Andrea Mauri

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Summary

I'm a PostDoc Researcher at the Dipartimento di Elettronica, Informazione e Bioingegneria (DEIB) of the Politecnico di Milano. My main research topics are models, methods and technologies for Crowdsourcing and Human Computation, with special attention to problems related to: crowd and social networks integration, adaptation and control of crowdsourcing task [P4].
My research interests include also smart city sensing and social content analysis [P5][P6]. In particular I'm interested in applying data science techniques for integrating heterogeneous data sources (e.g., phone data, energy consumption, social network, etc..).
I'm also interested in model-driven software engineering, with particular focus on language specification and model transformations, and in business process-based applications integrated with social network practices [P7] [P9].
Recently I began to work in the field of RDF Stream Processing with particular focus on the problem of publishing streams on the Web [P1].
I got my PhD student at the Dipartimento di Elettronica, Informazione e Bioingegneria (DEIB) of the Politecnico di Milano in January 2016 with the thesis "Methodologies for the Development of Crowd and Social based Applications" advised by Prof. Marco Brambilla. In the thesis I addressed the problem of designing, deploying and monitoring application on top of crowd-based systems.
During my PhD I was a visiting student at the Universitat Oberta de Catalunya, under the supervision of Prof. Jordi Cabot, where I studied the problem of integrating crowdsourcing in the development process of a modeling language.
I also visited the IBM Research Laboratory in Dublin, under the supervision of Prof. Jia Yuan Yu, where I investigated the problem of applying auction model to the selection of workers in order to increase the quality of the crowdsourced work.
Previously I was an Assistant Researcher at the University of Trento (from April to October 2012) where I worked on business process-based applications integrated with social network practices [P10] .
In July 2012 have been a visiting scholar at the Ecole de Mines in Nantes where I worked on on metamodelling and model transformations.
During my research activities had the opportunity to work in several European funded research projects, collaborating with both universities and industries.

Research Activity

I am involved in different research activities. As a PhD student I worked on Human Computation and Crowdsourcing using methodologies borrowed from the field of model-driven software engineering. As a PostDoc I got interested in smart city sensing and social content analysis with particular focus on the integration of heterogeneous data sources.
I beleive that a multidisciplinary attitude is fundamental for the advancement of the research and it's needed to produce result that can really impact the world outside the academia context.

A short description of the each research activity is reported below.

Human Computation and Crowdsourcing

Human Computation and Crowdsourcing raise several theoretical problems like quality assurance, time and cost management, user profiling and more practical ones likes user interface design.
In this research I focused on defining new model and methodologies for building crowd and social based applications. In particular I addressed the problem of the integration of traditional crowdsourcing platforms with social networks, and the problem of adaptation and control the execution of crowdsourcing tasks.
The main result of this research activity is the CrowdSearcher [P4] project. The framework supports the designing, deploying, and monitoring applications on top of crowd-based systems. The design is done declaratively, then the specification is transformed into platform-specific implementations which include social networks and crowdsourcing platforms. Finally it provides a reactive control environment, which guarantees application's adaptation and interoperability.
The effectiveness of the paradigm it was tested in the field of multimedia search within the CuBRIK project, where the socially-enacted search interaction was adopted for the indexing and the querying processes, and within the EIT and Expos E015 environments, where online social content sensing and analysis was paired with crowdsourced information.

Model Driven Engineering

In this activity I focused on language specification and model transformations. I worked on the extension the WebML notation by adding a set of components (called units in WebML parlance) that encapsulate the logic of the interaction with the social platforms. These units work as wrappers of the social platform APIs and hide the underlying complexity from the developer, reducing the cost of designing new applications. This work is covered by the BPM4People project [P10].
I worked at the definition of IFML [P7] (Interaction Flow Modeling Language), an international standard adopted by the OMG in 2014. The contribution to the field is also demonstrated by the widespread adoption of the associated tool WebRatio, now used by more than 17,000 students and researchers throughout the world for learning and research purposes.
In the Automobile [P9] project I worked on the specification of an extension of the IFML language tailored to mobile applications.

RDF Stream Processing

Recently I started to work in the field of RDF Stream Processing, with particular focus on the problem of publishing RDF Stream on the web. In this context I designed and developed TripleWave [P1] a NodeJS framework to publish RDF streams on the Web following the Linked Data principles.

Data Science and Social Media Analysis

More recently, I started to work on problems involved in the analysis of large scale social media and real world events. I study data fusion, wrangling and analysis on cross-disciplinary projects related to smart cities [P6][P3], large scale events, and social network user behavior. In particular I focus on the data fusion between mobile telephone data and social media to perform spatial-temporal analysis. I also study how is possible to discover new knowledge by analyzing data coming from the social network. In this context I designed and performed queries over big data dataset using Apache HIVE and worked on the applications developed in the MilanoHub [P6] and Urbanscope [P3] projects.

User Behavior Analysis in Web Applications

In this activity I combined model driven approach with data science techniques at the purpose of modeling users behavior in Web applications. While basic Web analytics tools are widespread and provide statistics about Web site navigation, no approaches exist for merging such statistics with information about the Web application structure, content and semantics. The aim of this research is to demonstrate the advantages of combining Web application models with runtime navigation logs, at the purpose of deepening the understanding of users behaviour

Awards

1. **Best paper award at ICWE2014 for the paper:** A. Bozzon, M. Brambilla, S. Ceri, **A. Mauri**, and R. Volonterio. Pattern-based specification of crowdsourcing applications [10].
2. **3rd prize at the AI Mashup Challenge 2014 at ESWC for the paper** M. Brambilla, D. Dell'Aglio, E. Della Valle, **A. Mauri**, R Volonterio. Augmented Participation to Live Events through Social Network Content Enrichment. [14]

Research Projects Participation

[P1] **TripleWave**:TripleWave is a framework to publish RDF streams on the Web following the Linked Data principles. Streams can be consumbed following pull- and push-based approaches. TripleWave can be fed with either existing Web (non-RDF) streams or RDF datasets.
https://github.com/streamreasoning/TripleWave

[P2] **EIT 3cixty**: 3cixty is a new initiative launched in 2014 to drive European leadership in future ICT-enabled urban life and mobility solutions. The initiative will realise a platform and related service ecosystem for the provisioning of comprehensive heterogeneous city-related mobility information

[P3] **Urbanscope**: This project encompasses researchers with competencies in Computing Engineering, Communication and Information Design, Management Engineering, and Mathematics. The aim of this project is to systematically produce compelling views on urban systems to foster understanding and decision making. Views are like new lenses: they are designed to support the recognition of specific patterns thus enabling new perspectives. The current research activity is focused on Milano and data coming from the use of social media within the urban context. http://www.urbanscope.polimi.it/#/

[P4] **CrowdSearcher**: CrowdSearcher is a crowd-management system that implements a paradigm that embodies crowds and social network communities as first-class sources for the information management and extraction on the Web. Its approach aims at filling the gap between traditional Web systems with social systems, capable of interacting with real people, in real time, to capture their opinions, suggestions, and emotions by leveraging crowdsourcing practices and making them viable upon a social network. My PhD thesis was developed in the context of this project, so I actively contributed to both the conceptual model and the concrete prototype. http://crowdsearcher.deib.polimi.it/

[P5] **EIT Urban life and mobility**: this project aims to enhance the life and mobility in smart cities through the integration of real time data coming from official sources and content generated on the social networks.

[P6] **MilanoHub**: MilanoHub is a project that involves different departments of the Politecnico di Milano (Computer Science, Management, Mathematics and Design). It has the objective to study the city of

Milan and its role in the world with respect to other European cities. This study will be carried out by analyzing both official data (coming from international observer, e.g Eurostat) ad how people talk and interact on different social networks.

[P7] **IFML** The standard Interaction Flow Modeling Language (IFML) is designed for expressing the content, user interaction and control behaviour of the front-end of software applications. I participated directly to the standardization process working on the metamodel and on the deliverables required by the OMG group. I also developed the first prototype of a Java code generator integrating IFML and fUML.
http://www.ifml.org/

[P8] **ECSTASYS**: ECSTASYS gathers in real-time the tweets related to the event, analyses them and links them to the specific sub-events they refer to. The goal is to improve the experience of (local or remote) attendees, by exploiting the contents shared on the social networks.

[P9] **Automobile** The AutoMobile project aims at designing and bringing to the market innovative methodologies, software tools, and vertical applications for the cost-effective implementation of cross-platform, multi-device mobile applications. In this project I worked on the extension of the IFML metamodel in order to add the concepts needed to model elements that characterize mobile applications.
http://automobile.webratio.com/

[P10] **BPM4People** The BPM4People project aims at designing and bringing to the market innovative methodologies, software tools, and vertical applications for the implementation of Social Business Process Management (Social BPM). I worked on the extension of the WebML notation by adding a set of components (called units in WebML parlance) that encapsulate the logic of the interaction with the social platforms.
http://bpm4people.webratio.com/bpm4people/content/en/home

Publications

JOURNALS

[1] A. Bozzon, M. Brambilla, S. Ceri, **A. Mauri**, R. Volonterio. Designing Complex Crowdsourcing Applications Covering Multiple Platforms and Tasks
Journal of Web Engineering, Volume 14 Issue 5-6, November 2015, Pages 443-473

[2] M. Brambilla, S. Ceri, **A. Mauri**, R. Volonterio. Adaptive and Interoperable Crowdsourcing.
IEEE Internet Computing 19(5): Pages 36-44

CONFERENCE PROCEEDINGS

[3] C. Bernaschina, M. Brambilla, **A. Mauri**, E. Umuhoza. A Big Data Analysis Framework for Model-Based Web User Behavior Analytics.
Accepted at ICWE2017, 2017

[4] C. Bernaschina, M. Brambilla, T. Koka, **A. Mauri**, E. Umuhoza. Integrating Modeling Languages and Web Logs for Enhanced User Behavior Analytics.
To appear in the proceedings of the companion publication of the 25th international conference on World Wide Web, 2017

[5] M. Brambilla, S. Ceri, C. Leonardi,**A. Mauri**, R. Volonterio. Modeling and Analyzing Engagement in Social Network Challenges.
International Conference on Web Information Systems Engineering. 2016. Pages 140-154.

[6] M. Brambilla, **A. Mauri**, M. Franzago, H. Muccini. A model-based method for seamless web and mobile experience.
Proceedings of the 1st International Workshop on Mobile Development. 2016. Pages 33-40.

[7] **A. Mauri**, JP. Calbimonte, D. Dell'Aglio, M. Balduini, M. Brambilla, E. Della Valle, K. Aberer. TripleWave: Spreading RDF Streams on the Web.
International Semantic Web Conference. 2016. Pages 140-149.

[8] **A. Mauri**, JP. Calbimonte, D. Dell'Aglio, M. Balduini, E. Della Valle, K. Aberer.Where Are the RDF Streams?: On Deploying RDF Streams on the Web of Data with TripleWave.
International Semantic Web Conference (Posters & Demos) 2015.

[9] M. Brambilla, S. Ceri, **A. Mauri**, R. Volonterio. An Explorative Approach for Crowdsourcing Tasks Design.
Proceedings of the companion publication of the 23rd international conference on World Wide Web, 2015, Pages 1125-1130

[10] A. Bozzon, M. Brambilla, S. Ceri, **A. Mauri**, R. Volonterio. Pattern-based Specification of Crowdsourcing Applications.
Web Engineering, Lecture Notes in Computer Science Volume 8541, 2014, Pages 218 - 235

[11] **A. Mauri**. Methodologies for the development of crowd and social based applications
Web Engineering,Lecture Notes in Computer Science Volume 8541, 2014, Pages 562 - 566

[12] M. Brambilla, **A. Mauri**, E. Umuhoza. Extending the Interaction Flow Modeling Language (IFML) for Model Driven Development of Mobile Applications Front End.
Mobile Web Information Systems, Lecture Notes in Computer Science Volume 8640, 2014, Pages 176 - 191

[13] M. Brambilla, D. Dell'Aglio, E. Della Valle, **A. Mauri**, R. Volonterio: Enriching Live Event Participation with Social Network Content Analysis and Visualization.
ESWC (Satellite Events) 2014: 159-170

[14] M. Brambilla, D. Dell'Aglio, E. Della Valle, **A. Mauri**, R. Volonterio. Augmented Participation to Live Events through Social Network Content Enrichment.
AI Mashup Challenge Co-located with ESWC 2014

[15] M. Brambilla, S. Ceri, **A. Mauri**, R. Volonterio. Community-based Crowdsourcing.
Proceedings of the companion publication of the 23rd international conference on World wide web companion, 2014, Pages 891 - 896

[16] A. Bozzon, M. Brambilla, S. Ceri, **A. Mauri**. Reactive Crowdsourcing.
Proceedings of the 22nd international conference on World Wide Web, 2013, Pages 153 - 164

[17] M. Brambilla, **A. Mauri**, Model-Driven development of social network enabled applications with WebML and social primitives.
Current Trends in Web Engineering, Lecture Notes in Computer Science Volume 7703, 2012, Pages 41 - 55

[18] M. Brambilla, A. Bozzon,**A. Mauri**. A Model-Driven Approach for Crowdsourcing Search.
CrowdSearch, 2012, Pages 31 - 35

BOOK CHAPTERS

[19] A. Bozzon, M. Brambilla, S. Ceri, **A. Mauri**, Extending search to crowds: a model-driven approach.
Search Computing, Lecture Notes in Computer Science Volume 7538, 2012, Pages 207-222

Teaching Vision

I currently teach two courses of software engineering, at bachelor and master level and a web technologies course at bachelor level.
I believe effective teaching of modern computer science requires at least these two elements:

- Strong theoretical background.
- Concrete experience.

Thus all courses I'm involved with are designed to have a big practical part. Students have to give presentations, submit personal assignments and group works in which they have to demonstrate to have clearly understood the topics while often addressing problems not saw during the class. This allow students to feel more motivated and confident with their abilities, while encouraging them to expand their body of knowledge to complete the assigned task. I have teaching experience in English-speaking, multi-cultural environment, thanks to courses I gave at the M.Sc. program of Politenico di Milano.

Work and Education

Record of Employment

- 2016 – *now*: Teaching Assistant at Politecnico di Milano for the course of Web Technologies.
- 2016 – *now*: Teaching Assistant at Politecnico di Milano for the course of Software Engineering.
- November 2015 - December 2015: Web Service Developer at WebRatio.
- 2012 – *now*: Teaching Assistant at Politecnico di Milano for the course of Advanced Software Engineering.
- 2013 – *2016*: Laboratory Assistant at Politecnico di Milano for the course of Software Engineering.
- February 2013 – April 2013: IT consultant for WebRatio
- April 2012 – October 2012: Assistant Researcher at University of Trento.

Education

- Ph.D. in Information Technology at Politecnico di Milano. 2012 – 2016.
  Title: *Methodologies for the development of crowd and social-based applications*
  Advisor: *Prof. Marco Brambilla* Tutor: *Prof. Stefano Ceri*
- M.Sc. in Computer Science Engineering at Politecnico di Milano. 2011. Grade: 110/110 cum laude.
  Thesis title: *Visualizations and exploration paths suggestion for multi-domain results of Web searches*.
  Advisor: *Prof. Marco Brambilla*

Visiting experiences

- Visiting PhD Student at Universitat Oberta de Catalunya, Barcelona, Spain (September 2015 - October 2015)
- Visiting PhD Student at IBM Research, Dublin, Ireland (May 2015 - July 2015)
- Visiting scholar at Ecole de Mines, Nantes, France (2012).

Scholarships

- Three-year scholarship for Ph.D. studies of the Italian Ministry of Education, University and Research (2012-2015). Ranked third place in the Information Engineering Ph.D. school of Politecnio di Milano.

Scientific Community Service

Reviewer of International Journals

- Advances in Human-Computer Interaction (2016)
- Computer Networks (2015)

Program Committee Membership

- SWEEM 2016: PC Member
- ICWE 2016 Demo and Poster: PC Member
- ICWE 2013 Demo and Poster: PC Member

External Referee or Reviewer

- ICAOR 2017
- EDOC 2016
- ICWE 2016 Research Track
- RCIS 2014