

Maria MAISTRO

PERSONAL DATA

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RESEARCH ACTIVITY

SINCE NOVEMBER 2014 PhD in COMPUTER SCIENCE
Doctorate School in Information Engineering, specialization in
“Information and Communication Science and Technologies
(ICT)”, Department of Information Engineering, University of
Padua
Supervisor: Prof. Nicola FERRO

The main contributions of my Ph.D. thesis deal with the following topics:

- Designing of a formal framework for IR evaluation measures and analysis of the properties characterizing the different IR measures;
- A family of new evaluation measures (called Markov Precision) built on top of Markov-chain based user models. This evaluation metric can be calibrated on the user dynamic and takes into account the user interactions with the front end Web application of a Web search engine;
- Integrate the user dynamic defined with a Markovian model in LambdaMART to improve learning to rank;
- A novel methodology for dealing with multiple crowd assessors, who may be contradictory and/or noisy (Referred as AWARE-Assessor-driven Weighted Averages for Retrieval Evaluation);
- Properly evaluation of click models for the specific case of sparsity of clicks and unbalance between the number of clicks and skips.

MARCH 2017-DECEMBER 2018 RESEARCH GRANT financed by the Department of Information Engineering, University of Padua, entitled: “Extending Learning to Rank Algorithms by Integrating the User Dynamic”.
Supervisor: Prof. Nicola FERRO

RESEARCH ACTIVITY

- JULY 2016-FEBRUARY 2017 VISITING PERIOD at the Department of Computer Science, Royal Melbourne Institute of Technology.
Supervisor: Prof. Mark SANDERSON
- We examine the query log of a job search engine contrasting logged behavior with behavior logged in Web search. We focus our analysis on query and click frequencies learning that users tend to click less in job search compared to Web search. Moreover, we train state of the art click models on both logs and we compare their performances on job and Web search.
- JULY 2016-FEBRUARY 2017 INTERNSHIP at SEEK, Melbourne.
URL: <https://www.seek.com.au/>
Tutors: Dr. Wilson WONG and Dr. Sargol SADEGHI
- SEEK creates world-class product technology solutions to address the needs of jobseekers and hirers and facilitates the matching between jobseekers and hirers across their online employment marketplaces. Across their employment marketplaces they receive over 375 million visits to their sites every month and have over 3 million job opportunities available at any given time and over 100 million jobseeker profiles.
- MAY 2016-FEBRUARY 2017 RESEARCH GRANT financed by the Department of Information Engineering, University of Padua, entitled: "Definition and Development of Information Retrieval Evaluation Measures based on Markovian User Models".
Supervisor: Prof. Nicola FERRO
- DECEMBER 2014-NOVEMBER 2015 RESEARCH GRANT financed by the Department of Information Engineering, University of Padua, entitled: "Improve Experimental Evaluation of Information Retrieval Systems Using Markovian User Models and Visual Analytics Techniques".
Supervisor: Prof. Nicola FERRO
- MAY-OCTOBER 2014 SCHOLARSHIP AT THE UNIVERSITY OF PADUA, department of Information Engineering. The contract dealt with the definition of stochastic and Markovian evaluation models for Information Retrieval, the implementation of these models and their experimental evaluation.

CONFERENCE PRESENTATIONS

- AUGUST 2017 ON INCLUDING THE USER DYNAMIC IN LEARNING TO RANK.
40th International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2017), Tokyo, Japan, August 7-11, 2017.
- JUNE 2017 EXTENDING LEARNING TO RANK WITH USER DYNAMIC.
8th Italian Information Retrieval Workshop (IIR 2017), Lugano, Switzerland, June 5-7, 2017.
- JUNE 2017 A GAME OF LINES: DEVELOPING GAME MECHANICS FOR TEXT CLASSIFICATION.
8th Italian Information Retrieval Workshop (IIR 2017), Lugano, Switzerland, June 5-7, 2017.
- FEBRUARY 2017 ADAPTING INFORMATION RETRIEVAL TO USER SIGNALS VIA STOCHASTIC MODELS.
10th ACM International Conference on Web Search and Data Mining (WSDM 2017), Cambridge, UK, February 6-10, 2017.
- MAY 2016 BASIS OF A FORMAL FRAMEWORK FOR INFORMATION RETRIEVAL EVALUATION MEASUREMENTS.
7th Italian Information Retrieval Workshop (IIR 2016), Venice, Italy, May 30-31, 2016.
- SEPTEMBER 2015 TOWARDS A FORMAL FRAMEWORK FOR UTILITY-ORIENTED MEASUREMENTS OF RETRIEVAL EFFECTIVENESS.
1st ACM SIGIR International Conference on the Theory of Information Retrieval (ICTIR 2015), Northampton, Massachusetts (USA), September 27-30, 2015.
- SEPTEMBER 2015 IMPROVING INFORMATION RETRIEVAL EVALUATION VIA MARKOVIAN USER MODELS AND VISUAL ANALYTICS.
6th Symposium on Future Directions in Information Access (FDIA 2015), Thessaloniki, Greece, September 2, 2015.
- MAY 2015 MARKOV PRECISION: MODELLING USER BEHAVIOUR OVER RANK AND TIME.
6th Italian Information Retrieval Workshop (IIR 2015), Cagliari, Italy, May 25-26, 2015.
- SEPTEMBER 2014 RETHINKING HOW TO EXTEND AVERAGE PRECISION TO GRADED RELEVANCE.
5th International Conference of the CLEF Initiative (CLEF 2014), Sheffield, UK, September 15-18, 2014.

PROFESSIONAL ACTIVITY AS A REVIEWER

- MAY 2017 MEMBER OF THE PROGRAM COMMITTEE (SHORT PAPERS)
The 26th ACM International Conference on Information and Knowledge Management (CIKM 2017).
Singapore, November 6-10, 2017.
- MARCH 2017 MEMBER OF THE PROGRAM COMMITTEE (SHORT PAPERS)
40th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2017).
Tokyo, Japan, August 7-11, 2017.
- MARCH 2016 MEMBER OF THE PROGRAM COMMITTEE (SHORT PAPERS)
39th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2016).
Pisa, Italy, July 17-21, 2016.

ORGANIZATION OF SCIENTIFIC EVENTS

- OCTOBER 2017 1ST INTERNATIONAL WORKSHOP ON LEARNING NEXT GENERATION RANKERS (LEARNER 2017).
Amsterdam, Netherlands, October 1, 2017.
ROLE: Organizer
- MARCH 2016 38TH EUROPEAN CONFERENCE ON INFORMATION RETRIEVAL (ECIR 2016).
Padova, Italy, March 20-23, 2016.
ROLE: Member of the Organization Committee

TECHNICAL SKILLS

NOVEMBER-DECEMBER 2015: I developed a Web application to allow participants to register at ECIR 2016. The application collected participants personal data and allow them to register at the conference and pay the registration fee. Moreover, the Web application invoked the Web service for the credit card payment system and managed the payment workflow. The application was developed with a database implemented in SQL, and the with the following programming languages: php, HTML, CSS, Bootstrap, AJAX and JavaScript.

PROGRAMMING SKILLS Java, JavaScript, Python, SQL, php, HTML, CSS, Bootstrap, AJAX, Matlab.

EDUCATION

SINCE NOVEMBER 2014 I attended the following Ph.D. courses:

APPLIED FUNCTIONAL ANALYSIS AND MACHINE LEARNING: gives a survey of the basic aspects of functional analysis, machine learning, regularization theory and inverse problems.

BAYESIAN MACHINE LEARNING: introduce fundamental topics in Bayesian reasoning and how they apply to machine learning problems. The course describes advantages and disadvantages of Bayesian approaches and presents a graphical tool to analyse the assumptions of these approaches in practical problems.

APPLIED LINEAR ALGEBRA: deals with the main concepts and techniques of linear algebra that are important for applications with a special emphasis on linear Least Squares problems, their numerical treatment and their statistical interpretation.

REAL-TIME SYSTEMS AND APPLICATIONS: provides an insight in the realm of real-time system. The aim of the course is to present aspects related to theory and practice in a way which is holistic enough to prepare graduates to embark on the development of real-time systems.

STATISTICAL METHODS: presents a small selection of linear statistical techniques which are widespread in applications, e.g. divergence minimization problem, multivariate analysis methods, expectation maximization methods, hidden Markov models.

OCTOBER-DECEMBER 2015 I attended the courses ENGLISH FOR PH.D. STUDENTS, which purpose is to develop the language skills in both writing and speaking that are necessary for an international academic environment (i.e. writing abstracts or articles for international journals, strategies for dealing with presentations at conferences; preparation of biographical information and so on).

OCTOBER 2014-JANUARY 2015 I attended the following master courses:

TELECOMMUNICATION NETWORKS: aims at providing basic knowledge of modern telecommunication architectures, as well as fundamental mathematical tools for the modeling, design and analysis of telecommunications networks and services. The course gives also practical experience with network protocols and devices, thanks to a series of lab experiences that introduce to router and socket programming.

INFORMATION RETRIEVAL: deals with the fundamental knowledge necessary in order to design, develop and evaluate an information retrieval system. In details, the course introduce to the automatic representation and retrieval of documents, indexing techniques, information retrieval models, and evaluation measures.

EDUCATION

OCTOBER 2014-JANUARY 2015

I attended the following bachelor course:

DATA STRUCTURES AND ALGORITHMS 1: describes in a formal and systematic way, the fundamental methodologies which are necessary in order to design and analyse algorithm and efficient data structures.

MARCH 2014-JUNE 2014

I attended the following master course:

DATABASE MANAGEMENT SYSTEM: deals with the project and development of a database management system, starting from the requirement analysis and going through the entity relationship schema, the relational schema, SQL language to implement the physical model, JDBC access to the database and development of a Web application.

MARCH 2014

Master Degree in MATHEMATICS

University of Padua, Padua

Title of the Thesis: "Stochastic user models for the evaluation in Information Retrieval"

Supervisors: Prof. Marco FERRANTE, Prof. Nicola FERRO

We developed a stochastic model based on Markov chains which describes a complex user behaviour. In particular, we proposed a new evaluation measure, we analysed its experimental properties and we compared it with other evaluation measures. Moreover, we studied multi-graded measures and we proposed a possible extension of a widely used binary metric.

DECEMBER 2011

Bachelor Degree in MATHEMATICS

University of Padua, Padua

Title of the Thesis: "Optimal Mix in the Interconnection of Drinking Water Sources with Variable Recharge Rate"

Supervisor: Prof.ssa Alessandra BURATTO

We tackled an optimization problem concerning the management of water resources of a city. This problem was analytically examined and then was implemented with the General Algebraic Modeling System (GAMS) to find a numerical solution.

INTERNATIONAL FORMATIVE ACTIVITIES

SEPTEMBER 2015 10TH EUROPEAN SUMMER SCHOOL IN INFORMATION RETRIEVAL (ESSIR 2015).
Thessaloniki, Greece, August 31 - September 4 2015.

GRANTS

- MARCH 2017 ACM GRANT
Grant financed by the Association for Computing Machinery (ACM) to participate in the ACM SIGIR International Conference on Research and Development in Information Retrieval (SIGIR 2017), held in Tokyo, Japan, August 7-11, 2017.
- JANUARY 2017 ACM GRANT
Grant financed by the Association for Computing Machinery (ACM) to participate in the ACM SIGIR International Conference on Web Search and Data Mining (WSDM 2017), held in Cambridge, UK, February 6-10, 2017.
- AUGUST 2015 ACM GRANT
Grant financed by the Association for Computing Machinery (ACM) to participate in the ACM SIGIR International Conference on the Theory of Information Retrieval (ICTIR 2015), held in Northampton, Massachusetts (USA), September 27-30, 2015.
- JULY 2015 ELIAS GRANT
Grant financed by the European Science Foundation (ESF) to participate in the 10th European Summer School in Information Retrieval (ESSIR 2015), held in Thessaloniki, Greece, August 31-September 4, 2015.
- SEPTEMBER 2014 ELIAS GRANT
Grant financed by the European Science Foundation (ESF) to participate in the Fifth International Conference of the Cross-Language Evaluation Forum (CLEF 2014), held in Sheffield, UK, September 15-18, 2014.

QUALIFICATION

- MAY 2014 GRE REVISED GENERAL TEST, Educational Testing Service (ETS)
Verbal Reasoning: 150/170
Quantitative Reasoning: 155/170
Analytical Writing: 3/6
- DECEMBER 2007 FIRST CERTIFICATE IN ENGLISH, University of Cambridge
Level: B2, Grade: B
- MAY 2007 ZERTIFICAT DEUTSCH, Goethe Institut
Level: B1, Grade: 258/300

TEACHING

- MARCH 2017-MAY 2017 Teaching assistant of DATABASE MANAGEMENT SYSTEMS, Master degree in Computer Engineering, Department of Information Engineering, University of Padua.
Teaching hours: 20
- MARCH 2016-MAY 2016 Teaching assistant of DATABASE MANAGEMENT SYSTEMS, Master degree in Computer Engineering, Department of Information Engineering, University of Padua.
Teaching hours: 14
- OCTOBER 2015-FEBRUARY 2016 Teaching assistant of MATHEMATICS WITH ELEMENT OF STATISTICS, Bachelor Course in Natural Science, Department of Biology, University of Padua.
Teaching hours: 25
- OCTOBER 2014-FEBRUARY 2015 Teaching assistant of MATHEMATICS WITH ELEMENT OF STATISTICS, Bachelor Course in Natural Science, Department of Biology, University of Padua.
Teaching hours: 25
- OCTOBER 2015 Teaching of MATHEMATICS WITH ELEMENT OF STATISTICS, Bachelor Course in Natural Science, Department of Biology, University of Padua.
Teaching hours: 30

PUBLICATIONS

Ferrante, M., Ferro, N., and Maistro, M. (Accepted in 2017). Aware: Exploiting Evaluation Measures to Combine Multiple Assessors. *ACM Transaction on Information Systems*.

Spina, D., Maistro, M., Ren, Y., Sadeghi, S., Wong, W., Baldwin, T., Cavedon, L., Moffat, A., Sanderson, M., Scholer, F., and Zobel, J. (2017). Understanding User Behavior in Job and Talent Search: An Initial Investigation. In Degenhardt, J., Kallumadi, S., de Rijke, M., Si, L., Trotman, A., and Yinghui X., editors, *Proceedings of the 2017 SIGIR workshop On eCommerce, (eCom 2017), co-located with the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2017), Tokyo, Japan, August 11, 2017, CEUR Workshop Proceedings*. CEUR-WS.org.

Ferro, N., Lucchese, C., Maistro, M., and Perego, R. (2017). On Including the User Dynamic in Learning to Rank. In Kando, N., Sakai, T., Joho, H., Li, H., de Vries, A. P. and White, R., editors, *Proceedings of the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2017), Tokyo, Japan, August 7-11, 2017, ACM*.

Di Nunzio, G. M., Maistro, M., and Zilio, D. (2017). A Game of Lines: Developing Game Mechanics for Text Classification. In Crestani, F., Di Noia, T., and Perego, R., editors, *Proceedings of the 8th Italian Information Retrieval Workshop, (IIR 2017), Lugano, Switzerland, June 5-7, 2017, CEUR Workshop Proceedings*. CEUR-WS.org.

Maistro, M. (2017). Adapting Information Retrieval to User Signals via Stochastic Models. In de Rijke, M. and Shokouhi, M. and Tomkins, A., and Zhang, M., editors, *Proceedings of the 10th ACM International Conference on Web Search and Data Mining, (WSDM 2017), Cambridge, United Kingdom, February 6-11 2017, pages 843-843, ACM*.

Di Nunzio, G. M., Maistro, M., and Zilio, D. (2016). The University of Padua (IMS) at TREC 2016 Total Recall Track. In *Proceedings of the 25th Text REtrieval Conference (TREC 2016), Gaithersburg, Maryland, USA, November 15-18, 2016*.

Di Nunzio, G. M., Maistro, M., and Zilio, D. (2016). Gamification for Information Retrieval: The Query Aspects Game. In Basile, P., and Corazza, A., and Cutugno, F., and Montemagni, S., and Nissim, M., and Patti, V. and Semeraro, G., and Sprugnoli, R., editors, *Proceeding of the 3rd Italian Conference on Computational Linguistics, (CLiC-it 2016), Napoli, Italy, December 5-6, 2016, volume 1749 of CEUR Workshop Proceedings*. CEUR-WS.org.

Di Nunzio, G. M., Maistro, M., and Zilio, D. (2016). Gamification for Machine Learning: The Classification Game. In Hopfgartner, F., Kazai, G., Kruschwitz, U., and Meder, M., editors, *Proceedings of the Third International Workshop on Gamification for Information Retrieval co-located with 39th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2016), Pisa, Italy, July 21, 2016, volume 1642 of CEUR Workshop Proceedings, pages 45-52*. CEUR-WS.org.

Ferro, N., Ferrante, M., and Maistro, M. (2016). Basis of a Formal Framework for Information Retrieval Evaluation Measurements. In Di Nunzio, G. M., Nardini, F. M., and Orlando, S., editors, *Proceedings of the 7th Italian Information Retrieval Workshop, (IIR 2016), Venezia, Italy, May 30-31, 2016, volume 1653 of CEUR Workshop Proceedings*. CEUR-WS.org.

Ferrante, M., Ferro, N., and Maistro, M. (2015). Towards a Formal Framework for Utility-Oriented Measurements of Retrieval Effectiveness. In Allan, J., Croft, W. B., de Vries, A. P., and Zhai, C., editors, *Proceedings of the 2015 International Conference on The Theory of Information Retrieval, (ICTIR 2015), Northampton, Massachusetts, USA, September 27-30, 2015, pages 21–30. ACM.*

Di Buccio, E., Di Nunzio, G. M., Ferro, N., Harman, D., Maistro, M., and Silvello G. (2015). Unfolding Off-the-shelf IR Systems for Reproducibility. In Arguello, J., Diaz, F., Lin, J., and Trotman, A., editors, *Proceedings of the First Workshop on Reproducibility, Inexplicability, and Generalizability of Results (RIGOR) co-located with 38th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2015), Santiago, Chile.*

Maistro, M. (2015). Improving Information Retrieval Evaluation via Markovian User Models and Visual Analytics. In Azzopardi, L. and Wilson, M., editors, *Proceedings of the 6th BCS-IRSG Symposium on Future Directions in Information Access, (FDIA 2015), Thessaloniki, Greece, August 31 - September 4, 2015, Workshops in Computing. BCS.*

Ferrante, M., Ferro, N., and Maistro, M. (2015). Markov precision: Modelling user Behaviour over Rank and Time. In Boldi, P., Perego, R., and Sebastiani, F., editors, *Proceedings of the 6th Italian Information Retrieval Workshop, (IIR 2015), Cagliari, Italy, May 25-26, 2015, volume 1404 of CEUR Workshop Proceedings. CEUR-WS.org.*

Ferrante, M., Ferro, N., and Maistro, M. (2014). Injecting User Models and Time into Precision via Markov Chains. In Geva, S., Trotman, A., Bruza, P., Clarke, C. L. A., and Järvelin, K., editors, *Proceedings of the 37th International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2014), Gold Coast, QLD, Australia, July 6-11, 2014, pages 597–606. ACM.*

Ferrante, M., Ferro, N., and Maistro, M. (2014). Rethinking how to Extend Average Precision to Graded Relevance. In Kanoulas, E., Lupu, M., Clough, P. D., Sanderson, M., Hall, M. M., Hanbury, A., and Toms, E. G., editors, *Information Access Evaluation. Multilinguality, Multimodality, and Interaction - 5th International Conference of the CLEF Initiative, (CLEF 2014), Sheffield, UK, September 15-18, 2014. Proceedings, volume 8685 of Lecture Notes in Computer Science, pages 19–30. Springer.*

Padova, August 21, 2017

Dr. Maria Maistro