

VINCENT GRIPON

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**Permanent researcher (*chargé de recherche*) in Télécom Bretagne,
one of the top french *Grande École*.
Qualified in Section 27 (Computer Science).**

Education

- **Télécom Bretagne, Brest, France**—Electronics department
Ph.D. in communication and information sciences.
 - “Networks of Neural Cliques”, defended on July 20th, 2011.
- **École Normale Supérieure de Cachan & Université de Rennes 1**—Computer Science
Magistère in Computer Science and Telecommunication.
 - Licence degree (bachelor) in Computer Science, Session 2006.
 - Master of science first degree in Computer Science, Session 2007.
 - Master of science second degree in Computer Science, Session 2008.
- Ranked 8th at the *ENS Cachan (École Normale Supérieure de Cachan)* national competitive examination, Session 2005.

Prices

- **2015 - Best paper award**—Cognitive 2015
“Automatic face recognition using SIFT and networks of neural cliques”

Previous experience

- **Permanent researcher**—Machine learning and informational neuroscience
Permanent researcher with Institut Mines-Télécom since 2013.
- **Postdoc**—Computational neuroscience
Postdoc in the ERC advanced grant team NeuCod under the supervision of Professor Claude Berrou, 2012-2013.
- **Postdoc**—Information theory, gossip algorithms and neural networks
Postdoc at McGill University in collaboration with Professors Warren J. Gross and Michael Rabbat, 2011-2012.
- **Merit scholarship Ph.D.**—Networks of neural cliques
Ph.D. under the direction of Claude Berrou at Télécom Bretagne, 2009-2011.
- **Merit Scholarship student**—Computer science Master of Science at ENS-Cachan
2005-2009
 - **2009 research internship**—Coding and neural network
Ten months internship with Claude Berrou from Télécom-Bretagne (Brest, France).
 - **2008 research internship**—Games with imperfect information
Five months internship with Olivier Serre from the Laboratoire d’Informatique Algorithmique: Fondements et Applications (LIAFA) (Paris, France).

- **2007 research internship**—Geolocalization based on WiFi hot points
Three months work with Frederic Vexo from the Virtual Reality Laboratory (VRLab) of the Ecole Polytechnique Fédérale de Lausanne (EPFL) (Switzerland).
- **Master of science project**—Java Detection of Attacks and Intrusions (JeDAI)
Project manager (12 people involved) of one year realized in the University of Rennes I.
- **2006 research internship**—Analysing criteriums on turbo codes interleavers
Two months work done with Claude Berrou (inventor of turbo codes) at Telecom Bretagne.

Visiting scientist

- **As host**—
 - Michael Rabbat, Associate Professor with McGill University (4 months in 2012)
- **As guest**—
 - Tartu University, Estonia (1 week, 2013)
 - McGill University, Canada (2 weeks, 2014)
 - EPFL, Switzerland (2 weeks, 2014)
 - ENS Lyon, France (1 week, 2015)

Research supervising

- **Ph.D. thesis**—
 - Bartosz Bogulawski, third year, joint Ph.D. between Télécom Bretagne and CEA-Leti.
 - Ala Aboudib, third year, Télécom Bretagne.
 - Philippe Tigréat, third year, Télécom Bretagne.
 - Robin Danilo, third year, joint Ph.D. between Télécom Bretagne and University of South Brittany.
 - Bastien Padeloup, second year, Télécom Bretagne.
 - Éliott Coyac, second year, Télécom Bretagne.
 - Jean-Charles Vialatte, first year, Télécom Bretagne.
- **Master of Science**—
 - Guillaume Soulié, 2015, student from École Polytechnique.
 - Demetrio Ferro, 2015, student from Politecnico di Torino.
 - Ala Aboudib, 2013, student from ENIB, valedictorian.

Books

1. C. Berrou and V. Gripon, “Petite mathématique du cerveau,” Odile Jacob, September 2012.

Journal Papers

1. A. Iscen, T. Furon, V. Gripon, M. Rabbat and H. Jégou, “Memory vectors for similarity search in high-dimensional spaces,” in *IEEE Transactions on Big Data*, pp. 1–13, 2017.
2. B. Padeloup, V. Gripon, G. Mercier, D. Pastor and M. Rabbat, “Characterization and inference of weighted graph topologies from observations of diffused signals,” in *IEEE Transactions on Signal and Information Processing over Networks*, 2016. Submitted to.
3. V. Gripon, J. Heusel, M. Löwe and F. Vermet, “A Comparative Study of Sparse Associative Memories,” in *Journal of Statistical Physics*, Volume 164, pp. 105–129, 2016.

4. B. Boguslawski, V. Gripon, F. Seguin and F. Heitzmann, “Twin Neurons for Efficient Real-World Data Distribution in Networks of Neural Cliques. Applications in Power Management in Electronic circuits,” in *IEEE Transactions on Neural Networks and Learning Systems*, Volume 27, Number 2, pp. 375–387, 2016.
5. X. Jiang, V. Gripon, C. Berrou and M. Rabbat, “Storing sequences in binary tournament-based neural networks,” in *IEEE Transactions on Neural Networks and Learning Systems*, Volume 27, Number 5, pp. 913–925, 2016.
6. H. Jarollahi, V. Gripon, N. Onizawa and W. J. Gross, “Algorithm and Architecture for a Low-Power Content-Addressable Memory Based on Sparse-Clustered Networks,” in *Transactions on Very Large Scale Integration Systems*, Volume 27, Number 2, pp. 375–387, 2016.
7. A. Aboudib, V. Gripon and G. Coppin, “A Neural Network Model for Solving the Feature Correspondence Problem,” in *Lecture Notes in Computer Science*, Volume 9887, pp. 439–446, September 2016.
8. G. Soulié, V. Gripon and M. Robert, “Compression of Deep Neural Networks on the Fly,” in *Lecture Notes in Computer Science*, Volume 9887, pp. 153–170, September 2016.
9. A. Aboudib, V. Gripon and G. Coppin, “A Biologically Inspired Framework for Visual Information Processing and an Application on Modeling Bottom-Up Visual Attention,” in *Cognitive Computation*, pp. 1–20, September 2016.
10. F. Leduc-Primeau, V. Gripon, M. Rabbat and W. J. Gross, “Fault-Tolerant Associative Memories Based on c-Partite Graphs,” in *IEEE Transactions on Signal Processing*, Volume 64, Number 4, pp. 829–841, 2015.
11. H. Jarollahi, N. Onizawa, V. Gripon, N. Sakimura, T. Sugibayashi, T. Endoh, H. Ohno, T. Hanyu and W. J. Gross, “A Non-Volatile Associative Memory-Based Context-Driven Search Engine Using 90 nm CMOS MTJ-Hybrid Logic-in-Memory Architecture,” in *Journal on Emerging and Selected Topics in Circuits and Systems*, Volume 4, pp. 460–474, 2014.
12. H. Jarollahi, N. Onizawa, V. Gripon and W. J. Gross, “Algorithm and Architecture of Fully-Parallel Associative Memories Based on Sparse Clustered Networks,” in *Journal of Signal Processing Systems*, pp. 1–13, 2014.
13. B. K. Aliabadi, C. Berrou, V. Gripon and X. Jiang, “Storing sparse messages in networks of neural cliques,” in *IEEE Transactions on Neural Networks and Learning Systems*, Volume 25, pp. 980–989, 2014.
14. V. Gripon and C. Berrou, “Sparse neural networks with large learning diversity,” in *IEEE Transactions on Neural Networks*, Volume 22, Number 7, pp. 1087–1096, July 2011.

Conference Proceedings

1. V. Gripon, “Tropical Graph Signal Processing,” in *Proceedings of the Asilomar conference*, October 2017. To appear.
2. T. Stérin, N. Farrugia and V. Gripon, “An Intrinsic Difference Between Vanilla RNNs and GRU Models,” in *Proceedings of Cognitive*, pp. 76–81, February 2017.
3. G. B. Hacene, V. Gripon, N. Farrugia, M. Arzel and M. Jezequel, “Finding All Matches in a Database using Binary Neural Networks,” in *Proceedings of Cognitive*, pp. 59–64, February 2017.
4. E. Coyac, V. Gripon, C. Langlais and C. Berrou, “Performance of Neural Clique Networks Subject to Synaptic Noise,” in *Proceedings of Cognitive*, pp. 4–9, February 2017.

5. N. Grelier, B. Padeloup, J. Vialatte and V. Gripon, "Neighborhood-Preserving Translations on Graphs," in *Proceedings of GlobalSIP*, pp. 410–414, October 2016.
6. P. Tigréat, C. R. K. Lassance, X. Jiang, V. Gripon and C. Berrou, "Assembly Output Codes for Learning Neural Networks," in *Proceedings of the 9th International Symposium on Turbo Codes and Iterative Information Processing*, pp. 285–289, September 2016.
7. A. Aboudib, V. Gripon and G. Coppin, "A Turbo-Inspired Iterative Approach for Correspondence Problems of Image Features," in *Proceedings of the 9th International Symposium on Turbo Codes and Iterative Information Processing*, pp. 226–230, September 2016.
8. E. Coyac, V. Gripon, C. Langlais and C. Berrou, "Distributed Coding and Synaptic Pruning," in *Proceedings of the 9th International Symposium on Turbo Codes and Iterative Information Processing*, pp. 206–210, September 2016.
9. D. Ferro, V. Gripon and X. Jiang, "Nearest Neighbour Search Using Binary Neural Networks," in *Proceedings of IJCNN*, pp. 5106–5112, July 2016.
10. E. Coyac, V. Gripon and C. Langlais, "Impact du bruit synaptique sur les performances des réseaux de cliques neurales," in *Proceedings of the GRETSI conference*, 2015.
11. R. Danilo, V. Gripon, P. Coussy and L. Conde-Canencia, "Réseaux de Clusters de Neurones Restreints," in *Proceedings of the GRETSI conference*, 2015.
12. B. Padeloup, V. Gripon, G. Mercier and D. Pastor, "Vers une caractérisation de la courbe d'incertitude pour des graphes portant des signaux," in *Proceedings of the GRETSI conference*, 2015.
13. A. Mheich, M. Hassan, F. Wendling, M. Khalil, O. Dufor, V. Gripon and C. Berrou, "SimNet: A new algorithm for measuring brain networks similarity," in *Proceedings of the ICABME international conference*, pp. 119–122, 2015.
14. B. Padeloup, M. Rabbat, V. Gripon, D. Pastor and G. Mercier, "Graph Reconstruction from the Observation of Diffused Signals," in *Proceedings of the 53rd Allerton Conference*, pp. 1386–1390, October 2015.
15. R. Danilo, V. Gripon, P. Coussy, L. Conde-Canencia and W. J. Gross, "Restricted Clustered Neural Network for Storing Real Data," in *proceedings of GLSVLSI conference*, pp. 205–210, May 2015.
16. R. Danilo, H. Jarollahi, V. Gripon, P. Coussy, L. Conde-Canencia and W. J. Gross, "Algorithm and Implementation of an Associative Memory for Oriented Edge Detection Using Improved Clustered Neural Networks," in *Proceedings of ISCAS Conference*, pp. 2501–2504, May 2015.
17. A. Aboudib, V. Gripon and G. Coppin, "A Model of Bottom-Up Visual Attention Using Cortical Magnification," in *Proceedings of ICASSP*, pp. 1493–1497, April 2015.
18. A. Mheich, M. Hassan, V. Gripon, O. Dufor, M. Khalil, C. Berrou and F. Wendling, "A novel algorithm for measuring graph similarity: application to brain networks," in *Proceedings of the IEEE EMBS Neural Engineering Conference*, pp. 1068–1071, April 2015.
19. A. Aboudib, V. Gripon and B. Tessiau, "Implementing Relational-Algebraic Operators for Improving Cognitive Abilities in Networks of Neural Cliques," in *Proceedings of Cognitive*, pp. 36–41, March 2015.
20. C. Yu, V. Gripon, X. Jiang and H. Jégou, "Neural Associative Memories as Accelerators for Binary Vector Search," in *Proceedings of Cognitive*, pp. 85–89, March 2015.
21. S. Larroque, E. S. Gooya, V. Gripon and D. Pastor, "Using Tags to Improve Diversity of Sparse Associative Memories," in *Proceedings of Cognitive*, pp. 1–7, March 2015.

22. E. S. Gooya, D. Pastor and V. Gripon, "Automatic face recognition using SIFT and networks of tagged neural cliques," in *Proceedings of Cognitive*, pp. 57–61, March 2015.
23. V. Gripon, V. Skachek and M. Rabbat, "Sparse Binary Matrices as Efficient Associative Memories," in *Proceedings of the 52nd Allerton conference*, pp. 499–504, October 2014.
24. H. Jarollahi, N. Onizawa, V. Gripon, T. Hanyu and W. J. Gross, "Algorithm and Architecture for a Multiple-Field Context-Driven Search Engine Using Fully-Parallel Clustered Associative Memories," in *Proceedings of SiPS*, pp. 1–6, October 2014.
25. C. Berrou, O. Dufor, V. Gripon and X. Jiang, "Information, Noise, Coding, Modulation: What about the Brain?," in *Proceedings of the 8th symposium on Turbo Codes and Iterative Information Processing*, pp. 167–172, August 2014.
26. Z. Yao, V. Gripon and M. Rabbat, "A GPU-based Associative Memory using Sparse Neural Networks," in *Proceedings of the PCNN-14 conference*, pp. 688–692, July 2014.
27. B. Boguslawski, V. Gripon, F. Seguin and F. Heitzmann, "Huffman Coding for Storing Non-uniformly Distributed Messages in Networks of Neural Cliques," in *proceedings of the Twenty-Eighth AAAI Conference on Artificial Intelligence, volume 1*, pp. 262–268, July 2014.
28. A. Aboudib, V. Gripon and X. Jiang, "A study of retrieval algorithms of sparse messages in networks of neural cliques," in *Proceedings of Cognitive 2014*, pp. 140–146, May 2014.
29. M. Rabbat and V. Gripon, "Towards a Spectral Characterization of Signals Supported on Small-World Networks," in *ICASSP*, pp. 4793–4797, May 2014.
30. F. Leduc-Primeau, V. Gripon, M. Rabbat and W. Gross, "Cluster-based Associative Memories Built From Unreliable Storage," in *ICASSP*, pp. 8370–8374, May 2014.
31. V. Gripon, V. Skachek and M. G. Rabbat, "Sparse Structured Associative Memories as Efficient Set-Membership Data Structures," in *Proceedings of the 51st Allerton conference*, pp. 500–505, October 2013.
32. V. Gripon and X. Jiang, "Mémoires associatives pour observations floues," in *Proceedings of XXIV-th GretsI seminar*, September 2013.
33. V. Gripon and M. Rabbat, "Maximum Likelihood Associative Memories," in *Proceedings of Information Theory Workshop*, pp. 1–5, September 2013.
34. V. Gripon and M. Rabbat, "Reconstructing a Graph from Path Traces," in *Proceedings of International Symposium on Information Theory*, pp. 2488–2492, July 2013.
35. H. Jarollahi, V. Gripon, N. Onizawa and W. J. Gross, "A Low-Power Content-Addressable-Memory Based on Clustered-Sparse-Networks," in *Proceedings of 24th International Conference on Application-specific Systems, Architectures and Processors*, pp. 642–653, June 2013.
36. H. Jarollahi, N. Onizawa, V. Gripon and W. J. Gross, "Reduced-complexity binary-weight-coded associative memories," in *Proceedings of International Conference on Acoustics, Speech, and Signal Processing*, pp. 2523–2527, May 2013.
37. V. Gripon, M. Rabbat, V. Skachek and W. J. Gross, "Compressing multisets using tries," in *Proceedings of Information Theory Workshop*, Lausanne, Switzerland, pp. 647–651, September 2012.
38. V. Gripon, V. Skachek, W. J. Gross and M. Rabbat, "Random clique codes," in *Proceedings of 7th International Symposium on Turbo Codes and Iterative Information Processing*, Gothenburg, Sweden, pp. 121–125, August 2012.

39. X. Jiang, V. Gripon and C. Berrou, "Learning long sequences in binary neural networks," in *Proceedings of Cognitive 2012*, Nice, France, pp. 165–170, July 2012.
40. H. Jarollahi, N. Onizawa, V. Gripon and W. J. Gross, "Architecture and Implementation of an Associative Memory Using Sparse Clustered Networks," in *Proceedings of IEEE International Symposium on Circuits and Systems*, pp. 2901-2904, May 2012.
41. V. Gripon and C. Berrou, "Nearly-optimal associative memories based on distributed constant weight codes," in *Proceedings of Information Theory and Applications Workshop*, San Diego, CA, USA, pp. 269–273, February 2012.
42. V. Gripon and C. Berrou, "A simple and efficient way to store many messages using neural cliques," in *Proceedings of IEEE Symposium on Computational Intelligence, Cognitive Algorithms, Mind, and Brain*, Paris, France, pp. 54–58, April 2011.
43. C. Berrou and V. Gripon, "Coded Hopfield networks," in *Proceedings of 6th International Symposium on Turbo Codes and Iterative Information Processing*, Brest, France, pp. 1–5, September 2010.
44. V. Gripon and O. Serre, "Qualitative Concurrent Stochastic Games with Imperfect Information," in *Proceedings of 36th International Colloquium of Automata, Languages and Programming*, Springer, Lecture Notes in Computer Science, Rhodes, Greece, pp. 200–211, July 2009.

Invited Talks, Seminars

1. Seminar, "Intelligence artificielle et neurosciences informationnelles", ENS-Lyon, January 2017.
2. Seminar, "Intelligence artificielle et neurosciences informationnelles", Kérichen high school, November 2016.
3. Seminar, "Vers une théorie de l'information mentale", *Century of the birth of Claude Shannon*, Institut Henri Poincaré, Paris, October 2016.
4. Invited talk, "Neurosciences informationnelles et intelligence artificielle", *Journée Intelligence Artificielle : le renouveau*, French Academy of Science, October 2016.
5. Seminar, "Réseaux de neurones binaires et applications", *Séminaire Institut Brestois du Numérique et des Mathématiques*, Brest, September 2016.
6. Invited talk, "Coding for machine learning and neural networks", *International symposium on turbo codes and iterative information processing*, Brest, September 2016.
7. Invited talk, "Mémoire associative basse consommation avec jonctions tunnel magnétiques", *Journée conférence débat "Atteindre une efficacité énergétique extrême dans les systèmes de calcul avec la bio-inspiration"*, Orsay, April 2016.
8. Invited talk, "Binary neural networks and applications", *ENS Lyon ski seminar*, les sept laux, January 2016.
9. Exposé, "Binary associative memories and applications", Brown University, December 2015.
10. Exposé, "Binary associative memories and applications", McGill University, November 2015.
11. Exposé, "Error correcting graphs for explaining long term memory", Nice, March 2015.
12. Invited talk, "Is information encoding in the brain analogic or digital?", *Panel Cognitive 2015*, Nice, March 2015.
13. Seminar, "Informational neurosciences: error correcting codes in the brain", *Recent advances in computationnal neurosciences seminar*, ENS Lyon, January 2015.

14. Exposé, "Computing with associative memories", *Ski-week of ENS Lyon*, Les sept Laux, January 2015.
15. Exposé, "Exploiting high dimensionality for similarity search", *NIPS 2014 workshop*, Montréal, December 2014.
16. Exposé, "Error correcting codes and long term memory", EPFL, November 2014.
17. Invited talk, "Associative memories for computing", *Hipec HPC Workshop*, Athens, Greece, October 2014.
18. Exposé, "Neurosciences informationnelles", *GRETSI summer school*, Peyresq, June 2014.
19. Associated with an invited talk, "L'information mentale", *UPMC Colloquium*, University Pierre et Marie Curie, March 2014.
20. Seminar, "Reconstructing a graph from path traces", *DECIDE team seminar*, Télécom Bretagne, February 2014.
21. Seminar, "Signal processing on graphs", *Télécom Bretagne lunch seminar*, February 2014.
22. Invited talk, "Resilient and energy efficient memories based on neuro-inspired codes", *2nd RIEC Symposium on Brain Functions and Brain Computer*, Sendai, Japan, February 2014.
23. Invited talk, "Un modèle numérique de la mémoire à long terme : l'information mentale", *Cantine numérique*, Quimper, November 2013.
24. Associated with an invited talk, "Codes sur graphes et mémoire cérébrale", *XXIV colloque GretsI*, Brest, September 2013.
25. Invited talk, "L'information mentale", *Sicma doctoral school day*, Télécom Bretagne, September 2013.
26. Seminar, "Calculating using associative memories", *Thursday Seminar*, Tartu University, Estonia, June 2013.
27. Seminar, "Calculating using associative memories", *68nqrt Seminar*, IRISA, Rennes, June 2013.
28. Invited talk, "L'information mentale", *Tuesdays at Espace des sciences*, Rennes, May 2013.
29. Seminar, "When neural networks meet error correcting codes: towards new architectures for associative memories", *NeuroMathComp seminar*, INRIA Sophia Antipolis, Nice, April 2013.
30. Associated with an invited talk, "When neural networks meet error-correction coding: new perspectives in associative memories", *International Workshop on Neuromorphic and Brain-Based Computing Systems*, Grenoble, France, March 2013.
31. Seminar, "Les mémoires associatives : point de rencontre naturel entre calcul et mémoires", *ENS-Cachan, Dept. Computer Science and Telecommunications*, Rennes, March 2013.
32. Invited talk, "When neural networks meet error correcting codes: new perspectives for resilient associative memories", *Neuro Inspired Accelerators for Computing workshop, HiPEAC conference*, Berlin, Germany, January 2013.
33. Seminar, "Neural coding: from error correcting codes to associative memories", *ICI seminar*, ETIS, ENSEA, November 2012.
34. Seminar, "When neural networks meet error correcting codes: towards resilient associative memories", CEA-LETI, Grenoble, November 2012.
35. Seminar, "How to improve associative memories using neural coding?", *Neucod seminar*, Télécom Bretagne, Brest, September 2012.

36. Associated with an invited talk, "Looking at the neocortex as a distributed decoder", 7th *International Symposium on Turbo Codes*, Gothenburg, Sweden, August 2012.
37. Invited talk, "Neural coding: a perspective for new associative memories", *Japan-France Frontiers of Engineering program*, Kyoto, Japan, February 2012.
38. Invited talk, "Nearly-optimal associative memories based on distributed constant weight codes", *Information Theory and Applications workshop*, San Diego, CA, February 2012.
39. Exposé, "Networks of Neural Cliques", Université de Montréal, November 2011.
40. Associated with an invited talk, "Graphs, codes and the brain", *14th International Symposium on Wireless Personal Multimedia Communications*, October 2011.
41. Seminar, "Neural computation: min, sum and max", *UBO mathematical department seminar*, University of Western Brittany, May 2011.
42. Exposé, Télécom Bretagne, March 2011.
43. Exposé, "Networks of Neural Cliques", McGill University, February 2011.
44. Exposé, "Réseaux de neurones parcimonieux à grande diversité d'apprentissage", École Supérieure de Physique et Chimie Industrielles, December 2010.
45. Seminar, "Networks of Neural Cliques: Some (not so) open issues", Télécom Bretagne, September 2010.
46. Seminar, *Breizh seminar of mathematics PhD students*, Western Brittany University, December 2009.
47. Seminar, *4th year students seminar*, École Normale Supérieure of Rennes, January 2009.

Patents

- "Dispositif d'apprentissage et de décodage de messages, mettant en oeuvre un réseau de neurones, procédés d'apprentissage et de décodage et programmes d'ordinateur correspondants", number 1056760.

Fundings obtained

- **LabEx CominLabs**—2 years project, Oct. 2015, 291k€.
- **Lab-STICC funding**—Furnitures, Sept. 2012, 3000€.

Other

- **Co-creator and co-organizer of TaupIC**—French programming annual contest for top undergraduate students
6h long online contest, since 2011
 - So far, more than 140 teams have participated.
- **Participant in IEEE Xtreme programming competition**—World wide online programming competition in teams of three
5th session, 2011
 - We finished 5th out of 1515 teams.

- **Organization of summer school on “mental information”**—LIESSE
Télécom Bretagne, 2013
- **Organization of the ENS webchat for contest competitors**—Institut Henri Poincaré
2014
- **Interviewer at the ENS (Cachan, Lyon, Rennes) competitive examination in “fundamental computer science”**—ENS Ulm
2015, 2016
- **Co-organizer of the NeuroSTIC seminar**—INRIA Grenoble
2016