

Fosca GIANNOTTI

Curriculum Vitae

EDUCATION: Laurea in Computer Science/Scienze dell'Informazione (MSc equivalent, 1982, Univ. Pisa, 110/110 cum laude), Italian National Habilitation for Full professorship in Computer Science (since 2013, Ministry of University and Research).

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1. CURRENT POSITIONS

- Director of Research at CNR – Italian National Research Council at Information Science and Technology Institute ISTI-CNR, Pisa (since January 2007);
- Coordinator of KDD Lab – *Knowledge Discovery & Data Mining Laboratory* <http://kdd.isti.cnr.it>, (since 1995),
- Scientific Coordinator of SoBigData Research Infrastructure: *Social Mining & Big Data Ecosystem*, H2020 - www.sobigdata.eu, No. 654024 (2015-2019)
- Scientific Coordinator of *SoBigData++ European Research Infrastructure for Social Mining & Big Data Analytics*, H2020 - www.sobigdata.eu, No. 871042 (2020-2024)
- Principal Investigator of ERC Advanced Grant 2018 *XAI – Science and technology for the Explanation of AI Decision Making*, ERC AdG No. 834756 (2019-2024)
- Member of Data Science PhD Board at Scuola Normale Superiore, Pisa, (since 2017)
- Member of Big Data Analytics Master Board, University of Pisa, (since 2014)
- Member of the Management Board of Laboratory “Artificial Intelligence and Intelligent Systems” of CINI, Consorzio Inter-Universitario Nazionale di Informatica, (since 2018)

- Member of the Steering Committee of EUDAS: European Data Science Association, Luxembourg University (since 2017)
- Member of *Sinergia* evaluation commission of SNSF Swiss National Science Foundation (2019-2023)
- Member of scientific advisory board of TU/e – Eindhoven University of Technology (since October 2019).
- External Advisory Board del Centro SmartData@Polito, Politecnico di Torino (since 2018)
- Chair of “Area Progettuale *Data, Content and Media*” of Department Ingegneria, ICT e Tecnologie per l'Energia e i Trasporti of CNR

2. POSITIONS HELD

- Member of Italian Delegation of G7-Academy for Canada 2018 G7 at Ottawa (March 19-20 2018).
- Senior Program Committee Member ACM SIGKDD 2018, London UK
- Award Chair of DSAA (Data Science and Advanced Analytics 2018), Torino Italy
- Chair of the Management board of the European Lab on Social Mining and Big Data Analytics (2013-2017), an inter-institutional aggregation of 10 research labs across all universities and research centers in Pisa (100+ data science researchers): CNR, Univ. Pisa, Scuola S. Anna, Scuola Normale and Scuola IMT-LUCCA.
- General Chair of DSAA (Data Science and Advanced Analytics 2017), Tokyo Japan;
- Member of the International Evaluation Panel of INRIA (France) for Theme Data and Knowledge Representation and Processing: 2015 (Panel chair) and 2011.
- Member of Advisory Board H2020, FET-Excellent Science, Research Infrastructures and e-infrastructures, (2014-15);
- Chair of Steering Committee of European Conf. on Machine Learning and Data Mining (2012-2015).
- National Coordinator of *Data mining and Semantic Web* project of ICT Department of CNR, (2006-2009)
- CNR Senior Researcher (Primo ricercatore) (2001-2007, CNUCE-CNR, Pisa)
- CNR Researcher (1990-2001, CNUCE-CNR, Pisa)
- Industrial researcher – Team Leader – Systems & Management R&D Lab, Pisa (1987-1990) and SIPE Optimization R&D Lab, Pisa (1985-1987)
- Industrial consultant – INTECS S.p.A, R&D Lab, Pisa (1984-1985)
- Research fellow – Progetto Finalizzato Informatica DATAID, Università di Pisa (1982-1984)
- Visiting professor, School of Economics, Univ. Paris1-Sorbonne (Sept-2016-Nov. 2016),
- Visiting professor, Central European University, Budapest, (October 2015-December 2015),
- Visiting scientist, Toyota InfoTechnology Center, and KDDI Labs, Tokyo (November-December 2013) and (December 2014);
- Visiting professor, Barabási Lab, Center for Complex Network Research, Northeastern University, Boston (2009-2010),
- Visiting professor, UCLA Dept. of Computer Science, Univ. of California at Los Angeles (2006), (short term mobility CNR)
- Visiting professor, UCLA Dept. of Computer Science, Univ. of California at Los Angeles (1995), (short term mobility CNR)
- Visiting professor, CWI Amsterdam, The Netherlands (1993), (short term mobility CNR)
- MCC, Microelectronics and Computer Technology Corporation, Austin, USA funded by a NATO-CNR fellowship (1989-1990).

3. SCIENTIFIC LEADERSHIP PROFILE

F. GIANNOTTI has been an active researcher in computer science for 35 years. In the first part of her career, the focus of her activity was on formal methods in programming, especially logic programming; progressively, she shifted towards logic and formal methods in databases and, eventually, to pioneering data mining and knowledge discovery. Her path, essentially, is from *computing* to *data* to *knowledge*, with a progression tied up with logic and formal methods, and a natural taste for combining theory with empirical evidence through data analysis.

F. GIANNOTTI had the intuition, around 1992, of data mining as a high potential area of disruptive impact and her determination brought to the construction of a research group around this vision, capable of gaining international visibility. The scientific production has been progressively increasing as well as her scientific leadership at national and international level. The KDD LAB (Knowledge and Discovery Laboratory) is a tangible result of this vision, being today a reference, top-ranked lab for the data mining research community, one of the largest and most competitive, capable of attracting international visitors, post-docs, and students, and establishing a large network of high-level international collaborations.

1995 – onwards: the construction of the KDD LAB. The most important shift in F. GIANNOTTI's scientific career takes place around 1995, when, together with colleagues Dino Pedreschi and Franco Turini of Univ. Pisa, she starts the *Pisa Knowledge Discovery and Delivery Laboratory* – KDD LAB <http://www.isti.cnr.it/research/unit.php?unit=KDD/> – a joint initiative of the two research institutions (CNR and Univ. Pisa) aimed at research in the emerging field of Data Mining and Knowledge Discovery in Databases. Since then, when KDD LAB was the earliest research lab in data mining in Italy and one of the earliest in Europe, it has grown as an established joint, interdisciplinary initiative, and gained a solid international reputation in the highly competitive area of data mining.

In 1998-1999 F. GIANNOTTI coordinated a task force of 10 young Phd students of 3 different University for the execution of a one year long massive experiment on the real data of the Ministry of Finance. The results of the fiscal fraud detection study were published at the ACM KDD Conf. in 1999 in the seminal paper “*A classification-based methodology for planning audit strategies in fraud detection*” F Bonchi, F Giannotti, G Mainetto, D Pedreschi, in the Proceedings of the fifth ACM SIGKDD, 117 citations on *GoogleScholar as of Jan 2020*. Those young students are now senior researchers in academies and research Institutions all over Italy (for example Francesco Bonchi now at ISI foundation, Mirco Nanni at ISTI CNR, Giuseppe Manco at ICAR CNR etc), all active and well-known in the DM&ML scientific community. Today, KDD LAB continues to collaborate with the Ministry of Finance to deploy data mining prediction models into their routine activity of inspection against tax evasion.

On another line, KDD LAB has a long-standing collaboration with Coop, the largest Italian supermarket chain, in the analysis and mining of sale transaction data for advanced CRM applications. Such collaboration has made possible the construction of a big data set of *10 years of detailed retail data of 2 million customers*. It has been and still is the biggest supermarket dataset available for training Data Mining and Machine Learning students and for research, ranging from smart CRM (KDD2017) to social mining studies aiming at leveraging the data for nowcasting socio-economic and health-related indicators, such as flu epidemics, migrant integration and wellbeing.

Today, KDD LAB counts on 4 senior researchers, 7 researchers, 7 post-docs, 9 PhD students, 5 technicians, and a variable number of international visitors and master students; KDD LAB is organized according 5 lines of research:

- Mobility Data Mining for Science of Cities,
- Social Network Analysis and Visual Analytics,
- Ethical Data Mining,
- Applied Data Science,
- Analytical Platforms and Infrastructures for Social Mining.

2005 – 2008: the shaping of a new scientific area at the cross road of Mobility, Data Mining and Privacy: F. GIANNOTTI is the proposer and later the coordinator of the European FP6 FET project GeoPKDD – *Geographic Privacy-aware Knowledge Discovery and Delivery* – www.geopkdd.eu. Centered on mobility, data mining and privacy, GeoPKDD involves more than 40 researchers from 8 different European countries, many of those young postdocs, and produces a great deal of high-impact new scientific results, becoming the reference for the rapidly blossoming area of the analysis of mobility data sensed by mobile phones and other localization devices. Prominent researchers involved in such initiative were for example Monica Wachowicz, now professor at University of New Brunswick, Natalia and Gennady Andrienko, now professors at City University London, and Yannis Theodoridis professor at University of Piraeus in Greece.

The book “*Mobility, Data Mining and Privacy*” (Springer in 2008), edited by F. GIANNOTTI spread the results obtained by GeoPKDD and brought a wide recognition to KDD LAB as a leading research hub on mobility data mining and data privacy technologies, becoming a reference not only for the international

research community but also for leading industrial and public operators, such as telecom providers (Orange, Wind, Telecom Italia), the Italian and European Data Protection Commissions, the mobility agencies of regional and municipal administrations. Follow up of this project have been 3 other FET-Open FP7 projects (FET stays for Future Emergent Technology):

- MODAP (Mobility, Data Mining, and Privacy),
- LIFT (Using Local Inference in Massively Distributed Systems),
- DataSIM (Data Science for Simulation into the era of electric vehicles) (<http://datasim-fp7.eu>) and one within the Smart Cities program:
- PETRA: Personal Transport Advisor: an integrated platform of mobility patterns for Smart Cities to enable demand-adaptive transportation system (<http://petraproject.eu/>).

F. GIANNOTTI has always been part of the proponent team, principal investigator for CNR and responsible of workpackages of the projects.

2006 – 2009: national coordinator of the Data Mining sector of the CNR ICT Department. F. GIANNOTTI has been nominated by the president of CNR as the national coordinator of the area “*Data Mining and Semantic Web*” of the ICT department of CNR, with responsibility of harmonizing the activities of 12 labs of 9 different CNR institutes all over Italy involving 90 permanent researchers and 120 early-stage researchers. The goal was to create a network of CNR researchers on the topic of knowledge and data engineering and promote their results and potential applications towards industry and the public administration. Her duties involved dissemination actions, proposal preparation, definition of strategic lines of research at national level, harmonization with European policies, hearings with funding agencies, etc.

2009 – 2010: shaping the convergence of data mining and network science. In 2009-2010 visiting the Center for Complex Network Research at Northeastern University in Boston, in collaboration with physicist A.-L. Barabasi, F. GIANNOTTI has laid the basis for a convergence of the methods of statistical physics and complex systems with data mining, aimed at understanding and forecasting aspects of the socio-economic complexity, such as diffusion and spreading, shopping behavior, mobility patterns. This line of research has brought to the paper *Human mobility, social ties, and link prediction*, published at KDD 2011, while in Sept. 2015 another joint paper with Barabasi on the data-driven discovery of two well-separated profiles of human mobility, *explorers and commuters*, has been published in *Nature Communications*.

2011 – 2013: guiding the Italian component of FuturICT Flagship initiative <https://futurict.eu>. Member of the proponent team. The initiative was aimed at shaping a 10 year program of research in Europe. The ultimate goal of the FuturICT project was to understand and manage complex, global, socially interactive systems, with a focus on sustainability and resilience. F. GIANNOTTI (<http://www.futurict.it/scientific-committee>) contributed to the two year process for the proposal preparation. The FuturICT FET Flagship proposal intended to unify hundreds of the best scientists in Europe in a 10 year 1 billion EUR program to explore social life on earth and everything it relates to. was not selected for funding, but indeed the experience has been valuable both from the point of the community that has been created and the research roadmap that has been shaped. F.G. participated to the writing of following white papers published into The European Physical Journal Special Topics Vol. 214: the first two represent the pillars of privacy-aware social data mining while the last focuses on the application of such paradigm for a new City Science.

- A planetary nervous system for social mining and collective awareness . F. Giannotti, D. Pedreschi, A. Pentland, P. Lukowicz, D. Kossmann, J. Crowley and D. Helbing. Eur. Phys. J. Special Topics 214, 49-75 (2012) <http://dx.doi.org/10.1140/epjst/e2012-01688-9> (open access) 63 citations on GS as of Jan 2020.
- FuturICT – The road towards ethical ICT , J. van den Hoven, D. Helbing, D. Pedreschi, J. Domingo-Ferrer, F. Giannotti and M. Christen. Eur. Phys. J. Special Topics 214, 153-181 (2012) <http://dx.doi.org/10.1140/epjst/e2012-01691-2> (open access) 1373 citations on GS as of Jan 2020.
- Smart cities of the future, M. Batty, K.W. Axhausen, F. Giannotti, A. Pozdnoukhov, A. Bazzani, M. Wachowicz, G. Ouzounis and Y. Portugali. Eur. Phys. J. Special Topics 214, 481-518 (2012) <http://dx.doi.org/10.1140/epjst/e2012-01703-3> (open access) One of the most downloaded articles of EPJ-ST, with 31K downloads. 1373 citations on GS as of Jan 2020.

2013 – 2017: the creation of the SoBigData initiative: shaping Data Science. F. GIANNOTTI has launched in 2013 the SoBigData (Social Mining and Big data Analytics) initiative www.sobigdata.it, a network of 10 research labs across all universities and research centers in Pisa (100+ data science researchers). SoBigData.it aims to perform advanced research and analyses on the emerging challenges posed by big data, namely the digital breadcrumbs of human activities continually sensed by the ICT systems that people use. SoBigData is awarded in 2015 by a European grant and become SoBigData.eu integrating also other existing European Research Centers operating on Big Data (www.sobigdata.eu funded by the EC under the H2020 Excellent Science program). F. GIANNOTTI is the scientific coordinator responsible of the execution of the project. SoBigData is a research infrastructure (RI) providing an integrated ecosystem for ethic-sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life, i.e. an open data science infrastructure for supporting data-driven, inter-disciplinary research as recorded by “big data”. SoBigData involves 11 partners of 6 European countries.

F. GIANNOTTI has been in charge of writing several position papers on influential venues characterize the scientific challenges of the emerging paradigm of Data Science. In 2013, for the European Research Consortium for Informatics and Mathematics (www.ercim.eu) F. GIANNOTTI coordinates a group of major experts in Europe realizing the paper [46] aimed at setting the European research agenda on Big Data Analytics. In 2013 was nominated member of Horizon2020 Advisory Group on RI including e-infrastructures and she was the principal author of the position paper [45] aimed at highlighting the actions to be included into the 2016-2018 WorkProgramme for Research Infrastructure for maximizing the data exploitation in science. In 2017 CNR designated Fosca GIANNOTTI as writer of the position paper on “Data Science” [44], a preparatory document for the G7 Academy Joint Statement on *New economic growth: the role of science, technology, innovation and infrastructure* that recognizes data science as an “emerging technology with a potential to impact virtually all economic activities.” In 2018 CNR has designated F. GIANNOTTI to participate as Italian representative at G7 Academy at Ottawa, 19-20 March 2018, with duty on finalizing the official statement on “Digital Future”.

2017-2020 – at the crossroads of Data Science and AI: shaping the research roadmap of Human-centric Artificial Intelligence. Leveraging the scientific excellence gained on ethically-minded data science and big data analytics oriented towards common good and wellbeing, F.G. has a key role in shaping the European scientific community of Human-centric Artificial Intelligence, a construction that began in 2017 with the proposal of the Humane-AI project as a candidate of the H2020 FET Flagship program. F.G. lead the CNR partner of Humane-AI as one of the few core partners of the project, together with DFKI and INRIA. Humane-AI was funded by the EC in 2018, becoming the first pan-European collaboration action tasked with the definition of the research roadmap of novel forms of AI that are ethical by-design and beneficial to humans, both at individual and societal level. A key aspect of this scientific agenda brought forward by F.G. is “Explainable AI (XAI)”, i.e., how to devise machine learning decision and classification models that not only have a high predictive accuracy, but also provide human comprehensible means to explain the rationale of the predictive decisions and classifications. Such explicability feature is key to design hybrid human-machine interaction and decision systems that are truly able to empower human decision making, thus expanding human agency and dignity (instead of the contrary.) F.G. and her collaborators quickly became a key reference for the booming field of XAI, counting today an amazing number of publications worldwide: the seminal survey paper by F.G. and collaborators received more than 350 citations in less than one year. In 2019, F.G. received a prestigious ERC Advanced Grant as a PI, entitle precisely “XAI – *Science and technology for the Explanation of AI Decision Making*”. She is also the coordinator of the XAI workpackage of the AI4EU H2020 project, which is developing the AI on-line platform for Europe. Also, in view of the advent of the Horizon Europe framework, the Humane-AI project is being re-targeted; accordingly, F.G. is leading CNR as a core partner the proposal “*Humane-AI-Network*”, submitted to the call ICT-48-2020 “*Towards a vibrant European network of AI excellence centres*”. On a different line of the same call, F.G. is also leading CNR as a core partner of the TAILOR proposal “*Foundations of Trustworthy AI integrating Learning, Optimisation and Reasoning*”. In the meantime, the SoBigData research Infrastructure has been approved in 2019 to the next stage of “Advanced Community”, still under the general coordination of F.G., with a broader partnership and focus and a higher funding for four more years 2020 till 2024, under the acronym SoBigData++. Coherently with F.G. scientific vision, SoBigData++ will serve as a platform for ethically-

mind data science and AI, stressing the human-centric view towards achievements of broad social impact. F.G. has been invited to present this vision and her latest achievements at two prestigious venues: the Global Forum on AI for Humanity, organized by the French Government in Paris in October 2019, and the European Parliament in November 2019 at the conference on AI for Citizens' wellbeing.

- Riccardo Guidotti; Anna Monreale; Fosca Giannotti; Dino Pedreschi; Salvatore Ruggieri; Franco Turini. Factual and Counterfactual Explanations for Black Box Decision Making. *IEEE Intelligent Systems* DOI: 10.1109/MIS.2019.2957223 (2020)
- R Guidotti, A Monreale, S Ruggieri, F Turini, F Giannotti, D Pedreschi. A survey of methods for explaining black box models. *ACM Computing Surveys (CSUR)* 51 (5), 93 (2019) (350 cit. in less than one year)
- D Pedreschi, F Giannotti, R Guidotti, A Monreale, S Ruggieri, F Turini. Meaningful explanations of Black Box AI decision systems. *Proceedings of the AAAI Conference on Artificial Intelligence* 33, 9780-9784 (2019)

4. KEY SCIENTIFIC CONTRIBUTIONS

In this section three high-impact papers for each of the current research lines are highlighted.

Mining mobility data: spatio-temporal data mining techniques for trajectories of moving objects reconstructed from telecommunication logs, especially from mobile phones and other location-aware devices. The early results by F.G. in trajectory pattern discovery, trajectory clustering and anonymity-preserving pattern discovering, presented at major data mining conferences since 2007, contributed to forge the newly emergent area, and influenced the research of many young researchers within and outside the GeoPKDD community. The methods proposed by F.G. with her team provide the novel basements for Understanding Human mobility in the era of Big Data. Contributions of the three selected papers are also the basic component of the seminal paper with Mike Batty: *Smart Cities of the Future* [24] and are highlighted by the following three publications: Contributions of the three above selected papers are also the basic component of the seminal paper of 2012 with Mike Batty: *Smart Cities of the Future*, in EPJ Special Topics [27], 1373 citations on GoogleScholar as of Jan 2020

1. *Mobility, Data Mining and Privacy: Geographic knowledge discovery*. Edited by Fosca Giannotti and Dino Pedreschi. Springer 2008, 339 citations on GoogleScholar on Jan 2020. The book contains selected paper by the activities of the EU project GeoPKDD (Geographic Privacy Aware Knowledge Discovery) coordinated by Fosca Giannotti. This book has marked the emergence of a new area of research: Mobility, Privacy-preserving Data Mining.
2. F. Giannotti, M. Nanni, F. Pinelli, D. Pedreschi: Trajectory pattern mining. 13th ACM SIGKDD Int. Conf. on Knowledge Discovery and Data Mining KDD 2007: 330-339. 1138 citations on GoogleScholar on Jan 2020. It has been the first to formulate the problem of trajectory pattern discovery and has provided a first algorithm for spatio-temporal data mining. It has been nominated for the SIGKDD 2017 test of time award.
3. F. Giannotti, M. Nanni, D. Pedreschi, F. Pinelli, C. Renso, S. Rinzivillo, and R. Trasarti. Unveiling the complexity of human mobility by querying and mining massive trajectory data. *The VLDB Journal* 20(5), 695-719, 2011. 314 citations on GoogleScholar on Jan 2020. This paper summarizes the methods of mobility data mining (trajectory pattern discovery and clustering of trajectory data) proposed by KDD Lab using its platform M_Atlas. M_Atlas is one of the major outcomes of project GeoPKDD. It was selected among the top 10 achievements ever within EU FET-Open projects, and invited for showcase at the European Parliament in April 2010 at the presence of the European Commissioner for Digital Agenda, Neelie Kroes.

Complex network analysis and data mining: data mining techniques for the discovery of patterns for network (graph) data, and their combination with the models of network science. Main results: network analytics for multi-dimensional networks, discovery of eras in evolving social networks, analysis of dynamic mobile social networks. The most impactful contribution has been the integration of data-driven discovery of local patterns and clusters with global models developed by statistical physicists, to devise more realistic generative models of mobility and social systems. These line of research has been carried

out in collaboration with complex system physicist A.-L. Barabási, also within the FP7 FET-Open project DATASIM: Data Science for Simulation in the Era of Electric Vehicles. The first, most influential papers along this line are the followings::

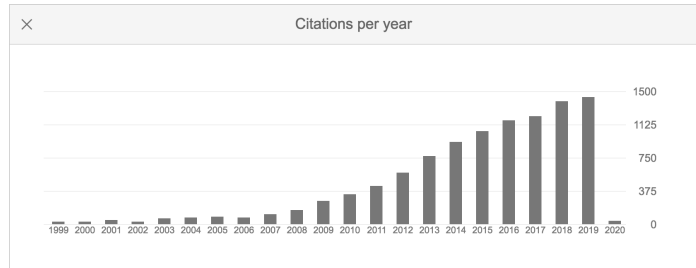
1. Dashun Wang, Dino Pedreschi, Chaoming Song, Fosca Giannotti, Albert-László Barabási: Human mobility, social ties, and link prediction. *KDD 2011*: 1100-1108, *630 citations on GoogleScholar on Jan 2020*, which investigates the limit of predictability of social links base not only on network features but also mobility features.
2. L. Pappalardo, F. Simini, S. Rinzivillo, D. Pedreschi, F. Giannotti, A.-L. Barabási. Returners and explorers dichotomy in human mobility. *Nature Communications* 6, Article number: 8166 (2015), 158 citations on GoogleScholar on Jan 2020. The paper, studying how the considerable variability in the characteristic travelled distance of individuals coexists with a high degree of predictability of their future locations, discovered the existence of two distinct classes of individuals: returners and explorers and develop more realistic models able to capture the empirical findings. This paper is at the base of constructing what-if analysis scenarios where different percentage of those two class of individuals may turn into a different impact on mobility-dependent phenomena, such as pollution, epidemics, traffic etc
3. M. Coscia, G. Rossetti, F. Giannotti, D. Pedreschi: DEMON: a local-first discovery method for overlapping communities. 18th ACM SIGKDD international conference on Knowledge discovery and data mining, 615-623 , (2012), *189 citations on GoogleScholar on Jan 2020*. The paper proposes a simple local-first approach to community discovery, able to unveil the modular organization of real complex networks. A label propagation algorithms starting by the ego networks of each node; generates local communities and the merge them into global collection. This paper, has activated a new line of research that has brought many new community discovery algorithms and some interesting applications (also on mobility analytics) based on this idea of bottom-up construction of communities.

Privacy-preserving data mining: privacy-aware data mining techniques for the discovery of patterns and models that do not disclose sensitive information of the source data. Main results: methods for privacy-aware pattern discovery and clustering of trajectory data, anonymization of mobility data. The most impactful contribution along this line has been the definition of a framework for “privacy-by-design” for big data analytics, based on the idea of seeking an optimal trade-off between risk of privacy breaches and quality of the information for delivering expected analytical services. The following are examples of privacy-by-design method for mobility data.

1. A. Monreale, G. Andrienko, N. Andrienko, F. Giannotti, D. Pedreschi, S. Rinzivillo, S. Wrobel. Movement Data Anonymity through Generalization. *TRANS. ON DATA PRIVACY* 3(2): 91-121 (2010). *174 citations on GoogleScholar on Jan 2020*. This journal paper summarizes the activities done in the last ten years on the risk of re-identification intrinsic into mobility trajectory data: the de-identification of such trajectories (forgetting the ID of their associated owners) is a weak protection, as generally it is possible to re-identify a person by observing her routine movements. A variety of methods for achieving true high-level protection of this data has been designed and paved the research on privacy-preserving spatio-temporal data analytics.
2. M Atzori, F Bonchi, F Giannotti, D Pedreschi. Anonymity preserving pattern discovery *The VLDB Journal—The International Journal on Very Large Data Bases* 17(4) p. 703-727 (2008). *137 citations on GoogleScholar on Jan 2020*. This is about publishing patterns obtained by data mining from personal data without compromising the anonymity of the data subjects in the training data.
3. A Monreale, S Rinzivillo, F Pratesi, F Giannotti, D Pedreschi. Privacy-by-design in big data analytics and social mining, *EPJ Data Science* 3 (1), 10 (2014). *52 citations on GoogleScholar on Jan 2020*. This paper introduces a systematic framework for privacy risk assessment for big data analytics, with several example applications in real life data science projects.

5. RESEARCH CONTRIBUTIONS

Google Scholar has **300+** publications, which received **10712** citations. Her h-index is **44** and i10-index (no. of papers with at least 10 citations) is **121**, as of January, 2020. The *Computer Science Bibliography* server <http://dblp.uni-trier.de> counts 234 publications of F.G., and ranks her around the 1000th position within the list of the most prolific computer science researchers internationally (DBLP has 15,000+ CS researchers with at least 50 publications.) The following table refines publications by venue:



The following table refines publications by venue:

Journals	International Conferences
European Physics J. – Special Topics (4)	SEBD (25)
European Physics J. – Data Science (4)	KDD (8)
Social Netw. Analys. Mining (3)	ASONAM (7)
IEEE Trans. Knowl. Data Eng. (3)	ECML-PKDD (9)
Inf. Syst. (3)	DSAA (5)
KI (2)	ICDM Workshops (5)
Sci. Comput. Program. (2)	ICDM (4)
VLDB J. (2)	GIS (3)
I. J. Data Science and Analytics (2)	DOOD (3)
PlosOne(2)	SAC (3)
J. Comput. Syst. Sci. (1)	EGC (2)
IEEE Systems Journal (1)	SEFM Workshops (2)
J. Log. Program. (1)	ICDE Workshops (2)
Machine Learning (1)	APPIA-GULP-PRODE (2)
J. Comput. Science (1)	AI*IA (2)
IEEE Intelligent Systems (1)	ITCC (2)
Data Knowl. Eng. (1)	KDID (2)
Data Min. Knowl. Discov. (1)	PAKDD (2)
IEEE Trans. Software Eng. (1)	EDBT (2)
Meth. of Logic in CS (1)	WWW(2)
Knowl. Inf. Syst. (1)	AAAI(1)
Comput. Syst. Sci. Eng. (1)	
Statistical Analysis and Data Mining (1)	
Nature Communications (1)	

5.1 Refereed contributions on International Journals

In the most recent papers current trainees of F.G. are underlined, the former trainees now current collaborators are not. F.G. has equally contributed to the team effort in co-authored publications. The order of authors tends to put the students first, when they have been in charge of the implementation of the ideas. Problem formulation and research design is typically led by F.G.

1. Riccardo Guidotti; Anna Monreale; Fosca Giannotti; Dino Pedreschi; Salvatore Ruggieri; Franco Turini. Factual and Counterfactual Explanations for Black Box Decision Making. *IEEE Intelligent Systems* (Early Access) DOI: 10.1109/MIS.2019.2957223 (2019)
2. Francesca Pratesi, Lorenzo Gabrielli, Paolo Cintia, Anna Monreale, Fosca Giannotti. PRIMULE: Privacy risk mitigation for user profiles. *Data & Knowledge Engineering* (2019) <https://doi.org/10.1016/j.datak.2019.101786>
3. Pappalardo, L., Cintia, P., Rossi, A., Massucco, E., Ferragina, P., Pedreschi, D., Giannotti, F. A public data set of spatio-temporal match events in soccer competitions. *Nature Scientific Data* 6, 236 (2019) doi:10.1038/s41597-019-0247-7

4. Sîrbu A, Pedreschi D, Giannotti F, Kertész J (2019) Algorithmic bias amplifies opinion fragmentation and polarization: A bounded confidence model. *PLoS ONE* 14(3): e0213246. <https://doi.org/10.1371/journal.pone.0213246>
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5.3 Editor of monographs and conference proceedings

1. (Katharina Morik, Fosca Giannotti, Marta González, Ioannis Katakis) *Special Issue on Data Mining for Smart Cities* ISSN: 1384-5810 (Print) 1573-756X (Online) May 2018, Volume 32, Issue 3, pp 736–736 |
2. (F. Giannotti, D. Pedreschi, Eds.) *Mobility, Data Mining and Privacy*. Springer, ISBN 978-3-540-75176-2, December 2007, Citations 116
3. *Proceedings of the 8th IEEE International Conference on Data Mining (ICDM 2008)*, December 15-19, 2008, Pisa, Italy. IEEE Computer Society 2008
4. *Knowledge Discovery in Databases: PKDD 2004, 8th European Conference on Principles and Practice of Knowledge Discovery in Databases*, Pisa, Italy. *Lecture Notes in Computer Science 3202* Springer 2004, ISBN 3-540-23108-0

5.4 Book chapters (with peer revision)

1. Fosca Giannotti, Giuseppe Manco and Franco Turini. *Towards a Logic Query Language for Data Mining*. In (R. Meo, P. Lanzi, M. Klemettinen, Eds.) *Database Support for Data Mining Applications*, pp. 75-93, Springer-Verlag, LNCS 2682, 2004. ISBN 978-3-540-22479-2.
2. Fosca Giannotti, Jef Wijsen and Giuseppe Manco. *Logical Languages for Data Mining*. In (Jan Chomicki, Ron van der Meyden, Gunter Saake, Eds.) *Logics for Emerging Applications of Databases*, pp. 325-361, Springer-Verlag, 2003. ISBN 3-540-00705-9.
3. A. Albano, F. Giannotti, R. Orsini e D. Pedreschi. *The Type System of Galileo*. In (Malcolm P. Atkinson, Peter Buneman, Ronald Morrison, Eds.) *Data Types and Persistence. Edited Papers from the Proceedings of the First Workshop on Persistent Objects, Appin, Scotland, August 1985*, pp. 101-120, Springer 1988. ISBN 3-540-18785-5.
4. A. Albano, F. Giannotti e D. Pedreschi. *Linguaggi Concettuali per Basi di Dati*. In (P. Tiberio ed.) *Basi di Dati: Stato dell'Arte e Prospettive. Collana AICA di Informatica, Masson Italia Editori*, pp. 80-138, 1985.
5. F. Giannotti, D. Pedreschi, F. Turini. *Mobility, Data Mining and Privacy: the Experience of the GeoPKDD Project*. In (F. Bonchi, E. Ferrari, W. Jiang, B. Malin, Eds.) *Privacy, Security, and Trust in KDD: Second ACM SIGKDD Int. Workshop, PinKDD 2008, Revised Selected Papers. Lecture Notes in Computer Science, Volume 5456*, Springer, 2009. ISBN 978-3-642-01717-9.
6. M. Berlingerio, F. Bonchi, M. Curcio, F. Giannotti, F. Turini. *Mining Clinical, Immunological, and Genetic Data of Solid Organ Transplantation*. In (Amandeep S. Sidhu and Tharam S. Dillon, Eds.)

Biomedical Data and Applications, Studies in Computational Intelligence, Volume 224/2009, Springer, 2009. ISBN 978-3-624-02192-3.

7. Fosca Giannotti, Dino Pedreschi. Mobility, Data Mining and Privacy: A Vision of Convergence. In (Fosca Giannotti, Dino Pedreschi Eds.): Mobility, Data Mining and Privacy - Geographic Knowledge Discovery. Pp. 1-11. Springer 2008, ISBN 978-3-540-75176-2
8. Giuseppe Manco, Miriam Baglioni, Fosca Giannotti, Bart Kuijpers, Alessandra Raffaeta, Chiara Renso. Querying and Reasoning for Spatiotemporal Data Mining. (Fosca Giannotti, Dino Pedreschi Eds.): Mobility, Data Mining and Privacy - Geographic Knowledge Discovery. pp. 335-374. Springer 2008, ISBN 978-3-540-75176-2

5.5 Vision and strategic white papers

1. Fabio Beltram, Fosca Giannotti, Dino Pedreschi. G7 Academies Meeting - Rome, 23-25 March 2017. Joint Statement on *New economic growth: the role of science, technology, innovation and infrastructure*. **Position Paper on Data Science**
2. Invited Books chapter: *How Data Mining and Machine Learning Evolved from Relational Data Base to Data Science*. G Amato, L Candela, D Castelli, A Esuli, F Falchi, C Gennaro, F Giannotti, in. A Comprehensive Guide Through the Italian Database Research Over the Last 25 years, 287-306, Springer,
3. Horizon2020 Advisory Group on Research Infrastructure including e-infrastructure, position paper: **Big Data & Future Research Infrastructures**, Fosca Giannotti, Lucie Guibold, Peter Witteburg
<http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=14950&no=1> (2014)
4. ERCIM white paper: **Big data Analytics: towards a European research Agenda**. Eds. Mirco Nanni, Costantino Thanos, Fosca Giannotti, Andreas Rauber
<http://www.ercim.eu/news/387-ercim-white-paper-on-big-data-analytics> (2013)

5.6 Invited keynotes, tutorials and Seminars

1. Invited talk: Explainable AI. Conference on Artificial Intelligence: the EU approach for citizen's wellbeing. European Parliament, - 19 November 2019 in Brussels, Belgium.
2. Invited talk: Intelligibility of AI. Global Forum on AI for Humanity - 28-30 October 2019 in Paris, France.
3. Invited talk: Explainable AI. ERCIM 30th anniversary celebrating day, Rome, 31.10.2019
4. Invited talk: AI: la rivoluzione ineluttabile. 22esima edizione Colloqui Internazionali di Cortona, Rome, 16.10.2019
5. Invited talk: Explainable Machine Learning. Umea University, Umea, Sweden, 07.10.2019
6. Invited talk: Data Science & Ethics. ACM Celebration of Women in Computing WOMENCOURAGE, Rome, 19.09.2019
7. Invited talk: Data Science & AI for Humanity. Bilateral Meeting Italy-China on Artificial Intelligence, Rome, 16.09.2019
8. Invited talk: Data and Algorithmic Bias. Meeting su Governance dell'IA, Fondazione Leonardo, Rome, 27.05.2019
9. Invited talk: Perché? Spiegare le decisioni delle black-box dell'AI. Data Driven Innovation Conference, Rome, 11.05.2019
10. Invited talk: Social Mining & Human AI. Trends & opportunities of digital world, Ambasciata Italiana and University of Beograd, Belgrado, 15.04.2019
11. Invited talk: Social Mining & Human AI. Official Visit of the President of CNR to Yerevan, Armenia, 25-26.01.2019
12. Invited talk: Data Science & AI. InnovAgorà, Museo Nazionale della Scienze e della Tecnologia Leonardo da Vinci, Milano, 06.05.2019
13. Invited talk: Big Data for Understanding Human Dynamics: the Power of Networks. Conference on Complex Systems CCS 2018, Salonicco, Grecia, 25.09.2018
14. Invited talk: Data Science & Big Data: a game changer for science and innovation. RDA International Data Week 2018, Gaborone, Botswana, 05-08.11.2018
15. Invited talk: Data & Algorithmic Bias. Anniversary Ceremony of the Institute for Big Data Analytics, Dalhousie University, Halifax, Canada, 23.11.2018

16. Invited talk: Big Data for Understanding Human Dynamics: the Power of Networks. EAIA Data Science Summer School, Porto, 04.07.2018
17. Invited talk: Big Data, Opportunities, Perils & Countermeasures. Resonance_Art_Science, JRC at ISPRA 25.06.2018
18. Invited talk: SoBigData Exploratory On Migration Studies. Seminar on Migration, Paris School of Economics, La Sorbonne, Paris, 15.06.2018
19. Invited talk: The SoBigData Research Infrastructure. Seminar at University of Sapienza Department of Computer Science, 30.05.2018
20. Invited Talk: Data privacy @ SoBigData.eu: privacy-by-design, risk assessment, personal data analytics & new deal on personal data. Mobility and Digitization, Expert Group Smart Data & Data Analytics, Competence Center of Cyberphysical Systems, Dormund. DE
21. Invited talk: The Sobigdata.it Ecosystem. Incontro con Agenzia Digitale a Scuola S: Anna, 14.05.2018
22. Invited talk: Big Data For Understanding Human Dynamics: The Power Of Networks. Invited speech at 18 eme Conference Internationale Sur L'extraction Et La Gestion Des Connaissance" 25 Janvier 2018 Maison Des Science De L'homme De Paris Nord ECG2018, Paris, 25.01.2018
23. Invited talk: Data Science For Nowcasting & Forecasting. Data Science Colloquium, PhD Data Science. 28.03.2018
24. Invited talk: Data Ethics In Sobigdata. Seminar on Data Privacy at Siemens, Munich 18.06.2017
25. Invited talk: Big Data For City Science: The Power Of Networks invited keynote at Workshop, "Knowledge Discovery from Mobility and Transportation Systems" at European Conference on Machine Learning and Knowledge Discovery, Skopje, Republic of Makedonia, September 2017
26. Invited talk: The SobigData Research Infrastructure, invited keynote at European Projects Workshop" European Conference on Machine Learning and Knowledge Discovery, Skopje, Republic of Makedonia, September 2017
27. Invited talk: Sobigdata: Verso Un CERN Per La Data Science. Seminario ad European Institute University 17.10.2017
28. Invited talk: "Data Science And Big Data: A Game-Changer For Science And Innovation" Relazione invitata ad ASPEN Institute, Bologna Bologna 23.10.2017
29. Invited talk: The Sobigdata Research Infrastructure, Relazione invitata alla GARR Conference, Venezia il 16.11.2017
30. Invited talk: Audizione: Big Data Analytics, Agcom e Garante Privacy, 05.12.2017
31. Invited talk: Understanding Human Mobility With Mobile Phone. Center de Etudes and Research of the Economie Internationale, Paris 25.10.2016
32. Invited talk: Verso Un Cern Per La Datascience. Mobilità Umana E Scienza Delle Città. Centro Studi dei Servizi di Intelligence, Governo Italiano ,Roma, 28.11.2016
33. Invited talk: Data Driven Models Of Human Mobility, ACM Data Science Summit, Venice, September 2016
34. Invited talk: Big Data And Social Mining, 5th Int. Workshop on Social Network Analysis ARS2015, Capri Italy
35. Invited talk: Sobigdata Research Infrastructure: Goals And Vision. EGI conference 2015, Lisbon Portugal
36. Invited talk: Understanding Urban Mobility With Big Data. European Conference on Complex Systems, ECCS 2014, Lucca, Italy
37. Invited talk: Understanding Urban Mobility With Big Data. 47th Scientific Meeting of the Italian Statistical Society, SIS 2014, Cagliari, Italy
38. Invited talk: Big Data And Social Mining, UFC, Fortaleza, and PUC University, Rio de Janeiro Gennaio 2013
39. Invited talk: Big Data and Privacy: time for a new deal on personal data? NATIONAL WORKSHOP ON SECURITY PRIVACY, CNR Rom (Italy), May 2013
40. Invited talk: Big Data & Social Mining & Privacy, Audizione Autorità Trattamento Dati Personali 30 Maggio 2013
41. Invited talk: Big Data & Social Mining, In this world of Open data. Workshop of the Embassy of Canada in Rome 10 Luglio 2013
42. Invited talk: Mobility Data Mining & Privacy ICT Lab, Toyota, Tokyo December 2013
43. Invited talk: Big Data & Social Data Mining The Scientific Vision, Undicesima Conferenza Nazionale Statistica, Rome, 20 February, 2013.

44. Invited talk: Big Data & Social Data Mining The Scientific Vision, ISTAT (Italian Statistical Agency), Rome, September 2012,
45. Invited talk: Mining The Patterns And Profiles Of Human Mobility, MIT Transportation Department, Cambridge, MA, USA January 18, 2012,
46. Invited talk: Mining The Patterns And Profiles Of Human Mobility, Northeastern University CCNR, Barabasi Lab., Boston, MA, USA January 19, 2012, TRB Annual Meeting, Washington, USA January 22, 2012
47. Invited talk: Mobility, Data Mining and Privacy Understanding Human Movement Patterns from Trajectory Data. Mobile Data Management, 6-9 June, 2011, Luleå, Sweden
48. Invited talk: Mobility, data mining and privacy: mining human mobility patterns from trajectory data. Symp. Extraction et gestion des connaissances (EGC'2011), Brest, France, January 2011.
49. Invited talk: Mobility, data mining and privacy: mining human mobility patterns from trajectory data. XI Brazilal Symposium on Geoinformatics (GEOINFO 2010), Campos do Jordao, SP, Brasil, December 2010.
50. Invited talk: Mobility, data mining and privacy: mining human mobility patterns from trajectory data. Google, Boston, MA, February 2010
51. Invited talk: Mobility, data mining and privacy: mining human mobility patterns from trajectory data. Media Lab, Transportation Dept., & Database Lab, MIT, Boston, MA, March 2010
52. Tutorial: Geographic privacy-aware knowledge discovery and delivery. Tutorial at EDBT 2009, 12th International Conference on Extending Database Technology, Saint Petersburg, Russia, March 24-26, 2009
53. Invited talk: Mobility, Data Mining and Privacy. SIAM Conference on Mathematics for Industry: Challenges and Frontiers 2009 (MI09). October 10th, San Francisco, CA.
54. Invited talk: Mobility, Data Mining and Privacy: lessons from the GeoPKDD project. Telemobility Forum 2008, sessione GIS, mappe e geo-contenuti. Milano. 05.11.2008. <http://www.telemobilityforum.com>.
55. Invited talk: GeoPKDD: Research Challenges and Results. Dagstuhl Seminar n. 8471: Geopgraphical Privacy-aware Knowledge Discovery and Delivery. Schloss Dagstuhl, Germany. Data: 16.11.2008.
56. Tutorial: Mobility, Data Mining and Privacy. Tutorial at ECML PKDD 2008, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, 15 - 19 September 2008, Antwerp, Belgium
57. Invited talk: Mobility, Data Mining and Privacy. International Seminar Celebrating the 20th Anniversary of EPFL's Database Laboratory (LBD), Lausanne, September 2008.
58. Invited talk: Mobility, Data Mining and Privacy. IEEE Data Mining Forum 2008, Hong Kong Polytechnic University and IEEE Technical Committee on Intelligence Informatics (TCII), May 2008
59. Invited panelist: Ubiquitous Knowledge Discovery - Challenges and Visions of an Emerging Field. Final Symposium - KDubiq CA. Bonn, Germania 14.05.2008. <http://wiki.kdubiq.org/kdubiqFinalSymposium>.
60. Tutorial: Privacy and Anonymity in Movement Aware Data Analysis, Tutorial at PAKDD 2007, Pacific Asian Conference on Knowledge Discovery in Databases, Nanjing, China, May 2007.
61. Invited talk: Mobility, Privacy and Geography: a Knowledge Discovery Perspective. Workshop on Knowledge Discovery for Sustainable Mobility. The Waag Society, Amsterdam, NL. Date: 9 November 2006
62. Invited talk: Business Process Intelligence and Business Intelligence: differences and convergences. Workshop on Business Process Intelligence (BPI). Vienna. 4 September 2006.
63. Invited talk: Mobility, Privacy and Geography: a Knowledge Discovery Perspective. Workshop on Knowledge Discovery for Sustainable Mobility. The Waag Society, Amsterdam, NL. 11.09.2006. Web site del workshop: <http://www.waag.org/project/mobilityworkshop>.
64. Invited panelist: Business Process Intelligence and Business Intelligence: diverences and convergences. Workshop on Business Process Intelligence (BPI). Vienna., 04.09.2006. Web site del workshop: <http://is.tm.tue.nl/bpi06>.
65. Presentation of the GeoPKDD project. 4th Int. Conf. on Trust Management. Pisa. 16.05.2006. Web site della conferenza: <http://www.iit.cnr.it/iTrust2006>.
66. GeoPKDD: Geographic Privacy-aware Knowledge Discovery. ECML/PKDD. Workshop on Mining Spatio-Temporal Data, MSTD 2005. 03.10.2005. Web site del workshop: <http://www.uniba.it/malerba/activities/mstd>.

67. Recent Results in Constrained Frequent Pattern Mining. Dagstuhl Seminar n. 04161: Detecting Local Patterns. Schloss Dagstuhl, Germany. 14.04.2004. Web site del seminario: <http://www.dagstuhl.de>, seminar n. 04161.
68. Invited tutorial Logic and Data Mining. 8th European Conf. on Logics in Artificial Intelligence, JELIA 2002. Cosenza. 23.09.2002. Proceedings della conferenza: Springer, LNCS n. 2424, ISBN 3-540-44190-5.
69. Logic-based data mining query languages. First ECML/PKDD Workshop on Knowledge Discovery and Inductive Databases, KDID'2002. Helsinki, Finland. 20.08.2002. Proceedings del workshop: Helsinki University Printing House, ISBN 952-10-0638-2.
70. Invited tutorial Knowledge discovery in databases and data mining: techniques, methodologies and experiences. Tutorial full-day (8 ore). EDBT 2000, VII Conf. on Extending Database Technology, Konstanz, Germany. 27.03.2000. <http://www.edbt2000.uni-konstanz.de/tutorials.html>
71. Invited tutorial: Knowledge discovery e data mining. Dipartimento di Elettronica, Informatica e Sistemistica della Facoltà di Ingegneria dell'Università di Bologna. 24.05.1999.
72. Logic Abstract Machine for Active Deductive Object-Oriented Databases. Dagstuhl Seminar n. 9639: Logic Databases and the Meaning of Change. Schloss Dagstuhl, Germany. 23.09.1996. <http://www.dagstuhl.de>.

5.7 Graduate level teaching activity

1. Professore a contratto per il corso: BigData Analytics. Corso di laurea magistrale in *Data Science & Business Informatics*, Univ. Pisa. Titolare del corso. Durata: 40 ore, (3 edizioni) a.a. 2016-2019
2. Professore a contratto per il corso: Data Mining. Corso di laurea magistrale in *Business Informatics*, Univ. Pisa. Titolare del corso. Durata: 40 ore, (8 edizioni) a.a. 2007-15.
3. Professore a contratto per il corso: Analisi dei dati ed estrazione di conoscenza. Corso di laurea magistrale in *Business Informatics*, Univ. Pisa. Titolare del corso. Durata: 40 ore, (4 edizioni) a.a. 2003-07.
4. Professore a contratto per il corso: Tecniche di Data mining. Corso di laurea specialistica in *Informatica*, Univ. Pisa. Titolare del corso. Durata: 42 ore, (2 edizioni) a.a. 2001-03.
5. Professore a contratto per il corso: Tecniche di Basi di Dati Deduttive. Corso di laurea specialistica in *Informatica*, Univ. Pisa. Titolare del corso. Durata: 42 ore, (4 edizioni) a.a. 1997-2001.
6. Professore a contratto per il corso di laurea vecchio ordinamento in Scienze dell'Informazione, Univ. Pisa. Corso integrativo Un Meta-Linguaggio Funzionale per la Semantica Denotazionale per il corso Metodi per il trattamento dell'informazione. Durata: 15 ore, (2 edizioni) a.a. 1990-1992.

5.8 Post-graduate/doctoral level teaching activity

1. *Data Mining & Machine Learning*, module of 40 hours at Master "Big data", of University of Pisa – 2015-2016-2017-2018-2019 (5 edizioni)
2. *Explainable Machine Learning*. Lecture at *Explainable Data Science Summer School*, European Association for Data Science, Luxembourg, 11.09.2019
3. *Explainable AI*. Lecture at *Data Science Summer School 2019*, SoBigData.eu, Pisa, 06.09.2019
4. *Big Data for city Management: the power of Human Mobility Networks*. EAIA 2018: Advanced School on Data Science for Big Data, Artificial Association the Portuguese Association for Artificial Intelligence Porto, July 2018
5. *Big Data for city Management: the power of Human Mobility Networks*. Lipari PhD Summer School on Computational Complex Systems: City of Citizens. July 2017.
6. *Data Mining and Customer Relationship Management* at the Master program MAINS (Service Management, Innovation and Engineering) of Scuola Superiore S. Anna, 2010-2019, Pisa
7. *Le criticità della privacy alla luce delle tecniche di BIG DATA analytics e dell'Internet of Things*, VI Modulo 20 ore, nell'ambito del corso su Sicurezza dei dati personali e privacy nell'era dell'Internet of Things di Federprivacy (27.03.2018)
8. *Nowcasting wellbeing in societies: at the crossroad of big data, network science, and complex systems*, lecture at Master Qulexity University of Florence , September 2016
9. Data Mining and Big Data Analytics, PhD class at Sorbonne Paris School of Economics Paris, October 2016
10. *Data Mining & Big Data Analytics*, PhD class (40 h) at Central European University Budapest, 2015
11. *Understanding Human Mobility with Big Data*, PhD class (20 h) at University of Bari, May 2015
12. *Big Data Analytics & Social Mining for Science and Society*, Lipari PhD Summer School on Computational Complex Systems July 2015.

13. *Mobility Data Analysis and Mining*, PhD class at Estonian Computer Science Summer School Estonia, August 2013
14. *Big Data Analytics & Social Mining*, UFC Fortaleza and PUC Univ. Rio de Janeiro, Brasil, Jan. 2013
15. Dottorato di Ricerca in Informatica, Univ. Pisa. Corso: *Privacy-preserving Data Publishing and Mining*, codocente con i Prof. D. Pedreschi e F. Turini, Univ. Pisa. 20 hours. July 2009. <http://cli.di.unipi.it/doku/doku.php/tdm/ppdm09>
16. KDubiq 2006 Summer School: 1st European Summer School on Knowledge Discovery for Ubiquitous Computing, Dortmund (D). Corso: *Privacy-preserving Data Mining*. 8 hours. 14 - 16.09.2006. Web site della C.A. KDubiq: <http://www.kdubiq.org>
17. Docente del modulo: Introduzione alle tecniche di analisi dei dati mediante data mining. Master in Coordinamento di sperimentazione clinica, Facoltà di Medicina e Chirurgia, Università di Firenze. 16 hours, 09 e 10.05.2006. Incarico di docenza. Rilasciato da: Univ. Firenze. Data: 19.04.2006.
18. Dottorato di Ricerca in Informatica, Univ. Pisa. Corso: *Data Mining and Knowledge Discovery in Databases*, co-teaching with Prof. Jiawei Han (Simon Fraser Univ., Canada). 20 hours March 2001.
19. Docente del corso: *Databases - Bases de Donnees*. UNESCO Advanced school on Science and Informatics - Ecole Maghrebine sur le Fondements des Sciences Informatique. Facoltà di Scienze dell'Università di Tunisi (Tunisia).: 30 hours. Dal 14.09.1992 al 10.10.1992.
20. Corso di Alta Formazione per Personale di Ricerca. Modulo: Semantica e sistemi organizzativi. Rivolto ai borsisti laureati CRAI. Presso CRAI (Consorzio per la Ricerca e le Applicazioni di Informatica), Rende (Cosenza). 40 ore. Dal 09.02.1987 al 13.02.1987.
21. Corso di esercitazioni del modulo: Software Engineering. Corso di Alta Formazione per Progettisti Software. Rivolto ai borsisti laureati EniData. Presso SOGESTA, Urbino, organizzato da CRAI (Consorzio per la Ricerca e le Applicazioni di Informatica), Rende (Cosenza). Durata: 72 ore. Dal 21.10.1985 al 31.10.1985.
22. Corso di Alta Formazione per Personale di Ricerca. Modulo: Programmazione funzionale in ML. Rivolto ai borsisti laureati CRAI. Presso CRAI (Consorzio per la Ricerca e le Applicazioni di Informatica), Rende (Cosenza). Durata: 9 ore. Dal 16.01.1985 al 18.10.1985.
23. Corso di Alta Formazione per Personale di Ricerca. Modulo: Semantica denotazionale. Rivolto ai borsisti laureati CRAI. Presso CRAI (Consorzio per la Ricerca e le Applicazioni di Informatica), Rende (Cosenza). Durata: 15 ore. Dal 17.12.1984 al 21.12.1984.

6. COORDINATION OF RESEARCH PROJECTS

In the last five years, F. GIANNOTTI has attracted additional research resources for CNR for approximately 8.5 million Euro. The following are **the projects with leadership responsibility**

6.1 As the project coordinator

1. XAI (2019-2024), ERC Advanced Grants 2018, *Science and technology for the explanation of AI decision making*. GAP-834756. XAI is a 60-months EU-funded project addressing the challenges of requiring that machine learning and AI be explainable and comprehensible in human terms (PI: F.G., funding: 2,5MEuro for CNR)
2. SoBigData-PlusPlus (2020-2024, H2020-Excellent Science Research Infrastructures, n. 871042) Integrated Infrastructure for Social Mining & Big Data Analytics. It is a research infrastructure (RI) at the second stage of "Advanced community", aggregating 32 partners of 12 EU Countries with the goal of consolidating and expanding SoBigData over the next 4 years. (funding 10MEuro overall, 2,5MEuro for CNR)
3. 2015-2019: Coordinator of *SoBigData.eu: Social Mining and Big Data Ecosystem – Research Infrastructure* – H2020, FET INFRAIA-2014-2015. Partners: KDD Lab, ISTI-CNR (coord.), CNR Consiglio Nazionale delle Ricerche Italy, USFD The University of Sheffield UK, UNIPI Università di Pisa Italy, FRH Fraunhofer IAIS and IGD Germany, UT Tartu Ulikool Estonia, IMT Scuola IMT Lucca Italy, LUH Gottfried Wilhelm Leibniz Universitaet Hannover, SNS Scuola Normale Superiore di Pisa Italy, AALTO Aalto University Finland, ETHZ ETH Zurich Switzerland, TUDelft Technische Universiteit Delft Netherlands Funding 6 milion euro (1050 K euro for ISTI-CNR).
4. 2009-2012 *MOTUS – MObility and Tourism IN Urban Scenarios*. – Industria 2015 – MISE (Ministro dello Sviluppo Economico – Industry2015 - <http://www.motus2015.it/>) (Coord. TELECOM Italia)

- (20 industrial and academic partners). FG was the scientific Coordinator of subproject: Mobility Knowledge Infrastructure. Budget for CNR 900 K Euro. The overall project budget is 20 Mil Euro.
5. 2012-2013 MATlas@Pisa, exploration initiative on “sensing the pulse of a town” joint with Comune di Pisa and Agency of Mobility of Pisa aimed at using the analytical platform MATlas and new sources of Mobility Data (GPS trajectories from 170K vehicles observed for 5 weeks in Tuscany and 5 Millions of CDRs observed for 3 weeks in provincial di Pisa, and 15K Flickr traces in Provincia di Pisa) for defining a report on mobility demand and o tourism fluxes of Pisa. 90K
 6. 2010-2012 MATlas@Paris, exploration initiative on “sensing the pulse of a town” joint and funded by Orange Research Labs. aimed at using the analytical platform MATlas and new sources of Mobility Data (25 Millions of CDRs observed for 3 weeks in Paris,) for defining a profiles of Tourists in Paris. Funds 50K
 7. 2005-2009: Coordinator of GeoPKDD –*Geographic Privacy-aware Knowledge Discovery and Delivery* www.geopkdd.eu, STREP within FET-Open program (Future Emerging Technologies). Partners: KDD Lab, ISTI-CNR (coord.), EPFL Lausanne (CH), Univ. Piraeus (GR), Univ. Hasselt (B), Fraunhofer Institute (D), Univ. Politecnica di Madrid (E), WIND Tele-comunicazioni spa (I), Univ. Sabanci, Istanbul (TK). Funding: 2.200 K euro (478 K euro for ISTI-CNR). Effort: 373 p/m.
 8. 2006-2009. *BI-COOP: Business Intelligence & Data Warehouse for UniCoop Tirreno*, Industrial R&D project. Goal: design and implementation of intelligent CRM services based on basket market analysis. Partners: KDD Lab, ISTI-CNR (coord.), UniCoop Tirreno. Funding 150 K euro
 9. 2007-2008. *DIVA: Tecniche di Data Mining per la Scoperta di Evasione IVA*, Industrial R&D project. Goal: design and implementation of predictive techniques for fiscal fraud evasion in case of IVA tax. Partners: KDD Lab, ICAR-CNR, SOGEI, Agenzia delle Entrate. Funding 180 K euro.
 10. 2003-2005 *P3D. Privacy Preserving Pattern Discovery*, curiosity-driven project, funded by ISTI CNR. Goal: Privacy preserving pattern extraction methods. Partners: KDD Lab e HPC Lab, ISTI-CNR. Funding: 70 K Euro.
 11. 2002-2005 *ECD - Technologies and Services for Enhanced Contents Delivery*, research project of Fondo Speciale della Ricerca di Interesse Strategico of MIR, legge 449/97. National coordinator of Action2: Mine The Web - Web search. Goal: design of methods, technologies and services for intelligent access and delivery of web contents based on web mining techniques. Partners: ISTI, Univ. Pisa, Univ. della Calabria, Univ. Roma 3, Univ. Modena, Politecnico Milano, Univ. Padova. (<http://www-ecd.isti.cnr.it>). Budget: 460 K euro (ISTI-CNR: 350 K euro)
 12. 2002-2004 *WebDigger*, Industrial Research, funded by Fondazione della Cassa di Risparmio di Pisa. Goal: Design of a Webmining infrastructure for developing web data analytical services. Partners: ISTI-CNR, Univ. Pisa.: Budget: 220 Mil. Italian Lire
 13. 1998-2001 ESPRIT Project 28115 *Dedugis: Deductive DataBases for Intelligent Geographic Information Systems*. Goal: Design and development of a new Geographic Information System capable to support spatio-temporal reasoning and uncertainty. Partners: CNUCE-CNR, GMD, CWI, Univ. Wuerzburg, Univ. Pisa. Partners Industriali: Intecs, Debis, Sistema, Sistemi Territoriali. Funding: 400 Mil. Italian Lire.
 14. 2000-2001 *MineFaST*. Industrial funded by FST - Fabbrica Servizi Telematici Atlantis. Goal: Design of an intelligent web caching system based on data mining techniques. Partners: FST, CNUCE-CNR, Univ. Pisa. Funding: 42 Mil. Italian Lire
 15. 1997-98 *DataSift: Market basket analysis in retail industry*. Progetto della Rete ad Alta Tecnologia della Regione Toscana. Goal: to realize a system for basket marked analysis based on association rules. Partners: Univ. Pisa, CNUCE-CNR, Intecs, COOP Toscana-Lazio. Funding: 100 Mil. Lire

6.2 As the responsible for the KDD Lab research unit

1. AI4EU (2019-2021, H2020, Contract n. 825619). AI4EU aims at building the European Platform for Artificial Intelligence. Is the European Union's landmark Artificial Intelligence project, which seeks to develop a European AI ecosystem, bringing together the knowledge, algorithms, tools and resources available and making it a compelling solution for users (funding 200KEuro for CNR)
2. Humane-AI (2019-2020, H2020-FETFLAG-2018-01 CSA n. 820437) *Toward AI Systems That Augment and Empower Humans by Understanding Us, our Society and the World Around Us*. Preparatory action for FET Flagship 2018 (funding 30KEuro for CNR)
3. Cimplex – Bringing citizens, Models and Data together in Participatory Interactive Social Exploratories (2014-2017). H2020 FET-PROACTIVE GSS project 2014. Coord. DFKI Germany. Budget KDD Lab. 600 K Euro.

4. 2014-2015 Personal Data Store: Living Lab for Smart retail EIT-ICT Lab HII – Trusted Cloud Budget KDD Lab. 100 K Euro
5. 2013-2014 City Data Fusion for Event Management. EIT-ICT Digital Cities. Budget KDD Lab. 100 K Euro
6. 2011-2014 DataSIM - FET-ICT VII Framework, Coord. Hasselt Univ. Belgium. Budget KDD Lab. 400 K Euro.
7. 2010-2013 LIFT, FET-ICT VII Framework, Coord. Fhg, Saint Augustin, Bonn. Budget KDD Lab. 270 K Euro.
8. 2009-2012 *MODAP – Mobility, Data Mining and Privacy*. FP7 FET-Open Coordination Action n. 245410. Coord.: Sabanci Univ., Istanbul. Member of the steering committee.
9. 2009-2012 *MOVE – Knowledge Discovery from Moving Objects*. COST Action della European Science Foundation n. IC0903. Role: Expert n. 10, Member Country Representative Boar
10. 2008-2010 *Anonimo – Anonimato e Privacy nell'Analisi di Dati di Mobilità*. PRIN project of MIUR, Italian Ministry of Research and Higher Education. Coord: Univ. Pisa.
11. 2005-2008 *KDubiQ – Knowledge Discovery in Ubiquitous Environments*. Coordination Action IST-6FP-021321 FET-Open FP6. Coord.: Fraunhofer Institute (D).
12. 2002-2004 *KDNet – Knowledge Discovery - Network of Excellence*. FP6 IST-2001- 33086
13. 2000-01 TelCal project of Regione Calabria on *Data mining and data warehousing*
14. 1998-99 and 2007 Project of Ministry of Finance on *Data Mining systems for fiscal fraud detection* (Italian consortium,)
15. 1997-99 *Kine: Knowledge Bases Integration Programming Environment*. Progetto coordinato n. 008 del CNR.

7. PUBLIC-PRIVATE PARTNERSHIPS

F.G. has coordinated/participated in many industrial collaborations, including with Toyota, KDDI Japan, SAS, WIND, VODAFONE, ENEL, ORANGE, TELECOM ITALIA, COOP, OCTOTELEMATICS, Siemens.

F.G. has designed and delivered high-level *training initiatives* targeted at management personnel of large companies, to boost data science and AI skills and awareness. She has provided a 1 to 3 days training courses on *Big Data Analytics and Social Mining* for the following companies: Generali S.p.A., SAS, Vodafone, Navionics, Unione Industriali, General Electrics, ENEL.

8. CONTRIBUTIONS TO THE SCIENTIFIC COMMUNITY

- General chair of SocInfo 2020, Int. Conf. on Social Informatics, Pisa, October 2020
- Senior PC member of ACM-SIGKDD 2018 and 2020 and IJCAI 2019 and 2020
- Member of the editorial board of the Springer journal *EPJ Data Science*
- General Chair of DSAA 2017 (4th IEEE Int. Conf. on Data Science and Advanced Analytics).
- General chair of ECML-PKDD2016 the *European conference on Machine Learning and Knowledge Discovery in Databases*
- Program chair of ECML/PKDD 2004, the European conference on Machine Learning and Knowledge Discovery in Databases
- Program chair of ICDM 2008, the IEEE Int. Conf. on Data Mining,
- Regular member of the program committee of the main international conferences on data mining and knowledge discovery: ACM-SIGKDD, IEEE-ICDM, ECML-PKDD, ASONAM, ACM SIAM-SDM etc.

9. COLLABORATION NETWORK

F.G. has a vast network of long-lasting international collaborations, also beyond computer scientists: with legal scholars active on the side of privacy and human rights (Mireille Hildebrandt), with computational social scientists (Dirk Helbing, Sandy Pentland, Andrzej Nowak), with ethical philosophers (Jeroen van der Hoven), with physicists of complex systems (Albert-László Barabási, Janos Kertesz, Alessandro

Vespignani), economists (Hillel Rapoport) and with computer science experts in visualization (Gennady and Natalia Andrienko), AI (Paul Lukowicz, Stan Matwin) among the others.

10. DIRECTION OF RESEARCH COMMUNITIES AND INFRASTRUCTURES

F.G. has directed high-complexity research infrastructures at both European and regional level: SoBigData.eu (www.sobigdata.eu) and SoBigData.it (www.sobigdata.it). The former is a European wide research infrastructure (RI) for big data analytics aimed at providing resources and services to a wide area of researchers and innovators in the area of social mining: economists, social scientists, consisting of three pillars: the user communities asking to access services, the e-infrastructure and the researchers providing the resources and the services. SoBigData **e-infrastructure** offers access to over **180 resources** (social datasets, Big Data analysis algorithms and courseware) designed to support data scientists in the execution of large scale experiments. The SoBigData e-infrastructure is currently used by a vast and diverse pool of stakeholders, including **120 companies and over 2,500 registered users**, with daily peaks of accesses and executions in the millions. The project has supported **on-site visits by 35 scientists** outside of the consortium that were hosted to develop their projects. The activity has produced **over 200 high-profile publications** stemming from Big Data experiments executed via resources provided by SoBigData. The project's training and innovation actions have produced courses for **over 700 students** and **120 pilot projects developed with companies** (53 Small and Medium Enterprises, 41 large companies and 26 public institutions). After 2019, SoBigData continues with its expanded successor SoBigData++ (2020-2024), with a EU-wide consortium of 32 Data Science & AI research centers, under F.G.'s coordination.

2006 – 2009: national coordinator of the Data Mining sector of the CNR ICT Department. F. G. has been nominated by the president of CNR as the national coordinator of the area “*Data Mining and Semantic Web*” of the ICT department of CNR, with responsibility of harmonizing the activities of 12 labs of 9 different CNR institutes all over Italy involving 90 permanent researchers and 120 early-stage researchers. The goal was to create a network of CNR researchers on the topic of knowledge and data engineering and promote their results and potential applications towards industry and the public administration. Her duties involved dissemination actions, proposal preparation, definition of strategic lines of research at national level, harmonization with European policies, hearings with funding agencies.

11. HUMAN RESOURCES MANAGEMENT

F.G. has managed KDD Lab since its creation in 1995, being responsible for the selection and management of temporary and permanent staff at CNR. Considering alumni and current personnel, KDD Lab has had more than 300 members in its life-span, with more than 40 current members, with a wide variety and dynamics of early stage personnel: stagiaires, Master and PhD candidates, foreign visitors, post-docs. This experience brought F.G. to reach a deep knowledge of CNR administration and regulations for human resources and funds management.

F.G. has supervised many Master and PhD theses, also acting as a mentor for their career.

11.1 Supervised PhD theses

1. Giuseppe Manco *Foundations of a Logic-Based Framework for Intelligent Data Analysis*. 2001 Dottorato di Ricerca in Ingegneria dell'Informazione, Univ. Pisa
2. Francesco Bonchi *Frequent Pattern Mining: Languages and Optimizations*. 2003 Dottorato di Ricerca in Ingegneria dell'Informazione, Univ. Pisa
3. Analisa Di Deo *Object-oriented Constraint Databases: Application to Spatial and Temporal Domains*. 2002 GMD-First Berlin Germany, Berlin
4. Fabio Pinelli, *Mobility Data Mining*. 2010 Dottorato di Ricerca in Ing. dell'Informazione, Univ. Pisa
5. Michele Berlingerio *Graph and Network Data: Mining the Temporal Dimension*. 2010 Phd IMT School for Advanced Studies Lucca – Lucca
6. Roberto Trasarti *Mastering the Spatio-temporal Knowledge Discovery Process*. 2010, Phd in Computer Science, Univ. Pisa
7. Anna Monreale *Privacy-By-Design in Data Mining*. 2011, Phd in Informatica, Univ. Pisa
8. Michele Coscia *Multidimensional Network Analysis*, 2012, Phd in Informatica, Univ. Pisa
9. Diego Pennacchioli, *Big data, complex networks and market*, 2014 Phd IMT School for Advanced

Studies Lucca – Lucca

10. Luca Pappalardo *Human Mobility, Social Networks and Economic Development: a Data Science perspective, 2014*, Phd in Computer Science, Univ. Pisa
11. Giulio Rossetti, *Social Network Dynamics, 2015*, Phd in Computer Science, Univ. Pisa
12. Guidotti Riccardo, *Personal Data Analytics*, June 2017, Phd in Computer Science, Univ. Pisa
13. Francesca Pratesi, *Privacy Risk Assessment in Big Data Analytics and User-Centric Data Ecosystems, September 2017*, Phd in Computer Science, Univ. Pisa
14. Letizia Milli, *Understanding spreading and evolution in complex network, March 2018*, Phd in Computer Science, Univ. Pisa
15. Lorenzo Gabrielli, *Towards Big Data Methods and Technologies for Official Statistics*, March 2018, Dottorato di Ricerca in Ingegneria dell'Informazione, Univ. Pisa
16. Joanna Milieu, *Big Data Analytics for Nowcasting and Forecasting Social Phenomena*, to be discussed in September 2018, Phd in Computer Science, Univ. Pisa
17. Laura Pollacci, *New superdiversity: at a crossroads of geography, language and emotions*. To be delivered in September 2018, Phd in Computer Science, Univ. Pisa
18. Voukelatou Vasiliki, *Sensing subjective well-being*, ongoing, Phd in Data Science SNS, Pisa
19. Kim Jisu, *Complex patterns in globalization flows: international migration and trade*, ongoing, Phd in Data Science SNS, Pisa.

11.2 Mentoring

Among the PhD candidates and post-docs that F.G. has supervised, Mirco Nanni and Roberto Trasarti are senior researchers at CNR in Pisa, Francesco Bonchi is a researcher at ISI Foundation Turin, Giuseppe Manco is a senior researcher at CNR in Cosenza, Italy, Maurizio Atzori is an associate professor at University of Cagliari, Laura Spinsanti is a Marketing data analyst at Swatch, Ticino CH, Michele Berlingiero and Fabio Pinelli are researchers into Industrial R&D labs (IBM Dublin and Vodafone respectively) Michele Coscia is an assistant professor at IT University of Copenhagen DK, Anna Monreale and Riccardo Guidotti are researchers at University of Pisa. Letizia Milli, Francesca Pratesi e Ioanna Miliou are post docs at University of Pisa within the Tuscany regional extension of SoBigData.

12. LANGUAGE

F.G. has an excellent knowledge of spoken and written English, also thanks to more than three years spent in the US as a visiting scientist.

13. EVALUATION OF RESEARCH

1. Member of *Sinergia* evaluation commission of SNSF Swiss National Science Foundation, CH (2019-2023)
2. Member of scientific advisory board of TU/e – Eindhoven University of Technology, NL (since October 2019).
3. Member of Assessment Committee of CS Department at TU Eindhoven, NL. Nov. 2018
4. External Advisory Board del Centro SmartData@Polito, Politecnico di Torino (since 2018)
5. Member of the International Evaluation Panel of INRIA (France) for Theme “Data and Knowledge Representation and Processing”: 2015 (Panel chair) and 2011.
6. Member of selection panel for a new senior lecturer (associate professor) in Database Technology at Department of Information Technology at Uppsala University 2016
7. Member of selection panel for associate professorship in "Computer Security" offered by Universitat Rovira i Virgili in Database Technology at Department of Information Technology Jan-Feb 2017.
8. Member of the evaluation panel of the calls ICT-12 and ICT-13 on Big Data, H2020 framework (2018), and two more FP7 calls in 2008 and 2011.

[Personal Data Treatment](#) Autorizzo il trattamento dei dati personali contenuti nel mio curriculum vitae in base art. 13 del D. Lgs. 196/2003