Matteo **Brucato**

PH.D. CANDIDATE · DATA AND INFORMATION MANAGEMENT AND ANALYTICS

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Summary

Ph.D. Candidate in Computer Science at the **University of Massachusetts, Amherst**. Advisor: **Prof Peter J. Haas**. Co-advisors: Prof Alexandra Meliou and Prof Azza Abouzied (NYU).

Ph.D. thesis on systems for scalable and easy prescriptive analytics. Thesis title: "Package Queries: Enabling Declarative and Scalable Prescriptive Analytics in Relational Data".

More than 8 years of experience in research, with several publications in top-tier conferences and journals in data and information management (SIGMOD, VLDB, CACM, VLDBJ). Multidisciplinary research, with publications in NLP, IR and robotics/AI conferences. Work recognized by several ACM awards (CACM, SIGMOD Highlights, invited VLDBJ, best demos and best paper at VLDB, best young research nominee in RANLP), and several scholarships (Krithi Ramamritham Computer Science Scholarship by UMass; merit, research and exchange scholarships by the University of Bologna).

More than 8 years of mentorship and advising experience. Mentored more than 20 students, at all levels (undergrad, master, and doctoral students), and managed several projects under my direct supervision.

Several industrial internships, both as researcher (MSR, IBM) and software developer (Cineca, Maggiore Hospital).

Research Interests

Research areas: Data Management, Prescriptive Analytics, Decision Making, Stochastic Constrained Optimization, Fair Machine Learning, Artificial Intelligence, Natural Language Processing, Information Retrieval.

Research interests: Theoretical and systemic aspects of constrained optimization, decision making and prescriptive analytics at a very large scale; Structured, unstructured, and natural query languages; Scalable and approximate algorithms; Systems for interactive data exploration; Scalable systems for fair ML; Scalable systems for AI and robotics; Personalized text summarization.

Education

UMASS AMHERST *Amherst, MA, USA*

PH.D. IN COMPUTER SCIENCE *2013 - 2021*
- Advisor: Peter J. Haas
- Co-advisors: Alexandra Meliou and Azza Abouzied (NYU)
- Thesis: *Package Queries: Enabling Declarative and Scalable Prescriptive Analytics in Relational Data*

UNIVERSITY OF BOLOGNA *Bologna, Italy*

M.S. IN COMPUTER SCIENCE *2011 - 2013*
- Summa cum laude
- Thesis Advisor: Danilo Montesi
- Thesis: *Temporal Information Retrieval*

UNIVERSITY OF BOLOGNA *Bologna, Italy*

B.S. IN COMPUTER SCIENCE *2008 - 2011*
- Summa cum laude
- Thesis Advisor: Danilo Montesi
- Thesis: *Mobile systems for patient-reported outcomes*

EXCHANGE PROGRAMS

ÅRHUS UNIVERSITY *Århus, Denmark*

EXCHANGE PROGRAM DURING M.S., COMPUTER SCIENCE *Jan - Jun 2013*
- Advisor: Christian S. Jensen

UC RIVERSIDE *Riverside, CA, USA*

EXCHANGE PROGRAM DURING B.S., COMPUTER SCIENCE *Sep - Jun 2011*
- Advisor: Vassilis J. Tsotras

Honors & Awards

2020	**Best demo award**, VLDB 2020	*Tokyo, Japan*
2020	**Best demo runner-up**, VLDB 2020	*Tokyo, Japan*
2019	**Krithi Ramamritham Computer Science Scholarship**	*Amherst, MA, USA*
2018	**CACM Research Highlight Award (Invited journal paper in CACM Research Highlights)**	*Amherst, MA, USA*
2017	**ACM SIGMOD Research Highlight Award (invited journal paper in SIGMOD Records)**	*Amherst, MA, USA*
2017	**Invited journal paper in the VLDB Journal, Special Issue on Best Papers of VLDB 2016**	*Amherst, MA, USA*

2016	**Best papers**, VLDB 2016	*New Delhi, India*
2013	**M.S. with Honors**, University of Bologna	*Bologna, Italy*
2013	**Best Young Researcher nominee**, RANLP 2013	*Hissar, Bulgaria*
2013	**Merit Scholarship**, awarded to 0.2% of all students of the University of Bologna	*Bologna, Italy*
2012	**Research Scholarship**, University of Bologna	*Bologna, Italy*
2012	**Merit Certificate**, University of Bologna	*Bologna, Italy*
2012	**Complimentary AAAI Membership**, Stanford Online AI Course	*Stanford, CA, USA*
2011	**B.S. with Honors**, University of Bologna	*Bologna, Italy*
2011	**Merit Certificate**, University of Bologna	*Bologna, Italy*
2010	**Merit Certificate**, University of Bologna	*Bologna, Italy*
2010	**Exchange Scholarship**, University of Bologna	*Bologna, Italy*

Publications

1. Samer B. Nashed, Justin Svegliato, **M. Brucato**, Connor Basich, Rod Grupen, Shlomo Zilberstein
   Title hidden because paper uder review
   ICRA 2021 (under review)

2. **M. Brucato**, Miro Mannino, Azza Abouzied, P. J. Haas, A. Meliou
   sPaQLTooLs: A Stochastic Package Query Interface for Scalable Constrained Optimization
   VLDB 2020
   🎗 **Best Demo. Video:** `https://www.youtube.com/watch?v=1v5KevGKbfE`

3. Anna Fariha, **M. Brucato**, P. J. Haas, A. Meliou
   SuDocu: Summarizing Documents by Example
   VLDB 2020
   🎗 **Best Demo Runner-Up. Video:** `https://www.youtube.com/watch?v=ZGzF6cBSYjo`

4. **M. Brucato**, N. Yadav, A. Abouzied, P. J. Haas, A. Meliou
   Stochastic Package Queries in Probabilistic Databases
   SIGMOD 2020

5. **M. Brucato**, A. Abouzied, A. Meliou
   Scalable Computation of High-Order Optimization Queries
   Communications of the ACM (CACM) 2019

6. **M. Brucato**, A. Abouzied, A. Meliou
   Package queries: Efficient and scalable computation of high-order constraints
   *The VLDB Journal 2018 (**Special Issue on Best Papers of VLDB 2016**)*

7. **M. Brucato**, A. Abouzied, A. Meliou
   A Scalable Execution Engine for Package Queries
   *SIGMOD Record 2017 (**ACM SIGMOD Research Highlight Award 2017**)*

8. **M. Brucato**, A. Abouzied, C. Blauvelt
   Redistributing Funds across Charitable Crowdfunding Campaigns
   arXiv:1706.00070, 2017

9. **M. Brucato**, J. F. Beltran, A. Abouzied, A. Meliou
   Scalable Package Queries in Relational Database Systems
   VLDB 2016
   🎗 **Best papers of VLDB 2016**
   🎗 **Invited journal paper in the VLDB Journal (Special Issue on Best Papers of VLDB 2016)**
   🎗 **ACM SIGMOD Research Highlight Award (Invited journal paper in SIGMOD Records 2017)**
   🎗 **CACM Research Highlight Award (Invited journal paper in CACM Research Highlight 2018)**

10. **M. Brucato**, A. Abouzied, and A. Meliou
    Improving Package Recommendations through Query Relaxation
    VLDB 2014, at Data4U

11. **M. Brucato**, R. Ramakrishna, A. Abouzied, A. Meliou
    PackageBuilder: From Tuples to Packages
    VLDB 2014

12. K. Fernandes, **M. Brucato**, R. Ramakrishna, A. Abouzied, A. Meliou
    PackageBuilder: Querying for packages of Tuples
    SIGMOD 2014

13. **M. Brucato**, D. Montesi
    Metric Spaces for Temporal Information Retrieval
    ECIR 2014

14. **M. Brucato**, L. Derczynski, H. Llorens, K. Bontcheva, C. S. Jensen
    Recognising and Interpreting Named Temporal Expressions
    RANLP 2013
    🎗 **Best Young Researcher award nominee**

Professional Experience

INDUSTRY

Microsoft Research
Redmond, WA, USA

RESEARCH INTERN — *May - Aug 2017*

Worked under the supervision of **Kaushik Chakrabarti** on natural language to SQL using neural networks.

IBM Watson
T. J. Watson Research Center, Yorktown Heights, NY, USA

RESEARCH INTERN, WATSON HEALTH — *Jun - Aug 2016*

Worked under the supervision of **Shilpa Mahatma** and **Yajuan Wang** on "*conceptual queries*" for healthcare applications.

CINECA
Casalecchio di Reno, Bologna, Italy

SOFTWARE ENGINEERING INTERN — *Jun - Oct 2012*

- Responsible for developing and managing a data warehouse and analytics system for a nationwide videoconferencing system.
- Duties included generating aggregated data and analytics, deployed through usable interfaces to let decision makers understand usage and performance of the videoconferencing system.

Maggiore Hospital
Bologna, Italy

SOFTWARE DEVELOPER (VOLUNTEER) — *2011 - 2013*

- Co-developed software to help the Emergency Room visit their patients using portable ultrasound technology.
- Software deployed on medical tablets to help doctors collect patient's information on the field.
- The collected data was then used to make better informed decisions in the Emergency Room.

ACADEMIA

DREAM Lab (Data systems Research for Exploration, Analytics, and Modeling), University of Massachusetts *Amherst, MA, USA*

RESEARCH ASSISTANT — *Sep 2013 - present*

- Working with **Prof Peter J. Haas**, **Prof Alexandra Meliou**, and **Prof Azza Abouzied** (NYU Abu Dhabi) to create 📦 **Package Builder**, a system that extends query engines to support the generation of *packages*, i.e., collections of tuples with global properties that are true of the entire collection.
- Technical paper at SIGMOD 2020
- Demo papers at VLDB 2020
- Invited journal paper at CACM Research Highlights 2019.
- Invited journal paper at the VLDB Journal 2018.
- Invited journal paper at SIGMOD Records 2017.
- Technical paper at VLDB 2016; workshop paper and demo paper at VLDB 2014; undergraduate research poster at SIGMOD 2014.
- Project website: packagebuilder.cs.umass.edu.
- DREAM Lab website: dbgroup.cs.umass.edu.
- Project code: Scalable-PaQL-Queries on GitHub

Design Technology Lab, NYU Abu Dhabi
Abu Dhabi, UAE

VISITING PH.D. CANDIDATE — *Mar - May 2016*

- Paper: Redistributing Funds across Charitable Crowdfunding Campaigns (arXiv:1706.00070).

AMPLab, UC Berkeley
Berkeley, CA, USA

VISITING PH.D. STUDENT — *May - Aug 2015*

- Worked on extensions to Package Builder to identify ideal packages by example, under NYU Summer internship.

Data-Intensive Systems Lab, Århus University
Århus, Denmark

VISITING M.S. STUDENT — *Jan - Jun 2013*

- Worked on M.S. thesis on *Temporal Information Retrieval* under the supervision of **Prof Christian S. Jensen**.
- Actively collaborated with researchers within the group.
- Published two papers in main international conferences in the fields of NLP and IR.

Database Lab, UC Riverside
Riverside, CA, USA

UNDERGRADUATE RESEARCH INTERN (VOLUNTEER) — *Jan - Jun 2013*

- Worked closely with a Ph.D. candidate and **Prof Vassilis J. Tsotras** on query optimization techniques for query result diversification.
- Developed a query parser for a SQL-like diversification query language.
- Devised and developed a query optimizer to select optimal diversification query plans.
- Developed client/server technology to issue and evaluate diversification queries.

Advising & Mentoring

Research Advisor for undergraduate student Agam Sandhu
Amherst, MA

UMASS AMHERST — *2020*

Agam Sandhu is working on scalable stochastic constrained optimization under costly sampling methods.

Research Advisor for PhD student Ahmad Chatha (NYU)
Amherst, MA

UMASS AMHERST — *2020*

Ahmad Chatha is working on combining scalable constrained optimization methods with scenario-based methods for stochastic optimization.

Project Mentor (in collaboration with Microsoft) *Amherst, MA*
UMASS AMHERST *2020*
Mentored MS students (Abdul Hannan Kanji, Parul Gupta, Ge Gao, Xinlu Liu) for their Independent Class project (CS 696DS), in collaboration with Microsoft, to improve the Fairlearn library (`https://fairlearn.github.io`).

Research Advisor for MS student Kanchi Masalia *Amherst, MA*
UMASS AMHERST *2020*
Kanchi Masalia is working on SuDocu, a new system for personalized efficient document summarization by example. SuDocu website: `http://sudocu.cs.umass.edu`.

Research Advisor for undergrad Genglin Liu *Amherst, MA*
UMASS AMHERST *2020*
Genglin Liu worked on the frontend of SuDocu, a new system for personalized efficient document summarization by example. SuDocu website: `http://sudocu.cs.umass.edu`.

Research Mentor for undergraduate student Kyaw Htet *Amherst, MA*
UMASS AMHERST *Fall 2019*
Kyaw worked on analyzing scenario reductions methods for stochastic optimization.

Project Mentor (in collaboration with Microsoft) *Amherst, MA*
UMASS AMHERST *Spring 2019*
Mentored a group of four MS students (Katie House, Shanu Vashishtha, Deeksha Razdan, Cheng-Yin Eng) for their Independent Class project (CS 696DS), in collaboration with Microsoft to produce notebooks that showcase their Machine-as-a-service platform Azure ML.

Research Mentor for undergraduate student Nishad Ranade *Amherst, MA*
UMASS AMHERST *2018–2019*
Nishad worked on Monte Carlo scenario reductions methods.

Research Mentor for 1st-year PhD student Nishant Yadav *Amherst, MA*
UMASS AMHERST *2018*
Nishant and I worked together on stochastic package queries.

Research Mentor for graduate student Sandhya Sankaranarayanan *Amherst, MA*
UMASS AMHERST *Fall 2015*
Sandhya and I worked together on extending the package query language PaQL.

Research Mentor for undergraduate student Kevin Fernandez *Amherst, MA*
UMASS AMHERST *Spring 2014*
Kevin and I worked together on evaluation techniques for package queries. This work was invited to present at the *ACM SIGMOD 2014 Undergraduate Research Poster Competition*.

Research Mentor for graduate student Rahul Ramakrishna *Amherst, MA*
UMASS AMHERST *2013 - 2014*
Rahul and I worked together on interface abstractions for package queries. Our work was demonstrated at *VLDB 2014*.

Teaching

Teaching Assistant for Undergraduate Database Systems (CS 345) *Amherst, MA*
UMASS AMHERST *Fall 2020*
Office hours, question answering, grading and labs.

Teaching Assistant for Undegraduate Class "A Networked World" (INFO 203) *Amherst, MA*
UMASS AMHERST *Spring 2018*
Homework grading.

Teaching Assistant for Undergraduate Introduction To Computation (CS 250) *Amherst, MA*
UMASS AMHERST *Fall 2017*
Responsible for discussion sessions, occasional lectures, office hours, homework and discussion grading.

Teaching Assistant for Undergraduate Database Systems (CS 345) *Amherst, MA*
UMASS AMHERST *Fall 2015*
Responsible for occasional lectures, project advising, office hours, homework and project grading.

Professional Service & Leadership

Reviewer *2020*
• *IEEE Transactions of Knowledge and Data Engineering (TKDE)*.

Guest Editorial Board *2014 - 2015*
• *Information Processing and Management*, special issue on *Time and Information Retrieval*, Elsevier, 2014/2015.

External Review Committee   *2013 - 2015*
- VLDB 2017
- SIGMOD 2015
- VLDB 2015
- RANLP 2013

Lab Seminar Organizer   *Amherst, MA, USA*
UMass Amherst Database Lab   *2014 - 2015*
- Coordinated weekly discussion seminar, including invited talks and paper readings, for the UMass Amherst Database Research group (∼10 Ph.D. students and faculty), and webmaster duties.

Student Seminar Leader   *Amherst, MA, USA*
UMass Amherst Database Lab   *Fall 2015*
- Organized and coordinated a weekly discussion seminar among Ph.D. and M.S. students in the UMass Amherst Database Research group to foster research collaborations, exchange of ideas, group discussions, and group cohesion.

Talks

Industry

Scalable Package Queries in Relational Database Systems   *Redmond, WA, USA*
Microsoft Research   *Jun 2017*

Conceptual Queries for Multiple Data Sources   *Austin, TX, USA*
IBM Watson   *Aug 2016*

Package Queries: From Tuples to Packages   *Berkeley, CA, USA*
Berkeley Labs   *Jul 2015*

Academia

Stochastic Package Queries For In-database Optimization Under Uncertainty *Virtually at INFORMS 2020*
INFORMS 2020   *November 2020*

sPaQLTooLs: A Stochastic Package Query Interface for Scalable Constrained Optimization *Tokyo, Japan (virtually)*
VLDB 2020   *September 2020*
- Video: https://www.youtube.com/watch?v=1v5KevGKbfE

Stochastic Package Queries in Probabilistic Databases   *Portland, OR, USA (virtually)*
SIGMOD 2020   *June 2020*
- Video: https://www.youtube.com/watch?v=UrEOEplK06I

Package Queries: Enabling Declarative and Scalable Prescriptive Analytics in Relational Data *Cambridge, MA, USA*
MIT CSAIL, Data Systems Group   *Feb 2020*

Stochastic Package Queries for In-Database Constrained Optimization Under Uncertainty *Cambridge, MA, USA*
MIT, North East Database Day, Samberg Conference Center   *Jan 2020*

Scalable Package Queries in Relational Database Systems   *New Delhi, India*
VLDB 2016   *Sep 2016*
- Slides: packagebuilder.cs.umass.edu/papers/scalable-paql-presentation-share.pdf

Package Queries: From Tuples to Packages   *Berkeley, CA, USA*
AMPLab, UC Berkeley   *Jun 2015*

Improving Package Recommendations through Query Relaxation   *Hangzhou, China*
VLDB 2014   *Sep 2014*
- Slides: packagebuilder.cs.umass.edu/papers/package-recomm-slides-web.pdf

Metric Spaces for Temporal Information Retrieval   *Amsterdam, the Netherlands*
ECIR 2014   *Apr 2014*

Metric Spaces for Temporal Information Retrieval   *Bologna, Italy*
University of Bologna   *Dec 2013*

Metric Spaces for Temporal Information Retrieval   *Århus, Denmark*
Århus University   *Jan 2013*