Lemire, Faster retrieval with a two-pass Dynamic-Time-Warping lower bound, *Pattern Recognition* **42** 9, 2009. <http://arxiv.org/abs/0811.3301>  
Cited at least **122 times**.
- [29] Daniel Lemire, Martin Brooks, Yuhong Yan, An optimal linear time algorithm for quasi-monotonic segmentation, *International Journal of Computer Mathematics* **86** 7, 2009. <http://arxiv.org/abs/0709.1166>

- [30] Kamel Aouiche, Daniel Lemire and Robert Godin, Web 2.0 OLAP: From data cubes to tag clouds, *Lecture Notes in Business Information Processing* **18**, 2009. <http://arxiv.org/abs/0905.2657>
- [31] Daniel Lemire and Owen Kaser, Hierarchical Bin Buffering: Online local moments for dynamic external memory arrays, *ACM Transactions on Algorithms* **4** 1, 2008.
- [32] Daniel Lemire, Streaming maximum-minimum filter using no more than three comparisons per element, *Nordic Journal of Computing* **13** 4, 2006.  
Cited at least **60 times**.
- [33] Owen Kaser and Daniel Lemire, Attribute value reordering for efficient hybrid OLAP, *Information Sciences* **176** 16, 2006.  
Cited at least **33 times**.
- [34] Daniel Lemire, Harold Boley, Sean McGrath, Marcel Ball, Collaborative filtering and inference rules for context-aware learning object recommendation, *International Journal of Interactive Technology & Smart Education* **2** 3, 2005.  
Cited at least **83 times**.
- [35] Daniel Lemire, Scale and Translation Invariant Collaborative Filtering Systems, *Information Retrieval* **8** 1, 2005.  
Cited at least **107 times**.
- [36] Serge Dubuc, Daniel Lemire, Jean-Louis Merrien, Fourier analysis of 2-point Hermite interpolatory subdivision schemes, *Journal of Fourier Analysis and Applications* **7** 5, 2001.
- [37] Daniel Lemire, Chantal Pharand, Jean-Claude Rajaonah, Bruno Dubé, A.-Robert LeBlanc, Wavelet time entropy, T wave morphology and myocardial ischemia, *IEEE Transactions in Biomedical Engineering* **47** 7, 2000.  
Cited at least **83 times**.
- [38] Gilles Deslauriers, Serge Dubuc, and Daniel Lemire, Une famille d'ondelettes biorthogonales sur l'intervalle obtenue par un schéma d'interpolation itérative, *Annales des Sciences Mathématiques du Québec* **23** 1, 1999.

#### **In Peer-Reviewed Proceedings**

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- [39] Dara Aghamirkarimi, Daniel Lemire, Discovering the Smart Forests with Virtual Reality, WIMS 2017, 2017.

- [40] Samy Chambi, Daniel Lemire, Robert Godin, Kamel Boukhalfa, Charles Allen, Fangjin Yang, Optimizing Druid with Roaring bitmaps, IDEAS 2016, 2016.
- [41] Jing Li, Yuhong Yan, Daniel Lemire, Scaling up Web Service Composition with the Skyline Operator, IEEE ICWS 2016, 2016.
- [42] Samy Chambi, Daniel Lemire, Robert Godin, Nouveaux modèles d'index bitmap compressés à 64 bits, EDA 2016, 2016.
- [43] Perrine Ruer, Charles Guin-Vallerand, Le Zhang, Daniel Lemire, and Evelyne F. Vallières, An analysis tool for the contextual information from field experiments on driving fatigue, CONTEXT 2015, 2015.
- [44] Jing Li, Yuhong Yan, Daniel Lemire, A web service composition method based on compact K2-trees, IEEE SCC 2015, 2015.
- [45] Jeff Plaisance, Nathan Kurz, Daniel Lemire, Vectorized VByte Decoding, International Symposium on Web Algorithms 2015, 2015.
- [46] Samy Chambi, Daniel Lemire, Robert Godin, Owen Kaser, Roaring bitmap : nouveau modèle de compression bitmap, EDA 2014, 2014.
- [47] Jing Li, Yuhong Yan, Daniel Lemire, Full Solution Indexing Using Database for QoS-aware Web Service Composition, IEEE SCC 2014, 2014. **(Best Student Paper Award)**
- [48] Andre Vellino and Daniel Lemire, Extracting, Transforming and Archiving Scientific Data, VLDL 2011, 2011.
- [49] Owen Kaser, Daniel Lemire, Kamel Aouiche, Histogram-aware sorting for Enhanced Word-Aligned Compression in bitmap indexes, DOLAP 2008, 2008.
- [50] Kamel Aouiche, Daniel Lemire, Owen Kaser, Tri de la table de faits et compression des index bitmaps avec alignement sur les mots, BDA 2008, 2008.
- [51] Hazel Webb, Owen Kaser, Daniel Lemire, Pruning attributes from data cubes with Diamond Dicing, IDEAS 2008, 2008.
- [52] Kamel Aouiche, Daniel Lemire, Robert Godin, Collaborative OLAP with tag clouds: Web 2.0 OLAP formalism and experimental evaluation, WEBIST 2008, 2008.
- [53] Kamel Aouiche and Daniel Lemire, A comparison of five probabilistic view-size estimation techniques in OLAP, DOLAP 2007, 2007.



- [54] Owen Kaser and Daniel Lemire, Removing manually-generated boilerplate from electronic texts: Experiments with project Gutenberg e-books, CASCON 2007, 2007.
- [55] Owen Kaser and Daniel Lemire, Tag-Cloud Drawing: Algorithms for cloud visualization, Tagging and Metadata for Social Information Organization (WWW 2007), 2007.  
Cited at least **257 times**.
- [56] Kamel Aouiche and Daniel Lemire, Unassuming view-size estimation techniques in OLAP: An experimental comparison, ICEIS 2007, 2007.
- [57] Daniel Lemire, A better alternative to piecewise linear time series segmentation, SIAM Data Mining 2007, 2007.  
Cited at least **71 times**.
- [58] Dan Kucerovsky and Daniel Lemire, Monotonicity analysis over chains and curves, Curves and Surfaces 2006, 2007.
- [59] Owen Kaser, Daniel Lemire, Steven Keith, The LitOLAP Project: data warehousing with literature, CaSTA 2006, 2006.
- [60] Daniel Lemire, Martin Brooks, Yuhong Yan, An optimal linear time algorithm for quasi-monotonic segmentation, ICDM 2005, 2005.
- [61] Will Fitzgerald, Daniel Lemire, Martin Brooks, Quasi-monotonic segmentation of state variable behavior for reactive control, AAI 2005, 2005.
- [62] Yuhong Yan, Martin Brooks, Daniel Lemire, Scale-based monotonicity analysis in qualitative modelling with flat segments, IJCAI 2005, 2005.
- [63] Daniel Lemire and Anna Maclachlan, Slope One predictors for online rating-based collaborative filtering. SIAM Data Mining 2005, 2005.  
Cited at least **607 times**.
- [64] Yuhong Yan, Daniel Lemire, Martin Brooks, Monotone pieces analysis for qualitative modeling, MONET 2004, 2004.
- [65] Michelle Anderson, Marcel Ball, Harold Boley, Stephen Greene, Nancy Howse, Daniel Lemire, Sean McGrath, RACOFI: A rule-applying collaborative filtering system, IEEE/WIC COLA 2003, 2003.  
Cited at least **150 times**.

- [66] Owen Kaser and Daniel Lemire, Attribute value reordering for efficient hybrid OLAP. DOLAP 2003, 2003.
- [67] Daniel Lemire, A family of 4-point dyadic high resolution subdivision schemes, Curves and Surfaces 2002, 2003.
- [68] Daniel Lemire, Wavelet-based relative prefix sum methods for range sum queries in data cubes, CASCON 2002, 2002. (**Best Paper Award**)

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#### Books

- [69] Mamadou Tadiou Koné and Daniel Lemire (Eds.), Canadian Semantic Web, Springer, 2006.

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#### Special Issues and editorials

- [70] Cameron Neylon, Jan Aerts, C. Titus Brown, Daniel Lemire, Jarrod Millman, Peter Murray-Rust, Fernando Perez, Neil Saunders, Arfon Smith, Gaël Varoquaux and Egon Willighagen, Changing computational research: The challenges ahead, *Source Code for Biology and Medicine* 7 (2), 2012.
- [71] Daniel Lemire and Richard Hotte (Eds.), Special issue on learning and the social web, *Journal of Emerging Technologies in Web Intelligence* 2 1, 2010.
- [72] Mamadou Tadiou Koné and Daniel Lemire (Eds.), Special issue on Canadian Semantic Web, *Computational Intelligence* 23 3, 2007.

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#### Book chapters

- [73] Sylvie Noël and Daniel Lemire, On the challenges of collaborative data processing, in *Collaborative Information Behaviour: User Engagement and Communication Sharing* (edited by Jonathan Foster), IGI Global, 2010.

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#### Magazines

- [74] Daniel Lemire, Marketing your ideas: Don't sell yourself short, *ACM XRDS: Crossroads* 16 (4), 2010.

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#### Technical Reports

- [75] Owen Kaser and Daniel Lemire, Threshold and Symmetric Functions over Bitmaps, UNBSJ CSAS Technical Report TR-14-001, 2014.
- [76] Hazel Webb, Owen Kaser, Daniel Lemire, Pruning attributes from data cubes with Diamond Dicing, UNBSJ CSAS Technical Report TR-08-011, 2008.

- [77] Owen Kaser and Daniel Lemire, Removing manually-generated boilerplate from electronic texts: Experiments with project Gutenberg e-books. UNBSJ CSAS Technical Report TR-07-001, 2007.
- [78] Daniel Lemire and Owen Kaser, One-pass, one-hash n-gram statistics estimation, UNBSJ CSAS Technical Report TR-06-001, 2006.
- [79] Steven Keith, Owen Kaser, Daniel Lemire, Analyzing large collections of electronic text using OLAP, UNBSJ CSAS Technical Report TR-05-001, 2005.
- [80] Jean-Michel Nonglaton, Franco Lenardon, and Daniel Lemire, Wavelet shrinkage of LINAC III and protons synchrotron booster transformers by the Haar Transform, CERN Technical Report Number AB-Note-2003-033, avril 2003, VNRC 45816.
- [81] Daniel Lemire, Local interpolation by high resolution subdivision schemes. Technical Report 200205-01, Acadia University, 2002.

#### **Lecture Notes**

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- [INF9004] Daniel Lemire, Informatique des entrepôts de données (Data Warehousing and Computer Science), 2012. Online course: <http://benhur.teluq.ca/SPIP/inf9004/>.
- [INF6104] Daniel Lemire, Recherche d'informations et web (Information Retrieval and the Web), 2008. Online course: <http://benhur.teluq.ca/SPIP/inf6104/>.
- [INF6460] Daniel Lemire, Recherche et filtrage d'informations (Information Retrieval and Filtering), 2007. Online course: <http://benhur.teluq.ca/SPIP/inf6460/>.
- [INF6450] Daniel Lemire, Gestion de l'information avec XML (Information Management with XML), ISBN 2762418747, 2005. (Revised in 2006, 2007 and 2008.) Online course: <http://www.teluq.ca/inf6450/>.

#### **Recent Public Appearances**

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- Engineering Fast Indexes for Big Data Applications at the Spark Summit East (Boston, 2017)
- “Algorithms: How content finds you” at the Discoverability Summit (CRTC, Toronto, 2016)
- “Pour la perennité de nos contenus nationaux : l'enjeu de la visibilité” at the “rencontres de l'ADISQ” (Montreal, 2016)

## Open Source Software (sample)

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- Daniel Lemire et al., Roaring Bitmaps, 2014. (<http://roaringbitmap.org>)  
I am one of the authors of several software libraries implementing the Roaring data structure (Java, C, C++, Go, Python, etc.). These libraries are used by Apache Spark, Apache Kylin (eBay's OLAP engine), Metamarkets' Druid, Apache Hive, Apache Tez, Netflix Atlas, LinkedIn Pinot, Pilosa, Microsoft Visual Studio Team Services (VSTS), Jive Miru and so forth. A reimplementation of this library is part of Apache Lucene, and used by systems such as Solr and Elastic. Lucene is the search engine used by sites such as Wikipedia.
- Daniel Lemire et al., JavaFastPFOR: A simple integer compression library in Java, 2012. (<https://github.com/lemire/JavaFastPFOR>)  
A derivative of this library is part of Apache Lucene. The library was integrated in Apache Parquet and Apache NiFi. A modified version of the library is included in the search engine Terrier.
- Daniel Lemire et al., The FastPFOR C++ library: Fast integer compression, 2012. (<https://github.com/lemire/FastPFOR>)  
This software library has been regularly cited in the literature as a reference and basis for further implementations.
- Daniel Lemire, FrameOfReference, 2015. (<https://github.com/lemire/FrameOfReference>)  
FrameOfReference was adapted by Apache Arrow and Apache Impala.
- Daniel Lemire et al., JavaEWAH, A compressed alternative to the Java BitSet class, 2009. (<https://github.com/lemire/javaewah>)  
This project was recognized by Google's Open Source Programs in 2012. JavaEWAH is used by Apache Hive for bitmap indexing, it is **part of major Linux distributions** like Redhat and Ubuntu. It is used by JGit.
- Daniel Lemire, EWAHBoolArray: A compressed bitmap class in C++, 2008. (<https://github.com/lemire/EWAHBoolArray>)  
Used by the OLAP engine Hustle.  
Ported to C by GitHub and integrated in the Git version control system. Thus most of the users of GitHub (and there are millions of them) benefit from the library and the research that supported it.

## Hobbies

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- I am a gamer: I spend many hours every week playing video games. I share this appreciation for video games with my two sons.
- My favorite science-fiction authors are Charles Stross, Peter F. Hamilton and Alastair Reynolds.
- I build radio-controlled sailboat models.
- Since I was twelve years old, I have been programming computers for fun.