CURRICULUM VITAE AND RESEARCH PLAN
Luca Becchetti

July 23, 2018

Contents

1 Education

- 1995 - 1998: PhD in Computer Science, Sapienza University of Rome (Advisor: Prof. Alberto Marchetti - Spaccamela).
- July 1999 - December 1999: Post Doc at University of Graz, in the combinatorial optimization group, under Prof. Gerhard Woeginger.

2 Current position

Associate Professor at Dipartimento di Ingegneria Informatica, Automatica e Gestionale "A. Ruberti", Sapienza University of Rome.

3 Research

I have a background in the design and analysis of efficient algorithms for NP-hard and on-line problems. More recently, I investigated problems arising in the modelling and analysis of applications for large scale information networks, such as Internet and the Web. This activity occurred especially within the framework of european research projects that have involved or involve prominent european academic institutions and other international, public/private research labs. My current research interests touch the following areas:

Data mining and information retrieval in complex networks. Large scale Internet and Web applications continuously perform data mining and information retrieval tasks that benefit both end users and service providers. Performing these tasks poses algorithmic and computational challenges that are typically magnified by sheer data size and that are the object of intensive research.

I am interested in the study of efficient and scalable algorithmic techniques, with emphasis on solutions that address the issues of decentralization, lack of coordination and privacy. mIn this area, among others I investigated the application of techniques from spectral graph theory to the problem of fully decentralized clustering of possibly large graphs. More recently, I began to investigate the application of advanced graph mining and spectral graph analysis techniques to the emerging field of Network Medicine.

Optimization in large social networks. I am interested in the study of optimization problems arising in complex systems and social networks, with emphasis on resource allocation and task scheduling. Many information retrieval and coordination tasks in large-scale Web applications can be recast as optimization problems over possibly dynamic data sets. Examples include Crowdsourcing tasks to teams so as to optimize given performance goals or addressing important performance optimization issues in Web search applications, which can be recast as on-line combinatorial/stochastic optimization problems.

Algorithmic modelling and analysis of complex systems. The development and analysis of models of agents' behaviour in social networks and complex systems in general plays an important role both in our understanding of such systems and in the design of effective strategies to address problems that arise in a variety of applications, from electronic commerce to viral marketing, to the timely detection of disease outbreaks to name a few. I am currently interested in effective and simple strategies to solve basic but important coordination problems in dynamic social networks, such as reaching a majority consensus, spreading information or identified communities in a fully decentralized way.

4 Projects

I was local coordinator for Sapienza University of Rome of the following national project, funded by the Italian Ministry of Research:

- PRIN project COGENT: "Aspetti Computazionali e di Teoria dei Giochi in Reti Non-Coordinate".

Among others, I was or am involved in the following projects: EU FET IP Project DELIS: "Dynamically Evolving Large Scale Information Systems"; EU FET IP Project AEOLUS: "Algorithmic Principles for Building Efficient Overlay Computers"; EU FET Project FRONTS: Foundations of Adaptive Networked Societies of Tiny Artefacts; MULTIPLEX: Foundational Research on MULTIlevel comPLEX networks and systems.

5 Service

Program committees. Among others, I was or am in the program committees of the following conferences:

- International Colloquium on Automata, Languages and Programming: 2016, 2018.
- European Symposium on Algorithms: 2007.
- 34th International Symposium on Mathematical Foundations of Computer Science (MFCS 2009).
- International World Wide Web Conference (WWW): 2014 - 2018, 2019 (upcoming).
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining: 2015, 2016, 2018.
- ACM Conference in Information Knowledge and Management (CIKM): 2012, 2013.
- ACM International Conference on Web Search and Data Mining (WSDM): 2009, 2012, 2014 - 2018.
- IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining: 2015 - 2018
- 30th IEEE International Conference on Data Engineering, 2014

Conference and workshop organization.

- ACM Conference on Web Search and Data Mining, main session and doctoral consortium, registration chair.
- 9th Italian Information Retrieval workshop (IIR 2018): program chair.

Other reviewing activity. Amongs others, I have frequently served as a reviewer for the following journals: *Elsevier Algorithmica*, *Internet Mathematics*, *IEEE Journal on Selected Areas in Communications*, *IEEE Transactions on Parallel and Distributed Systems*, *Journal on Computer and Systems Science*, *ACM Transactions on Knowledge Discovery from Data*, *ACM Transactions on Algorithms*, *ACM Transactions on the Web*, *Algorithmica*, *Theoretical Computer Science*, *Discrete and Applied Mathematics*, *Plos One*.

6 Teaching

I have taught undergraduate and graduate courses at Sapienza University of Rome since the academic year 2000/2001. Among these, undegraduate courses in algorithms and data structures, graduate and undergraduate courses in computer networks.

I am currently teaching an undegraduate course in foundations of computer science and programming and a graduate/PhD course in advanced algorithmic techniques for information retrieval and data mining.

7 References

References

[1] Aris Anagnostopoulos, Reem Atassi, Luca Becchetti, Adriano Fazzone, and Fabrizio Silvestri. Tour recommendation for groups. *Data Min. Knowl. Discov.*, 31(5):1157–1188, 2017.

[2] Aris Anagnostopoulos, Luca Becchetti, Ilaria Bordino, Stefano Leonardi, Ida Mele, and Piotr Sankowski. Stochastic query covering for fast approximate document retrieval. *ACM Trans. Inf. Syst.*, 33(3):11:1–11:35, 2015.

[3] Aris Anagnostopoulos, Luca Becchetti, Carlos Castillo, and Aristides Gionis. An optimization framework for query recommendation. In *Proceedings of the Third International Conference on Web Search and Web Data Mining, WSDM 2010, New York, NY, USA, February 4-6, 2010*, pages 161–170, 2010.

[4] Aris Anagnostopoulos, Luca Becchetti, Carlos Castillo, Aristides Gionis, and Stefano Leonardi. Power in unity: forming teams in large-scale community systems. In *Proceedings of the 19th ACM Conference on Information and Knowledge Management, CIKM 2010, Toronto, Ontario, Canada, October 26-30, 2010*, pages 599–608, 2010.

[5] Aris Anagnostopoulos, Luca Becchetti, Carlos Castillo, Aristides Gionis, and Stefano Leonardi. Online team formation in social networks. In *Proceedings of the 21st World Wide Web Conference 2012, WWW 2012, Lyon, France, April 16-20, 2012*, pages 839–848, 2012.

[6] Aris Anagnostopoulos, Luca Becchetti, Bart de Keijzer, and Guido Schäfer. Inefficiency of games with social context. In *Algorithmic Game Theory - 6th International Symposium, SAGT 2013, Aachen, Germany, October 21-23, 2013. Proceedings*, pages 219–230, 2013.

[7] Aris Anagnostopoulos, Luca Becchetti, Bart de Keijzer, and Guido Schäfer. Inefficiency of games with social context. *Theory Comput. Syst.*, 57(3):782–804, 2015.

[8] Aris Anagnostopoulos, Luca Becchetti, Adriano Fazzone, Ida Mele, and Matteo Riondato. The importance of being expert: Efficient max-finding in crowdsourcing. In *Proceedings of the 2015 ACM SIGMOD International Conference on Management of Data, Melbourne, Victoria, Australia, May 31 - June 4, 2015*, pages 983–998, 2015.

[9] Aris Anagnostopoulos, Luca Becchetti, Stefano Leonardi, Ida Mele, and Piotr Sankowski. Stochastic query covering. In *Proceedings of the Forth International Conference on Web Search and Web Data Mining, WSDM 2011, Hong Kong, China, February 9-12, 2011*, pages 725–734, 2011.

[10] Elisa Baglioni, Luca Becchetti, Lorenzo Bergamini, Ugo Maria Colesanti, Luca Filipponi, Andrea Vitaletti, and Giuseppe Persiano. A lightweight privacy preserving sms-based recommendation system for mobile users. In *Proceedings of the 2010 ACM Conference on Recommender Systems, RecSys 2010, Barcelona, Spain, September 26-30, 2010*, pages 191–198, 2010.

[11] Luca Becchetti. Modeling locality: A probabilistic analysis of LRU and FWF. In *Algorithms - ESA 2004, 12th Annual European Symposium, Bergen, Norway, September 14-17, 2004, Proceedings*, pages 98–109, 2004.

[12] Luca Becchetti, Lorenzo Bergamini, Ugo Maria Colesanti, Luca Filipponi, Giuseppe Persiano, and Andrea Vitaletti. A lightweight privacy preserving sms-based recommendation system for mobile users. *Knowl. Inf. Syst.*, 40(1):49–77, 2014.

[13] Luca Becchetti, Lorenzo Bergamini, Francesco Ficarola, Francesco Salvatore, and Andrea Vitaletti. First experiences with the implementation and evaluation of population protocols on physical devices. In *2012 IEEE International Conference on Green Computing and Communications, Conference on Internet of Things, and Conference on Cyber, Physical and Social Computing, GreenCom/iThings/CPSCom 2012, Besancon, France, November 20-23, 2012*, pages 335–342, 2012.

[14] Luca Becchetti, Lorenzo Bergamini, Francesco Ficarola, and Andrea Vitaletti. Population protocols on real social networks. In *Proceedings of the 9th ACM Symposium on Performance evaluation of wireless ad hoc, sensor, and ubiquitous networks, PE-WASUN 2012, Paphos, Cyprus, October 21-25, 2012*, pages 17–24, 2012.

[15] Luca Becchetti, Lorenzo Bergamini, Francesco Ficarola, and Andrea Vitaletti. Population protocols on real social networks. In *Proceedings of the Fifth Workshop on Social Network Systems, Bern, Switzerland, April 10, 2012*, page 15, 2012.

[16] Luca Becchetti, Paola Bertolazzi, Carlo Gaibisso, and Giorgio Gambosi. On the design of efficient ATM routing schemes. *Theor. Comput. Sci.*, 270(1-2):341–359, 2002.

[17] Luca Becchetti, Paolo Boldi, Carlos Castillo, and Aristides Gionis. Efficient semi-streaming algorithms for local triangle counting in massive graphs. In *Proceedings of the 14th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Las Vegas, Nevada, USA, August 24-27, 2008*, pages 16–24, 2008.

[18] Luca Becchetti, Paolo Boldi, Carlos Castillo, and Aristides Gionis. Efficient algorithms for large-scale local triangle counting. *TKDD*, 4(3):13:1–13:28, 2010.

[19] Luca Becchetti, Vincenzo Bonifaci, Michael Dirnberger, Andreas Karrenbauer, and Kurt Mehlhorn. Physarum can compute shortest paths: Convergence proofs and complexity bounds. In *Automata, Languages, and Programming - 40th International Colloquium, ICALP 2013, Riga, Latvia, July 8-12, 2013, Proceedings, Part II*, pages 472–483, 2013.

[20] Luca Becchetti, Vincenzo Bonifaci, Michael Dirnberger, Andreas Karrenbauer, Kurt Mehlhorn, and Girish Varma. P. polycephalum can compute shortest paths. In *BICT 2015, Proceedings of the 9th EAI International Conference on Bio-inspired Information and Communications Technologies (formerly BIONETICS), New York City, United States, December 3-5, 2015*, page 587, 2015.

[21] Luca Becchetti, Vincenzo Bonifaci, and Emanuele Natale. Pooling or sampling: Collective dynamics for electrical flow estimation. In *Proceedings of the 17th International Conference on Autonomous Agents and MultiAgent Systems, AAMAS 2018, Stockholm, Sweden, July 10-15, 2018*, pages 1576–1584, 2018.

[22] Luca Becchetti, Ilaria Bordino, Stefano Leonardi, and Adi Rosén. Fully decentralized computation of aggregates over data streams. *SIGKDD Explorations*, 12(2):83–91, 2010.

[23] Luca Becchetti and Carlos Castillo. The distribution of pagerank follows a power-law only for particular values of the damping factor. In *Proceedings of the 15th international conference on World Wide Web, WWW 2006, Edinburgh, Scotland, UK, May 23-26, 2006*, pages 941–942, 2006.

[24] Luca Becchetti, Carlos Castillo, Debora Donato, Ricardo A. Baeza-Yates, and Stefano Leonardi. Link analysis for web spam detection. *TWEB*, 2(1):2:1–2:42, 2008.

[25] Luca Becchetti, Carlos Castillo, Debora Donato, Stefano Leonardi, and Ricardo A. Baeza-Yates. Link-based characterization and detection of web spam. In *AIRWeb 2006, Proceedings of the Second International Workshop on Adversarial Information Retrieval on the Web, Seattle, Washington, USA, 10 August 2006, co-located with SIGIR 2006*, pages 1–8, 2006.

[26] Luca Becchetti, Ioannis Chatzigiannakis, and Yiannis Giannakopoulos. Streaming techniques and data aggregation in networks of tiny artefacts. *Computer Science Review*, 5(1):27–46, 2011.

[27] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, and Gustavo Posta. Self-stabilizing repeated balls-into-bins. In *Proceedings of the 27th ACM on Symposium on Parallelism in Algorithms and Architectures, SPAA 2015, Portland, OR, USA, June 13-15, 2015*, pages 332–339, 2015.

[28] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, and Riccardo Silvestri. Plurality consensus in the gossip model. In *Proceedings of the Twenty-Sixth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2015, San Diego, CA, USA, January 4-6, 2015*, pages 371–390, 2015.

[29] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, Riccardo Silvestri, and Luca Trevisan. Simple dynamics for plurality consensus. In *26th ACM Symposium on Parallelism in Algorithms and Architectures, SPAA '14, Prague, Czech Republic - June 23 - 25, 2014*, pages 247–256, 2014.

[30] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, Riccardo Silvestri, and Luca Trevisan. Simple dynamics for plurality consensus. *Distributed Computing*, 30(4):293–306, 2017.

[31] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, and Luca Trevisan. Stabilizing consensus with many opinions. In *Proceedings of the Twenty-Seventh Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2016, Arlington, VA, USA, January 10-12, 2016*, pages 620–635, 2016.

[32] Luca Becchetti, Andrea E. F. Clementi, Emanuele Natale, Francesco Pasquale, and Luca Trevisan. Find your place: Simple distributed algorithms for community detection. In *Proceedings of the Twenty-Eighth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2017, Barcelona, Spain, Hotel Porta Fira, January 16-19*, pages 940–959, 2017.

[33] Luca Becchetti, Andrea E. F. Clementi, Francesco Pasquale, Giovanni Resta, Paolo Santi, and Riccardo Silvestri. Flooding time in opportunistic networks under power law and exponential intercontact times. *IEEE Trans. Parallel Distrib. Syst.*, 25(9):2297–2306, 2014.

[34] Luca Becchetti, Ugo Maria Colesanti, Alberto Marchetti-Spaccamela, and Andrea Vitaletti. Self-adaptive recommendation systems: Models and experimental analysis. In *Second IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2008, 20-24 October 2008, Venice, Italy*, pages 479–480, 2008.

[35] Luca Becchetti, Ugo Maria Colesanti, Alberto Marchetti-Spaccamela, and Andrea Vitaletti. Recommending items in pervasive scenarios: models and experimental analysis. *Knowl. Inf. Syst.*, 28(3):555–578, 2011.

[36] Luca Becchetti, Suhas N. Diggavi, Stefano Leonardi, Alberto Marchetti-Spaccamela, S. Muthukrishnan, Thyagarajan Nandagopal, and Andrea Vitaletti. Parallel scheduling problems in next generation wireless networks. In *SPAA*, pages 238–247, 2002.

[37] Luca Becchetti, Luca Filipponi, and Andrea Vitaletti. Privacy support in people-centric sensing. *JCM*, 7(8):606–621, 2012.

[38] Luca Becchetti and Carlo Gaibisso. Lower bounds for the virtual path layout problem in ATM networks. In *SOFSEM '97: Theory and Practice of Informatics, 24th Seminar on Current Trends in Theory and Practice of Informatics, Milovy, Czech Republic, November 22-29, 1997, Proceedings*, pages 375–382, 1997.

[39] Luca Becchetti, Miriam Di Ianni, and Alberto Marchetti-Spaccamela. Approximation algorithms for routing and call scheduling in all-optical chains and rings. In *Foundations of Software Technology and Theoretical Computer Science, 19th Conference, Chennai, India, December 13-15, 1999, Proceedings*, pages 201–212, 1999.

[40] Luca Becchetti, Miriam Di Ianni, and Alberto Marchetti-Spaccamela. Approximating call-scheduling makespan in all-optical networks. In *Graph-Theoretic Concepts in Computer Science, 26th International Workshop, WG 2000, Konstanz, Germany, June 15-17, 2000, Proceedings*, pages 13–22, 2000.

[41] Luca Becchetti, Miriam Di Ianni, and Alberto Marchetti-Spaccamela. Approximation algorithms for routing and call scheduling in all-optical chains and rings. *Theor. Comput. Sci.*, 287(2):429–448, 2002.

[42] Luca Becchetti, Miriam Di Ianni, and Alberto Marchetti-Spaccamela. Approximating call-scheduling makespan in all-optical networks. *J. Discrete Algorithms*, 2(4):501–515, 2004.

[43] Luca Becchetti, Jochen Könemann, Stefano Leonardi, and Martin Pál. Sharing the cost more efficiently: improved approximation for multicommodity rent-or-buy. In *Proceedings of the Sixteenth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2005, Vancouver, British Columbia, Canada, January 23-25, 2005*, pages 375–384, 2005.

[44] Luca Becchetti, Jochen Könemann, Stefano Leonardi, and Martin Pál. Sharing the cost more efficiently: Improved approximation for multicommodity rent-or-buy. *ACM Trans. Algorithms*, 3(2):23, 2007.

[45] Luca Becchetti, Peter Korteweg, Alberto Marchetti-Spaccamela, Martin Skutella, Leen Stougie, and Andrea Vitaletti. Latency constrained aggregation in sensor networks. In *Algorithms - ESA 2006, 14th Annual European Symposium, Zurich, Switzerland, September 11-13, 2006, Proceedings*, pages 88–99, 2006.

[46] Luca Becchetti and Elias Koutsoupias. Competitive analysis of aggregate max in windowed streaming. In *Automata, Languages and Programming, 36th International Colloquium, ICALP 2009, Rhodes, Greece, July 5-12, 2009, Proceedings, Part I*, pages 156–170, 2009.

[47] Luca Becchetti and Stefano Leonardi. Non-clairvoyant scheduling to minimize the average flow time on single and parallel machines. In *Proceedings on 33rd Annual ACM Symposium on Theory of Computing, July 6-8, 2001, Heraklion, Crete, Greece*, pages 94–103, 2001.

[48] Luca Becchetti and Stefano Leonardi. Nonclairvoyant scheduling to minimize the total flow time on single and parallel machines. *J. ACM*, 51(4):517–539, 2004.

[49] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Online weighted flow time and deadline scheduling. In *Approximation, Randomization and Combinatorial Optimization: Algorithms and Techniques, 4th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems, APPROX 2001 and 5th International Workshop on Randomization and Approximation Techniques in Computer Science, RANDOM 2001 Berkeley, CA, USA, August 18-20, 2001, Proceedings*, pages 36–47, 2001.

[50] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Semiclairvoyant scheduling. In *Algorithms - ESA 2003, 11th Annual European Symposium, Budapest, Hungary, September 16-19, 2003, Proceedings*, pages 67–77, 2003.

[51] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Semiclairvoyant scheduling. *Theor. Comput. Sci.*, 324(2-3):325–335, 2004.

[52] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Online weighted flow time and deadline scheduling. *J. Discrete Algorithms*, 4(3):339–352, 2006.

[53] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Flow time minimization. In *Encyclopedia of Algorithms*. 2008.

[54] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Kirk Pruhs. Flow time minimization. In *Encyclopedia of Algorithms*, pages 766–768. 2016.

[55] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, and Guido Schäfer. Scheduling to minimize flow time metrics. In *17th International Parallel and Distributed Processing Symposium (IPDPS 2003), 22-26 April 2003, Nice, France, CD-ROM/Abstracts Proceedings*, page 223, 2003.

[56] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, Guido Schäfer, and Tjark Vredeveld. Average case and smoothed competitive analysis of the multi-level feedback algorithm. In *44th Symposium on Foundations of Computer Science (FOCS 2003), 11-14 October 2003, Cambridge, MA, USA, Proceedings*, pages 462–471, 2003.

[57] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, Guido Schäfer, and Tjark Vredeveld. Average case and smoothed competitive analysis of the multi-level feedback algorithm. In *Algorithms for Optimization with Incomplete Information, 16.-21. January 2005*, 2005.

[58] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, Guido Schäfer, and Tjark Vredeveld. Average-case and smoothed competitive analysis of the multilevel feedback algorithm. *Math. Oper. Res.*, 31(1):85–108, 2006.

[59] Luca Becchetti, Stefano Leonardi, Alberto Marchetti-Spaccamela, Andrea Vitaletti, Suhas N. Diggavi, S. Muthukrishnan, and Thyagarajan Nandagopal. Parallel scheduling problems in next generation wireless networks. *Networks*, 45(1):9–22, 2005.

[60] Luca Becchetti, Stefano Leonardi, and S. Muthukrishnan. Scheduling to minimize average stretch without migration. In *Proceedings of the Eleventh Annual ACM-SIAM Symposium on Discrete Algorithms, January 9-11, 2000, San Francisco, CA, USA.*, pages 548–557, 2000.

[61] Luca Becchetti, Stefano Leonardi, and S. Muthukrishnan. Average stretch without migration. *J. Comput. Syst. Sci.*, 68(1):80–95, 2004.

[62] Luca Becchetti, Alberto Marchetti-Spaccamela, Andrea Vitaletti, Peter Korteweg, Martin Skutella, and Leen Stougie. Latency-constrained aggregation in sensor networks. *ACM Trans. Algorithms*, 6(1):13:1–13:20, 2009.

[63] Lorenzo Bergamini, Luca Becchetti, and Andrea Vitaletti. Privacy-preserving environment monitoring in networks of mobile devices. In *NETWORKING 2011 Workshops - International IFIP TC 6 Workshops, PE-CRN, NC-Pro, WCNS, and SUNSET 2011, Held at NETWORKING 2011, Valencia, Spain, May 13, 2011, Revised Selected Papers*, pages 179–191, 2011.

[64] Carlos Castillo, Debora Donato, Luca Becchetti, Paolo Boldi, Stefano Leonardi, Massimo Santini, and Sebastiano Vigna. A reference collection for web spam. *SIGIR Forum*, 40(2):11–24, 2006.

[65] Fabrizio d'Amore, Luca Becchetti, Sergei L. Bezrukov, Alberto Marchetti-Spaccamela, M. Ottaviani, Robert Preis, Markus Röttger, and Ulf-Peter Schroeder. On the embedding of refinements of 2-dimensional grids. In *Euro-Par '97 Parallel Processing, Third International Euro-Par Conference, Passau, Germany, August 26-29, 1997, Proceedings*, pages 950–957, 1997.

[66] Gabriel Tolosa, Luca Becchetti, Esteban Feuerstein, and Alberto Marchetti-Spaccamela. Performance improvements for search systems using an integrated cache of lists+intersections. In *String Processing and Information Retrieval - 21st International Symposium, SPIRE 2014, Ouro Preto, Brazil, October 20-22, 2014. Proceedings*, pages 227–235, 2014.

[67] Gabriel Tolosa, Esteban Feuerstein, Luca Becchetti, and Alberto Marchetti-Spaccamela. Performance improvements for search systems using an integrated cache of lists + intersections. *Inf. Retr. Journal*, 20(3):172–198, 2017.