Annual Research Report 2022

Department of Computer Science, University of Pisa

September 2023

Preface

This report summarizes the main research activities and achievements at the Computer Science Department of the University of Pisa in 2022. Specifically, after a short introduction to the Department, we list: (*i*) the funded projects active in 2022 that were managed by the Department; (*ii*) the editorships of journals or special issues pursued by members of the Department; (*iii*) the scientific associations and societies that involved members of the Department in their managing boards; (*iv*) the scientific events involving members of the Department in 2022; (*v*) the new research positions that have been opened in 2022 with their specific themes; (*vi*) the description of the two PhD schools managed by the Department in 2022, and of a PhD participated by the Department; (*vii*) the visiting fellows that were welcome in 2022; and finally (*viii*) information on the scientific publications having members of the Department as co-authors in the same year.

All of this testifies the relevant activity and the extensive scientific results that were achieved by the community of researchers of the Computer Science Department in 2022. As shown in this report, such a community has been enhanced in the considered year via the opening of several young researcher and PhD student positions, as well as of new faculty positions. Together with the exchange opportunities of the visiting fellows, which have shown an increase in 2022 with respect to 2021, where they were limited due to the consequences of the Covid-19 pandemic disease, this emphasizes the great attention of the Department towards research activities and their enhancements, as well as its wide network of scientific collaborations.

1 The Department

During the academic year 1969/1970, the University of Pisa activated a graduation program in Computer Science, named *Corso di Laurea in Scienze dell'Informazione*, the first one in Italy and one of the very first ones in Europe. Simultaneously, the Computer Science Institute ISI (*Istituto di Scienze dell'Informazione* in Italian) of the University of Pisa was founded, collecting the designers of the Calcolatrice Elettronica Pisana (CEP) together with several researchers coming from other universities, mostly with engineering and mathematics background, all characterized by a great interest and passion towards the Computer Science themes and challenges. This Institute is the ancestor of the current Computer Science Department.

Starting from the scientific results achieved in those pioneering years, the research activities of the Computer Science Department have been continuously enhanced and evolved, spanning now across all the sectors of the Computer Science discipline (INF/01) as well as to areas of applied mathematics. Specifically, since 2012 all the faculties of the University of Pisa in the area of Operations Research (MAT/09) are now with the Computer Science Department, as well as several researchers in Numerical Analysis (MAT/08).

Within the above mentioned scientific sectors, at the beginning of 2022 the composition of the Department was as follows:

- 21 Full Professors (17 INF/01, 1 MAT/08 and 3 MAT/09)
- 27 Associate Professors (21 INF/01, 2 MAT/08 and 4 MAT/09)

- 3 Assistant Professors (RTI)(3 INF/01)
- 11 Temporary Assistant Professors (RTD) (11 INF/01):
  - 6 RTD-A (6 INF/01)
  - 5 RTD-B (5 INF/01)

On the other hand, at the end of 2022 the Department was composed of:

- 21 Full Professors (17 INF/01, 1 MAT/08 and 3 MAT/09)
- 27 Associate Professors (21 INF/01, 2 MAT/08, 3 MAT/09 and 1 SECS-P/07)
- 3 Assistant Professors (RTI)(3 INF/01)
- 17 Temporary Assistant Professors (RTD) (16 INF/01 and 1 MAT/09):
  - 10 RTD-A (9 INF/01 and 1 MAT/09)
  - 7 RTD-B (7 INF/01)

In particular, one INF/01 Full Professor and one INF/01 Associate Professor retired in November 2022. Moreover:

- one INF/01 Associate Professor upgraded to Full Professor;
- two INF/01 RTD-B upgraded to Associate Professors;
- one SECS-P/07 Associate Professor was recruited via an exchange with a MAT/09 Associate Professor of the Computer Science Department of the University of Pisa (since September 1, 2022);
- there were three new entries as RTD-B;
- there were seven new entries as RTD-A.

2 Research projects in 2022

The researchers of the Department have been involved in several projects, both at international, national and regional level. We report here the list of the projects funded after an open competitive call, with funds that have been, or will be, managed by the Department, and that were active in 2022. We classify them according to their typology of funding.

We also list projects funded by private companies, hence without an open call, but rather a direct contract with a Principal Investigator (PI) affiliated with the Department, as well as Research Agreements, Collaborations and Prizes characterized by a related budget. Data of this section are taken from the research office of the Department, integrated with information from PIs when needed.

In all of the tables below, with the exception of the table related to the PNRR projects, the BUDGET column indicates the fraction of the total budget of the project (that is, for the whole duration, not just during year 2022) that has been assigned to our Department. On the other hand, the BUDGET column for the PNRR projects refers to the budget assigned to the University of Pisa for each of the listed projects.

2.1 International projects

NAME	PI UNIPI	PROGRAMME	ROLE UNIPI	DURATION	BUDGET
HELIOS	Ricci	UE - H2020	partner	01/19 - 02/22	€ 411.903,75
XAI	Pedreschi	UE - ERC	partner	10/19 - 09/25	€ 1.022.000,00
HumMingBird	Sirbu	UE - H2020	partner	12/19 - 05/24	€ 159.312,50
TEACHING	Bacciu	UE - H2020	coordinator	01/20 - 06/23	€ 657.371,25
NoBIAS	Ruggieri	UE - H2020	partner	01/20 - 12/23	€ 522.999,36
SoBigData++	Pedreschi	UE - H2020	partner	01/20 - 12/24	€ 580.735,00
Humane AI-NET	Pedreschi	UE - H2020	partner	09/20 - 08/24	€ 140.000,00
TAILOR	Bacciu	UE - H2020	partner	09/20 - 08/24	€ 103.437,50
SMS++4OuU	Frangioni	PGMO	coordinator	10/20 - 08/24	€ 50.000,00
PLANET4	Mazzei	UE - EPLUS	coordinator	11/20 - 10/23	€ 199.594,00
ME-MIND	Ferrari	UE - CREA2020	partner	01/21 - 10/22	€ 62.505,12
ALPACA	Pisanti	UE - H2020	partner	01/21 - 12/24	€ 261.499,68
SAI	Pedreschi	UE - CHISTERA	partner	01/21 - 06/24	€ 45.937,50
ADMIRE	Torquati	UE - H2020	third part of CINI	04/21 - 03/24	€ 98.750,00
TEXTAROSSA	Danelutto	UE - H2020	third part of CINI	04/21 - 03/24	€ 28.560,00
SMS++M2EO	Frangioni	PGMO	coordinator	09/21 - 08/23	€ 25.000,00
EUPEX	Torquati	UE - H2020	third part of CINI	01/22 - 12/25	€ 135.875,00
EUMASTER4HPC	Danelutto	UE - H2020	third part of CINI	01/22 - 12/25	€ 29.556,25
ACCORDION	Dazzi	UE - H2020	third part of CNR	06/22 - 04/23	€ 80.000,00
AInCP	Prencipe	UE - HE	co-coordinator	06/22 - 05/27	€ 693.750,00
EMERGE	Bacciu	UE - HE	coordinator	10/22 - 09/26	€ 1.046.551,00
SoBigData RI PPP	Pedreschi	UE - HE	partner	10/22 - 09/25	€ 98.777,50
FINDHR	Ruggieri	UE - HE	partner	11/22 - 10/25	€ 360.250,00

2.2 National projects

CALL	PI UNIPI	DURATION	BUDGET
PRIN	Bonchi	08/19 - 08/23	€ 159.600,00
PRIN	Ferragina	08/19 - 08/23	€ 108.217,00
PRIN	Gadducci	08/19 - 08/23	€ 128.000,00
PRIN	Grossi	08/19 - 08/23	€ 76.385,00
PRIN	Venturini	08/19 - 08/23	€ 136.305,00

2.3 PNRR projects

TYPOLOGY	STAFF COMPUTER SCIENCE DEPT.	DURATION	BUDGET UNIPI
CN1-SPOKE 1	Danelutto (PI), Cisternino, Ferragina Gemignani, Manzini, Mencagli, Torquati	09/2022 - 08/25	€ 3.324.013,00
CN1-SPOKE 6	Poloni	09/2022 - 08/25	€ 3.324.013,00
CN1-SPOKE 10	Bernasconi, Bonchi, Del Corso, Gadducci	09/2022 - 08/25	€ 3.324.013,00
CN2-SPOKE 5	Gallicchio	09/2022 - 08/25	€ 3.875.752
CN2-SPOKE 9	Chessa	09/2022 - 08/25	€ 3.875.752
CN4-SPOKE 10	Scutellà (WP leader)	09/2022 - 08/25	€ 6.593.032,01
THE-SPOKE 3	Prencipe (PI), Bacciu, Ferragina Gervasi, Priami, Sirbu	12/2022 - 11/25	€ 17.662.130,40
THE-SPOKE 5	Mastroeni (WP leader)	12/2022 - 11/25	€ 17.662.130,40
THE-SPOKE 6	Pisanti (PI), Gori, Grossi, Micheli Milazzo, Manzini, Rosone, Venturini	12/2022 - 11/25	€ 17.662.130,40
IR-SOBIGDATA	Monreale (PI)	11/2022 - 04/25	€ 1.439.800
PE2-SPOKE 8	Frangioni	12/2022 - 11/25	€ 7.172.469,44

2.4 Regional projects

NAME	PI UNIPI	CALL	DURATION	BUDGET
BRAID	Micheli	RICERCA-SALUTE 2018	09/20 - 09/24	€ 158.566,31
I-POTERI	Prencipe	POR	01/21 - 01/23	€ 105.285,38
MYBREATHINGHEART	Gervasi	Regionale covid	02/21 - 02/24	€ 72.000,00
OPTIMISED	Bacciu	Regionale Covid	02/21 - 02/24	€ 21.227,37
CLMs4BPO	Passaro	5g-FSC	12/22 - 11/23	€ 28.000,00

2.5 University projects

COORDINATOR	CALL	DURATION	BUDGET
Pisanti	PRA 2020	up to 08/22	€ 59.855,61
Poloni	PRA 2020	up to 08/22	€ 56.925,00
Bacciu	BIHO 2019	up to 08/22	€ 75.000,00
Brogi	BIHO 2020	up to 12/21	€ 50.000,00
Monreale	BIHO 2020	up to 12/21	€ 50.000,00
Venturini	BIHO 2021	up to 12/22	€ 30.000
Brogi	PRA 2022	up to 12/24	€ 52.770,00
Prencipe	PRA 2022	up to 12/24	€ 39.700,00
Gadducci	PRA 2022	up to 12/24	€ 33.620,00
Bacciu	BIHO 2022 AZ. 2	up to 12/24	€ 50.000,00
Bacciu	BIHO 2022 AZ. 3	up to 12/24	€ 75.000,00

2.6 Industrial projects

PI UNIPI	INDUSTRY PARTNER	DURATION	BUDGET
Ferragina	European Broadcasting Union	02/2020 - 07/2023	€ 180.000,00
Priami	GSK	09/2020 - 06/2024	€ 196.000,00
Ferragina	Sadas srl	04/2021 - 04/2022	€ 47.520,00
Ruggieri	Sadas srl	04/2021 - 02/2022	€ 24.000,00
Priami	Chiesi	05/2021 - 09/2024	€ 155.000,00
Lomonaco	Seavision	10/2021 - 12/2022	€ 30.000,00
Micheli	Fosber	12/2021 - 12/2022	€ 30.000,00
Monreale	Co.Svi.G	06/2022 - 11/2022	€ 8.000,00
Frangioni	MAIOR	02/2022 - 12/2024	€ 60.000,00
Micheli	MAIOR	09/2022 - 09/2023	€ 6.000,00
Ferragina	Sadas srl	05/2022 - 09/2023	€ 47.520,00

2.7 Research Agreements/Collaborations/Prizes

PI UNIPI	ENTITY - PARTNER	DURATION	BUDGET
Di Francesco Maesa	Foundation Ethereum	since 07/2022	$ 24.000,00
Lomonaco	META	since 08/2022	$ 50.000,00
Dazzi	ISTI-CNR	09/2022 - 09/2025	€ 27.000,00
Venturini	ISTI-CNR	12/2022 - 12/2023	€ 15.000,00

3 Editorships of journals

We list here the editorial boards and the special issues of journals that involved members of the Department in 2022. This section is edited with data collected via a direct communication with the researchers.

3.1 Editorial Boards

In 2022, the members of the Department joined the editorial board, or were an area editor, an associate editor or an academic editor, of the following journals.

Bacciu Senior Editor of *IEEE Transactions on Neural Networks and Learning Systems* by IEEE (since 2022)

Electronic ISSN: 2162-2388, Print ISSN: 2162-237X,

https://cis.ieee.org/publications/t-neural-networks-and-learning-systems

Bigi Associate Editor of *INFORMS Journal of Computing* by INFORMS (since 2021)

ISSN: 1091-9856,

https://pubsonline.informs.org/journal/ijoc

Electronic ISSN 1572-8153,

https://www.springer.com/journal/11036

Brogi Associate Editor of *IEEE Transactions on Cloud Computing* by IEEE (since 2019)

Electronic ISSN: 2168-7161,

https://www.computer.org/csdl/journal/cc

Brogi Editorial Board Member of *Journal of Computer Languages* by Elsevier (since 2019)

ISSN: 2590-1184,

https://www.journals.elsevier.com/journal-of-computer-languages

Brogi Editorial Board Member of *Electronics* by MDPI (since 2020)

EISSN: 2079-9292,

https://www.mdpi.com/journal/electronics

Ferragina Editorial Board Member of *Journal of Graph Algorithms and Applications* by Brown University (since 2011)

ISSN: 1526-1719,

https://jgaa.info/

Ferragina Editorial Board Member of *Encyclopedia of Algorithms* by Springer (since 2008)

ISSN: 978-0-387-36061-4,

https://link.springer.com/referencework/10.1007/978-0-387-30162-4

Ferragina Editorial Board Member of *Encyclopedia of Big Data Technologies* by Springer (since 2019)

ISSN: 978-3-319-77525-8,

https://link.springer.com/referencework/10.1007/978-3-319-77525-8

Forti Academic Editor of *PLOS ONE* by Plos (since 2022)

ISSN: 1932-6203,

https://journals.plos.org/plosone/

Forti Associate Editor of *ACM SIGSOFT Software Engineering Notes* by ACM (since 2022)

ISSN: 0163-5948,

https://www.sigsoft.org/SEN/

Frangioni Area "Design and Analysis of Algorithms - Continuous" Editor of *Journal on Computing* by INFORMS (since 2019)

ISSN: 1091-9856,

https://pubsonline.informs.org/journal/ijoc

Frangioni Associate Editor of *4OR - A Quarterly Journal of Operations Research* by Springer (since 2015)

ISSN: 1619-4500,

http://www.4or.be

Frangioni Associate Editor of *Open Journal of Mathematical Optimization* by Centre Marsenne (since 2019)

ISSN: 2777-5860

https://ojmo.centre-mersenne.org

Frangioni Associate Editor of *INFOR: Information Systems and Operational Research* by Taylor & Francis (since 2008)

ISSN: 0315-5986, e-ISSN: 1916-0615

https://www.tandfonline.com/journals/tinf20

Gallicchio Associate Editor of *Intelligenza Artificiale* by IOSPress (since 2022)

ISSN: 1724-8035,

https://www.iospress.com/catalog/journals/intelligenza-artificiale

Gallicchio Associate Editor of *Transactions on Neural Networks and Learning Systems* by IEEE (since 2022)

ISSN: 2162-237X,

https://cis.ieee.org/publications/t-neural-networks-and-learning-systems

Gemignani Editorial Board Member of *Mathematics* by MDPI (since 2020)

ISSN: 2227-7390,

https://www.mdpi.com/journal/mathematics

Gervasi Editorial Board Member of *Expert Systems: The Journal of Knowledge Engineering* by Wiley (since 2006)

ISSN: 1468-0394,

https://onlinelibrary.wiley.com/journal/14680394

Grossi Editorial Board Member of *Theory of Computing Systems* by Springer (since 2009)

Print ISSN: 1432-4350

Electronic ISSN: 1433-0490,

https://www.springer.com/journal/224

Guidi Academic Editor of *PLOS ONE* by Plos (since 2020)

ISSN:1932-6203,

https://journals.plos.org/plosone/

Guidi Associate Editor of *Communications* by SciencePG (since 2020)

ISSN:2328-5923,

http://www.sciencepublishinggroup.com/journal/index?journalid=139

Guidi Associate Editor of *IEEE Access* (since 2022)

Print ISSN: 2169-3536

https://ieeeaccess.ieee.org/

Guidi Associate Editor of *IET Networks* by the Institution of Engineering and Technology (since 2021)

Online ISSN: 2047-4962, Print ISSN: 2047-4954

https://digital-library.theiet.org/content/journals/iet-net

Guidi Academic Editor of *Wireless Communications and Mobile Computing* by Hindawi (since 2021)

ISSN: 1530-8669 (Print), ISSN: 1530-8677 (Online)

https://www.hindawi.com/journals/wcmc/

Guidotti Editorial Board Member of *Data Mining and Knowledge Discovery* by Springer (since 2022)

Print ISSN: 1384-5810

Electronic ISSN: 1573-756X,

https://www.springer.com/journal/10618/

Malizia Associate editor of *ACM Ubiquity* by ACM (since 2019)

ISSN: 1530-2180,

https://ubiquity.acm.org/

Malizia Editorial Board Member of *Interacting with Computers* by Oxford Academic (since 2021)

ISSN: 0953-5438,

https://academic.oup.com/iwc

Mencagli Editorial Board Member of *Future Generation Computer Systems* by Elsevier (since 2019)

ISSN: 0167-739X,

https://www.sciencedirect.com/journal/future-generation-computer-systems

Mencagli Editorial Board Member of *Cluster Computing* by Springer (since 2019)

ISSN: 1386-7857,

https://www.springer.com/journal/10586

Micheli Associate Editor of *Transactions on Neural Networks and Learning Systems* by IEEE (since 2019)

ISSN: 2162-237X,

https://cis.ieee.org/publications/t-neural-networks-and-learning-systems

Micheli Editorial Board Member of *Intelligenza Artificiale* by IOS Press (since 2015)

ISSN: 1724-8035

ISSN: print 1724-8035,

http://www.iospress.nl/journal/intelligenza-artificiale/

Michienzi Editorial Board Member of *Journal of Computer Science* by (since 2022)

Print ISSN: 1549-3636

Electronic ISSN: 1552-6607,

https://www.thescipub.com/jcs

Michienzi Academic Editor of *Security and Communication Networks* by Hindawi (since 2022)

Print ISSN: 1939-0114

Electronic ISSN: 1939-0122,

https://www.hindawi.com/journals/scn/

Monreale Editorial Board Member of *Transactions on Data Privacy* by University of Skovde (since 2013)

ISSN: 1888-5063

ISSN electronic: 2013-1631,

http://www.tdp.cat

Monreale Editorial Board Member of *Intelligent Information Systems: Integrating Artificial Intelligence and Database Technologies* by Springer (since 2019)

ISSN electronic: 1573-7675

ISSN print: 0925-9902,

https://www.springer.com/journal/10844

Paganelli Associate Editor of *IEEE Transactions on Network and Service Management* by IEEE (since 2019)

ISSN: 1932-4537,

https://www.comsoc.org/publications/journals/ieee-tnsm

Paganelli Associate Editor of *Future Internet* by MDPI (since 2016)

ISSN: 1999-5903,

https://www.mdpi.com/journal/futureinternet

Paganelli Associate Editor of *Telecom* by MDPI (since 2020)

ISSN: 2673-4001,

https://www.mdpi.com/journal/telecom

Pappalardo Editorial Board Member of *Minimax theory and its applications* by Heldermann (since 2016)

ISSN: 2199-1413 (printed edition), 2199-1421 (electronic edition)

https://www.heldermann.de/MTA/mtacover.htm

Passacantando Editorial Board Member of *Mathematics* by MDPI (since 2021)

ISSN: 2227-7390

https://www.mdpi.com/journal/mathematics

Passaro Editorial Board Member of *IJCoL · Italian Journal of Computational Linguistics* by Accademia University Press (since 2022)

EISSN: 2499-4553

https://journals.openedition.org/ijcol/

Pisanti Editorial Board Member of *International Journal of Computer Science and Application* by Science and Engineering Publishing Company USA (since 2012)

ISSN: 2324-7134,

https://www.destechpub.com/product/ijcsa/

Pisanti Editorial Board Member of *Network Modeling Analysis in Health Informatics and Bioinformatics* by Springer (since 2017)

ISSN: 21926662, Online: 21926670,

https://www.springer.com/journal/13721

Poloni Editorial Board Member of *Linear and Multilinear Algebra* by Taylor & Francis (since 2020)

Print ISSN: 0308-1087 Online ISSN: 1563-5139,

https://www.tandfonline.com/action/journalInformation?journalCode=glma20

Poloni Editorial Board Member of *Stochastic Models* by Taylor & Francis (since 2020)

Print ISSN: 1532-6349 Online ISSN: 1532-4214,

https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=lstm20

Prencipe Editorial Board Member of *Electronics* by MDPI, Section Board for Computer Science & Engineering (since 2019)

ISSN: 2079-9292,

https://www.mdpi.com/journal/electronics/sectioneditors/computer_science_engineering

Ricci Editor Board Member of *ACM Distributed Ledger Technologies* by ACM (since 2021)

ISSN 2096-7209,

https://dl.acm.org/journal/dlt

Ricci Associate Editor of *Blockchain: Research and Applications* by Elsevier (since 2020)

ISSN 2098-7300,

https://www.journals.elsevier.com/blockchain-research-and-applications

Ricci Section Editor of *Innovation in Blockchain and Distributed Ledgers*, SN in Computer Science by Springer (since 2020)

ISSN 0967-0912

https://www.springer.com/journal/42979/updates/17470758

Ruggieri Editorial Board Member of *Intelligenza Artificiale*, by IOS Press (since 2016)

ISSN 1724-8035

https://www.iospress.com/catalog/journals/intelligenza-artificiale

Scutellà Associate Editor of *Networks* by Wiley (since 2013)

Online ISSN:1097-0037,

https://onlinelibrary.wiley.com/journal/10970037

Scutellà Editorial Advisory Board Member of *Computers & Operations Research* by Elsevier (since 2004)

ISSN: 0305-0548,

http://www.journals.elsevier.com/computers-and-operations-research/

Sirbu Editorial Board Member of *Journal of Data Science and Analytics* by Springer (since 2022)

Electronic ISSN: 2364-4168, Print ISSN: 2364-415X,

https://www.springer.com/journal/41060

Soldani Editor-in-Chief of *ACM SIGSOFT Software Engineering Notes* by ACM (since 2022)

ISSN: 0163-5948,

https://www.sigsoft.org/SEN/

Soldani Associate Editor of *Frontiers in Computer Science* by Frontiers Media S.A. (since 2022)

ISSN: 2424-9898,

https://www.frontiersin.org/journals/computer-science

Soldani Academic Editor of *PLOS ONE* by Plos (since 2019)

ISSN: 1932-6203,

https://journals.plos.org/plosone/

Soldani Editorial Board Member of *Mathematics and Computer Science* by SciencePG (since 2020)

ISSN: 2575-6028,

http://www.sciencepublishinggroup.com/j/mcs

Soldani Associate Editor of *Journal of Systems and Software* by Elsevier (since 2022)

ISSN: 0164-1212,

https://www.journals.elsevier.com/journal-of-systems-and-software

3.2 Guest editorship of special issues

The members of the Department managed as guest editors the following special issues, which were published in 2022 or have a call which is still open.

This section is edited with data collected via a direct communication with the researchers.

Bacciu Special Issue of *Transactions on Neural Networks and Learning Systems*, IEEE, "Causal Discovery and Causality-Inspired Machine Learning", opened in 2021 and closed in February 2022.

ISSN: 2162-237X,

https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=5962385

Bacciu Special Issue of *Transactions on Neural Networks and Learning Systems*, IEEE, "Deep Learning: When and How?", opened in 2022 and closing in April 2023.

ISSN: 2162-237X,

https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=5962385

Di Francesco Maesa Special Issue of *Blockchain: Research and Applications*, Elsevier, "Blockchain: protocols, applications, and Transaction analysis", opened in 2021 and published in 2022.

https://www.sciencedirect.com/journal/blockchain-research-and-applications/special-issue/10L8LLK3VVH

ISSN: 2096-7209,

Di Francesco Maesa Special Issue of *ACM Distributed Ledgers Technologies: Research and Practice*, ACM, "Blockchain-based Pervasive Systems: Theory, Applications, and Challenges", opened in 2022 and closing in April 2023

https://dl.acm.org/journal/dlt/calls-for-papers

Forti Special issue of *MDPI*, "Future Internet", opened in 2021 and published in 2022.

ISSN:1999-5903,

https://www.mdpi.com/journal/futureinternet

Gadducci Special issue of *Theoretical Computer Science*, Elsevier, "Theoretical Topics in Graph Transformation", opened in 2020 and closed in 2021.

ISSN:0304-3975,

https://www.sciencedirect.com/journal/theoretical-computer-science/special-issue/10N3TH4CHW7

Gadducci Special issue of *Science of Computer Programming*, Elsevier, "Application-oriented aspects of Graph Transformation", opened in 2020 and closed in 2021.

ISSN:0167-6423,

https://www.sciencedirect.com/journal/science-of-computer-programming/special-issue/10LWN9PLMWJ

Gadducci Special issue of *Journal of Logical & Algebraic Methods in Programming*, Elsevier, "Specification and Modelling of Computing Systems through Graphs and Graph Transformation", opened in 2021 and closed in 2022.

ISSN:0743-1066 (print) 1873-5789 (online),

Gadducci Special issue of *Logical Methods in Computer Science*, Episcience, "Selected Papers of the 9th Conference on Algebra and Coalgebra in Computer Science (CALCO 2021)", opened in 2021 and closed in 2022.

ISSN:1860-5974,

Gallicchio Special issue of *Transactions on Neural Networks and Learning Systems*, IEEE, "New Frontiers in Extremely Efficient Reservoir Computing", opened in 2020 and closed in 2022.

ISSN:2162-237X,

https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=5962385

Guidi Special issue of *IET Networks*, Wiley, "Blockchain and Decentralized Solutions for Social Good", opened in 2021 and closed in March 2022.

ISSN: 2047-4962

https://ietresearch.onlinelibrary.wiley.com/pb-assets/assets/20474962/Special%20Issues/IET_NET_CFP_BDSSG-1658243941623.pdf

Guidi Special issue of *MDPI Sensors*, MDPI, "Social Media Sensing: Methodologies and Applications", opened in June 2022 and closing in February 2023.

ISSN:1424-8220

https://www.mdpi.com/journal/sensors/special_issues/Social_Media_Sensing

Guidi Special issue of *Multimedia Tools and Applications*, Springer, "Information Technology for Social Good - Selected papers of GoodIT 2021", opened in 2021 and closed in November 2022.

Electronic ISSN: 1573-7721

http://www.grc.upv.es/goodit2021/figs/MTAPSpecialIssueGoodIT.PDF

Guidi Special issue of *Sensors*, MDPI, "Advances in Blockchain Challenges and Opportunities", opened in December 2022 and closing in August 2023.

ISSN:1424-8220,

https://www.mdpi.com/journal/sensors/special$_issues/0E9R83J7XJ$

Guidi Special issue of *Sustainability*, MDPI, "Mobile Networks and Sustainable Applications", opened in 2020 and closing in 2021.

ISSN:2071-1050,

https://www.mdpi.com/journal/sustainability/special_issues/Mobile_Networks_Sustainable_Applications

Micheli Special issue of *Transactions on Neural Networks and Learning Systems*, IEEE, "New Frontiers in Extremely Efficient Reservoir Computing", opened in 2020 and closed in 2022.

ISSN:2162-237X

https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=5962385

Micheli Special issue of *Transactions on Neural Networks and Learning Systems*, IEEE, "Deep Neural Networks for Graphs: Theory, Models, Algorithms and Applications", opened in 2021 and closing in 2023.

ISSN:2162-237X

https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=5962385

Michienzi Special issue of *IET Networks*, Wiley, "Blockchain and Decentralized Solutions for Social Good", opened in 2021 and closed in March 2022.

Online ISSN:2047-4962

https://ietresearch.onlinelibrary.wiley.com/journal/20474962

Michienzi Special issue of *MDPI Sensors*, MDPI, "Social Media Sensing: Methodologies and Applications", opened in June 2022 and closing in February 2023.

ISSN:1424-8220

https://www.mdpi.com/journal/sensors/special_issues/Social_Media_Sensing

Pappalardo Special issue of *Journal of Optimization Theory and Applications*, Springer, "Optimization, Variational Analysis and Applications", opened in 2021 and closed in 2022. Volume 193, issues 1-3.

ISSN:00223239

https://link.springer.com/journal/10957/volumes-and-issues/193-1

Ricci Special Issue of *Blockchain: Research and Applications*, Elsevier, "Blockchain: protocols, applications, and Transaction analysis", opened in 2021 and published in 2022.

ISSN: 2096-7209,

https://www.sciencedirect.com/journal/blockchain-research-and-applications/special-issue/10L8LLK3VVH

Ricci Special Issue of *ACM Distributed Ledgers Technologies: Research and Practice*, ACM, "Blockchain-based Pervasive Systems: Theory, Applications, and Challenges", opened in 2022 and closing in April 2023

https://dl.acm.org/journal/dlt/calls-for-papers

Ruggieri Special Issue of *ACM SIGKDD Explorations*, ACM, "Special Section on Bias and Fairness in AI", opened in 2020 and closed in 2021.

ISSN: 1931- 0145,

https://dl.acm.org/doi/10.1145/3468507.3468509

Ruggieri Special Issue of *Elsevier Data Mining and Knowledge Discovery journal*, Elsevier, on "Bias and Fairness in AI", opened in 2021 and closing in 2023.

ISSN: 1384-5810 (Print), 1573-756X (Online),

https://link.springer.com/journal/10618/topicalCollection/AC_a1fcffade3e6523787edc3a6f15017ae

Soldani Special issue of *Future Internet*, MDPI, "Service-Oriented Systems and Applications", opened in 2021 and published in 2022.

ISSN:1999-5903

https://www.mdpi.com/journal/futureinternet

Torquati Special issue of *MICPRO*, Elsevier, "The 29th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing", opened in 2021 and closed in 2022.

ISSN:0141-9331

https://www.sciencedirect.com/journal/microprocessors-and-microsystems/special-issue/107KTCLLCCC

Torquati Special issue of *Journal of Supercomputing*, Springer, "Parallel, Distributed, and Network-Based Processing", opened in 2022 and closed in 2023.

https://link.springer.com/collections/ijgdajhfff

4 Managing Boards of Scientific Associations and Societies

We list here the scientific associations and societies that involved members of the Department, in their managing boards, in 2022. This section is edited with data collected via a direct communication with the researchers.

Bacciu Associazione Italiana per l'Intelligenza Artificiale (Vice-president, since 2015)

https://aixia.it/organizzazione/

Bacciu IEEE Technical Committee on Neural Networks (Vice-chair, since 2021)

https://cis.ieee.org/activities/technical-activities/neural-networks-technical-committee/30-technical-committees/132-neural-networks-members

Bacciu IEEE Task Force on Learning for Structured Data (Chair, since 2020)

www.learning4graphs.org

Bigi EUROPT (Chair, since 2018)

https://www.euro-online.org/websites/continuous-optimization/

Gadducci AICA Associazione Italiana per l'Informatica e il Calcolo Automatico (Comitato Direttivo, since 2021)

https://www.aicanet.it/

Gadducci GRIN Gruppo di Informatica (Chair, since 2020)

http://www.grin-informatica.it/opencms/opencms/grin

Gadducci IFIP Working Group 1.3 "Foundations of System Specification" (Chair, since 2022)

http://ifipwg13.cs.ovgu.de/

Gallicchio IEEE Task Force on Reservoir Computing (TFRC) (Co-chair and co-founder, since 2018)

https://sites.google.com/view/reservoir-computing-tf

Gallicchio IEEE Task Force on Randomization-Based Neural Networks and Learning Systems (RandNN) (Vice-chair and co-founder, since 2021)

https://sites.google.com/view/randnn-tf

Micheli European Neural Network Society (Executive committee, since 2020)

https://e-nns.org/current-enns-executive-committee/

Micheli IEEE Task Force on Reservoir Computing (TFRC) (Co-chair and co-founder, since 2018)

https://sites.google.com/view/reservoir-computing-tf

Micheli AIxIA MLDM (Machine Learning and Data Mining) group (National coordinator, since 2014)

https://aixia.it/en/gruppi/mldm/

Micheli AIIS - CINI National Lab (Artificial Intelligence and Intelligent Systems) (Director of Pisa group, since 2021)

https://www.consorzio-cini.it/index.php/it/artificial-intelligence-and-intelligent-systems

Priami Fondazione The Microsoft Research - University of Trento Centre of Computational and Systems Biology (Advisory board, since 2020)

https://www.cosbi.eu

Priami Digital Health - CINI National Lab (Advisory board, since 2021)

https://www.consorzio-cini.it/index.php/it/laboratori-nazionali/digital-health

Ricci IEEE TEMS TC on Blockchain and Distributed Ledger Technologies (Founding member)

https://www.ieee-tems.org/tc-blockchain-dlt/

5 Scientific events

Here we report the list of the scientific events, such as conferences, workshops and PhD schools, that took place in 2022 and involved members of the Department in their scientific and/or technical organization. The events are classified according to the role of the involved researchers. This section is based on data taken from the url:
https://ricerca.di.unipi.it/workshops-and-conferences/
combined with data obtained via personal communications with the researchers.

5.1 Chairing of conferences

Chairing or co-chairing of international conferences in Computer Science settings:

Gervasi REFSQ 2022 (28th International Working Conference on Requirements Engineering: Foundation for Software Quality), Birmingham, UK

https://2022.refsq.org/

Paganelli NoF2022 (13h International Conference on Network of the Future), Ghent, Belgium

https://nof2022.dnac.org/

Priami (General Co-chair) IEEE International Conference on Digital Health, hybrid event in Barcelona, Spain

https://conferences.computer.org/icdh/2022/

Ricci (Program Co-chair) ICBTA 2022, 5th Int. Conference on Blockchain Technology and Applications, Xi'an, China,

https://easychair.org/cfp/ICBTA2022

Torquati (Program Co-chair) PDP 2022, 30th Euromicro International Conference on Parallel, Distributed and Network-based Processing, Valladolid, Spain

https://pdp2022.infor.uva.es/organisation.php

5.2 Chairing of workshops and symposia

Bacciu PAIW 2022 (1st Pervasive AI Workshops) held in conjuction with the 2022 IEEE World Congress on Computational Intelligence (IEEE WCCI 2022), Padova, Italy

http://pai.di.unipi.it/paiw2022/

Di Francesco Maesa BRAIN 2022 (3rd Workshop on Blockchain theoRy and ApplicatIoNs) held in conjunction with 2022 IEEE Pervasive Computing (IEEE Percom 2022), Pisa, Italy,

https://sites.google.com/view/brain-2022

Guidi OASIS 2022 (Workshop on Open Challenges in Online Social Networks (OASIS)), online

https://sites.google.com/di.unipi.it/oasis2022/home

Guidotti XKDD2022 (ECML PKDD International Workshop on eXplainable Knowledge Discovery in Data Mining), Grenoble, France

https://kdd.isti.cnr.it/xkdd2022/

Malizia IEEE VL/HCC 2022 (The 21st IEEE Symposium on Visual Languages and Human-Centric Computing), Rome, Italy

https://conf.researchr.org/home/vlhcc-2022

Micheli MLDM.it 2022 (11th Italian Workshop on Machine Learning and Data Mining), Udine, Italy

https://sites.google.com/view/mldm2022

Michienzi OASIS 2022 (2nd Workshop on Open Challenges in Online Social Networks (OASIS), held in conjunction with 33rd ACM Conference on Hypertext and Social Media), Barcelona, Spain

https://sites.google.com/di.unipi.it/oasis2022/program

Paganelli PerAwareCity, WSCC 2022 (2022 Joint Workshop on Pervasive Smart Sustainable Cities), online

https://sites.google.com/view/perawarecity-wscc-2022/home

Ricci BRAIN 2022 (3rd Workshop on Blockchain theoRy and ApplicatIoNs) held in conjunction with 2022 IEEE Pervasive Computing (IEEE Percom 2022), Pisa, Italy,

https://sites.google.com/view/brain-2022

Sirbu Workshop on New data and methods for migration studies: going beyond traditional data sources, Paris School of Economics, Paris, France, 10-11 October 2022

https://hummingbird-h2020.eu/news/event-items/SBDpapers

5.3 Steering Committee membership of conferences and symposia

Bonchi CMCS 2022 (16th IFIP WG 1.3 International Workshop on Coalgebraic Methods in Computer Science), Munich, Germany

https://www.coalg.org/cmcs22/index.html

Gervasi REFSQ 2022 (28th International Working Conference on Requirements Engineering: Foundation for Software Quality), Birmingham, UK

https://2022.refsq.org/

Micheli ICANN (31st International Conference on Artificial Neural Networks), Bristol, UK

https://e-nns.org/icann2022/

Micheli ProSIT 2022 (1st ProSIT: Le Sfide delle Tecnologie Digitali per la Salute del Futuro), Pisa, Italy

https://www.prosit.unipi.it/pubblicazioni/1006-convegno2022.html

Pisanti WABI 2022 (22nd Conference on Algorithms in Bioinformatics), Potsdam, Germany

https://algo-conference.org/2022/wabi/

Prencipe SAND 2021 (1st Symposium on Algorithmic Foundations of Dynamic Networks), online (held in 2022)

https://www.sand-conf.org/

Prencipe SAND 2022 (1st Symposium on Algorithmic Foundations of Dynamic Networks), online

https://www.sand-conf.org/

Priami (also founder) International Conference on Computational Methods in Systems Biology, Bucharest, Romania

https://cmsb.sciencesconf.org/

Ruggieri ACM FAccT 2022 (ACM Conference on Fairness, Accountability, and Transparency), Seoul, South Korea

https://facctconference.org/2022/index.html

Ruggieri FORC 2022 (Symposium on Foundations of Responsible Computing), Cambridge, MA, USA

https://responsiblecomputing.org/forc-2022/

Ricci DAIS 2022 - 22nd International Conference on Distributed Applications and Interoperable Systems, Lucca

https://www.discotec.org/2022/dais

Torquati Euro-Par 2022 - International Conference Euro-Par, Glasgow, UK

https://2022.euro-par.org/organization/

5.4 Direction of PhD Schools and symposia

Ferragina (co-director) Lipari PhD School on Computational Complex and Social Systems, topic of 2022 edition "DATA SCIENCE: Models, Algorithms, AI and Beyond", Lipari, Italy

https://complex22.liparischool.it/

Soldani (PhD Symposium chair) CCGRID 2022 (The 22nd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing), Taormina, Italy

https://fcrlab.unime.it/ccgrid22/

Soldani (PhD Symposium chair) ESOCC 2022 (9th European Conference on Service-Oriented and Cloud Computing), online

https://esocc-conf.eu

5.5 Program Committee membership of conferences, workshops and symposia

Program Committee (PC) membership of the following international conferences or workshops in Computer Science and Operations Research settings:

Bacciu AAAI 2022 (AAAI Conference on Artificial Intelligence), online

https://aaai.org/conference/aaai/aaai-22/

Bacciu ESANN 2022 (30th ESANN European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning), Bruges, Belgium

https://www.esann.org/

Bacciu IJCAI-ECAI 2022 (31st International Joint Conference on Artificial Intelligence), Vienna, Austria

https://ijcai-22.org/

Bacciu ICLR 2022 (International Conference on Learning Representations), online

https://iclr.cc/Conferences/2022

Bacciu ICML 2022 (International Conference on Machine Learning), Baltimore, USA

https://icml.cc/Conferences/2022

Bacciu NeurIPS 2022 (Conference on Neural Information Processing Systems), New Orleans , USA

https://neurips.cc

Bacciu WCCI 2022 (IEEE World Congress on Computational Intelligence), Padova, Italy

https://wcci2022.org

Bernasconi DCAS 2022 (15TH IEEE Dallas Circuits and Systems Conference), Dallas, USA

https://www.dcas2022.com/

Bernasconi IWLS 2022 (31st International Workshop on Logic & Synthesis), online

https://www.iwls.org/iwls2022/

Bodei ICISSP 2022 (8th International Conference on Information Systems Security and Privacy 2022), online

Bonchi ICTCS2022 (23rd Italian Conference on Theoretical Computer Science), Rome, Italy

https://easyconferences.eu/ictcs2022/

Bonchi MFCS 2022 (47th International Symposium on Mathematical Foundations of Computer Science), Vienna, Austria

https://ac.tuwien.ac.at/mfcs2022/

Brogi ADAPTIVE 2022 (14th International Conference on Adaptive and Self-Adaptive Systems and Applications), Barcelona, Spain

https://www.iaria.org/conferences2022/ADAPTIVE22.html

Brogi ASYDE 2022 (4th International Workshop on Automated and verifiable Software sYstem DEvelopment), Berlin, Germany

https://asyde-series.github.io/asyde2022/

Brogi CIbSE 2022 (25th Ibero-American Conference on Software Engineering), Cordoba, Argentine

https://cibse2022.frc.utn.edu.ar

Brogi CloudAM 2022 (11TH INTERNATIONAL WORKSHOP ON CLOUD AND EDGE COMPUTING, AND APPLICATIONS MANAGEMENT), Portland, USA

https://sites.google.com/unizar.es/cloudam2022/

Brogi CLOUD COMPUTING 2022 (13th International Conference on Cloud Computing), Barcelona, Spain

https://www.iaria.org/conferences2022/CLOUDCOMPUTING22.html

Brogi DISCOLI 2022 (1st Workshop on DIStributed Collective Intelligence), Bologna, Italy

https://discoli-workshop.github.io/2022/

Brogi ESOCC 2022 Ph.D. Symposium, Lutherstadt Wittenberg, Germany

https://esocc-conf.eu/

Brogi FASSI 2022 (8th International Conference on Fundamentals and Advances in Software Systems Integration), Lisbon, Portugal

https://www.iaria.org/conferences2022/FASSI22.html

Brogi ICCCN 2022 (31st International Conference on Computer Communications and Networks - Mobile, Edge, and Cloud Computing track), Honolulu, USA

http://www.icccn.org/icccn22/committeesandtracks/technical-tracks/track6.html

Brogi ICDCS 2022 (42nd IEEE International Conference on Distributed Computing Systems - Cloud Computing and Data Centers Track), Bologna, Italy

https://icdcs2022.icdcs.org/

Brogi ICONS 2022 (17th International Conference on Systems), Barcelona, Spain

https://www.iaria.org/conferences2022/ICONS22.html

Brogi ICSEA 2022 (17th International Conference on Software Engineering Advances), Lisbon, Portugal

https://www.iaria.org/conferences2022/ICSEA22.html

Brogi ICSOC 2022 (20th International Conference on Service-Oriented Computing), Seville, Spain

https://icsoc2022.spilab.es/

Brogi IEEE JCC 2022 (13th IEEE International Conference on JointCloud Computing), San Francisco, USA

https://www.jointcloud.cloud/JCC2022

Brogi MODELSWARD 2022 (10th Int. Conference on Model-Driven Engineering and Software Development), Malta

https://modelsward.scitevents.org/?y=2022

Brogi PerAwareCity-WSCC2022 (7th Joint Workshop on Pervasive Smart Sustainable Cities), Pisa, Italy

https://sites.google.com/view/perawarecity-wscc-2022/home

Brogi SEAA CNADO 2022 (48th Euromicro Conference on Software Engineering and Advanced Applications - Cloud Native And Dev Ops track), Gran Canaria, Spain

https://dsd-seaa2022.iuma.ulpgc.es/

Brogi SERVICE COMPUTATION 2022 (14th International Conference on Advanced Service Computing), Barcelona, Spain

https://www.iaria.org/conferences2022/SERVICECOMPUTATION22.html

Brogi SOFTENG 2022 (8th International Conference on Advances and Trends in SOftware Egineering), Barcelona, Spain

https://www.iaria.org/conferences2022/SOFTENG22.html

Brogi SummerSoc 2022 (16th Symposium and Summer School On Service-Oriented Computing), Crete, Greece

https://www.summersoc.eu/

Brogi UCC 2022 (15th IEEE/ACM Internation Conference on Utility and Cloud Computing), Portland, USA

https://ucc-conference.org/

Bruni WRLA 2022 (14th International Workshop on Rewriting Logic and its Applications), Munich, Germany

http://sv.postech.ac.kr/wrla2022/

Busi PriSC 2022 (6th Workshop on Principles of Secure Compilation), Philadelphia, United States

https://popl22.sigplan.org/home/prisc-2022

Di Francesco Maesa ICBC 2022 (IEEE International Conference on Blockchain and Cryptocurrency), online.

https://icbc2022.ieee-icbc.org/

Di Francesco Maesa EICC 2022 (European Interdisciplinary Cybersecurity Conference), Barcellona, Spagna.

https://www.fvv.um.si/eicc2022/

Di Francesco Maesa DLT 2022 (4th Distributed Ledger Technology Workshop), Roma.

https://dlt2022.github.io/

Di Francesco Maesa 5th International Workshop on Emerging Technologies for Authorization and Authentication" parte di "ESORICS 2022", Copenhagen, Danimarca.

https://hosting.services.iit.cnr.it/etaa2022/index.html

Di Francesco Maesa ICBTA 2022 (5th International Conference on Blockchain Technology and Applications), Xi'an, Cina.

http://www.icbta.net/com.html

Forti WSACC 2022 (Workshop on Smart and Circular Cities), Paphos, Cyprus

https://wsacc22.isi.gr/

Forti JCC 2022 (International Conference on Joint Cloud Computing), San Francisco, USA

https://ieeesose.com/ieee-jcc-2022/

Forti ICTS4eHealth 2022 (IEEE International Conference on ICT Solutions for eHealth), Rodhes, Greece

https://icts4ehealth.icar.cnr.it/

Forti CCGRID 2022 (IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing), Taormina, Italy

https://fcrlab.unime.it/ccgrid22/

Forti SioTec 2022 (Workshop on Secure IoT, Edge and Cloud systems), Taormina, Italy

https://siotec2022.netsons.org/

Forti Cloud2Things 2022 (Workshop on From Cloud to Things: harnessing pervasive data in the Computing Continuum), Taormina, Italy

https://cloud2things2022.netsons.org/

Forti AI4Health 2022 (IEEE International Workshop on Artificial Intelligence for Health), Taormina, Italy

https://www.ai4health.icar.cnr.it/ai4health2022/index.html

Forti Cloud Computing 2022 (International Conference on Cloud Computing), Barcelona, Spain

https://www.iaria.org/conferences2022/CLOUDCOMPUTING22.html

Frangioni EURO XXXII (The 32nd European Conference on Operations Research), Espoo, Finland

https://euro2022espoo.com/

Frangioni Odysseus 2021 (8th International Workshop on Freight Transportation and Logistics), Tangier, Morocco (held in 2022)

https://symposia.cirrelt.ca/Odysseus2021/en/home

Gallicchio AAAI 2022 (AAAI Conference on Artificial Intelligence), online

https://aaai.org/conference/aaai/aaai-22/

Gallicchio ESANN 2023 (30th ESANN European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning) (held in 2022), Bruges, Belgium

https://www.esann.org/pastesann

Gallicchio ICLR (International Conference on Learning Representations), online

https://iclr.cc/Conferences/2022

Gallicchio IJCAI-ECAI 2022 (31st International Joint Conference on Artificial Intelligence), Vienna, Austria

https://ijcai-22.org/

Gallicchio NeurIPS 2022 (Conference on Neural Information Processing Systems), New Orleans, USA

https://neurips.cc

Gallicchio WCCI 2022 (IEEE World Congress on Computational Intelligence), Padua, Italy

https://wcci2022.org/

Gervasi AIRE 2022 (Ninth International Workshop on Artificial Intelligence and Requirements Engineering), Melbourne, Victoria, Australia

https://aire-ws.github.io/aire22/

Gervasi CrowdRE'22 (The 6th International Workshop on Crowd-Based Requirements Engineering), Melbourne, Victoria, Australia

https://crowdre.github.io/ws-2022/

Gervasi ICSE 2022 (44th International Conference on Software Engineering), Pittsburgh, PA, USA

https://conf.researchr.org/home/icse-2022

Gervasi RE'22 (30th IEEE International Requirements Engineering Conference), Melbourne, Victoria, Australia

https://conf.researchr.org/home/RE-2022

Gervasi REFSQ 2022 (28th International Working Conference on Requirements Engineering: Foundation for Software Quality), Birmingham, UK

https://2022.refsq.org/

Guidi ACM GoodIT (ACM International Conference on Information Technology for Social Good), Limassol, Cyprus

https://cyprusconferences.org/goodit2022/

Guidi HT 2022 (HT '22: 33rd ACM Conference on Hypertext and Social Media), Barcelona, Spain

https://ht.acm.org/ht2022/

Guidi CCNC (IEEE Consumer Communications Networking Conference), virtual conference

https://ccnc2022.ieee-ccnc.org/index.html

Guidi OASIS 2022 (Workshop on Open Challenges in Online Social Networks (OASIS)), online

https://sites.google.com/di.unipi.it/oasis2022/home

Micheli ACM-SAC GMLR 2022 (Graph Models for Learning and Recognition (GMLR) Track at 37th ACM-SAC (ACM Symposium on Applied Computing)), Brno, Czech Republic

https://phuselab.di.unimi.it/GMLR2022/

Micheli ECML/PKDD 2022 (European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases), Grenoble, France

https://2022.ecmlpkdd.org/

Micheli ESANN 2023 (30th ESANN European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning) (held in 2022), Bruges, Belgium

https://www.esann.org/pastesann

Micheli ICANN (31st International Conference on Artificial Neural Networks), Bristol, UK

https://e-nns.org/icann2022/

Micheli IJCAI-ECAI 2022 (31st International Joint Conference on Artificial Intelligence), Vienna, Austria

https://ijcai-22.org/

Michienzi BANDIT2022 (Special Track on BLOCKCHAIN AND DECENTRALIZED TECHNOLOGIES FOR SOCIAL GOOD (BANDIT), in conjunction with ACM International Conference on Information Technology for Social Good (GoodIT 2022)), Lymassol, Cyprus

https://sites.google.com/view/bandit2022/

Michienzi B2C'2022 (Blockchain and Cryptocurrency congress), Barcelona, Spain

https://b2c-conference.com/

Michienzi FTC'2022 (Future Technologies Conference (FTC) 2022), online

https://saiconference.com/Conferences/FTC2022

Michienzi HT22 (33rd ACM Conference on Hypertext and Social Media), Barcelona, Spain

https://ht.acm.org/ht2022/program-committee/

Michienzi ICCTD'2022 (International Conference on Computer Technologies and Development), online

http://www.icctd.org/com.html

Michienzi NES22 (International Workshop on Networked Entertainment Systems, Co-Located with the 42nd IEEE International Conference on Distributed Computing Systems (ICDCS 2022)), Bologna, Italy

https://www.math.unipd.it/ cpalazzi/NES2022/

Milli CDB (ComplexDataBlocks: Data Science and Complexity on the Blockchain (CDB), Satellite della Conference on Complex Systems (CCS 2022)), Palma de Mallorca, Spain

https://www.trmlabs.com/complexdatablocks

Milli Complex Networks 2022 (11th International Conference on Complex Networks and their Applications 2022), Palermo, Italy

https://2022.complexnetworks.org/

Milli DATA ANALYTICS 2022 (The Eleventh International Conference on Data Analytics), Valencia, Spain

https://www.iaria.org/conferences2022/DATAANALYTICS22.html

Milli SOCINFO 2022 (13th international conference on Social Informatics 2022), Glasgow, Scotland

http://www.dcs.gla.ac.uk/socinfo2022/

Paganelli CNSM 2022 (18th International Conference on Network and Service Management), Thessaloniki, Greece

http://www.cnsm-conf.org/2022

Paganelli NetSoft 2022 (IEEE International Conference on Network Softwarization), Milan, Italy

https://netsoft2022.ieee-netsoft.org/

Paganelli NOMS 2022 (IEEE/IFIP Network Operations and Management Symposium), Budapest, Hungary

https://noms2022.ieee-noms.org/

Pisanti CiE 2022 (17th International Conference of Computability in Europe), Swansea, UK

https://cs.swansea.ac.uk/cie2022/

Pisanti CPM 2022 (33rd Annual Symposium of Combinatorial Pattern Matching), Prague, Czech Republic

http://www.stringology.org/event/CPM2022/

Pisanti ISBRA 2022 (18th International Symposium on Bioinformatics Research and Applications), Haifa, Israel

https://www.iscb.org/

Pisanti SPIRE 2022 (29th International Symposium on String Processing and Information Retrieval), Concepcion, Chile

http://spire2022.inf.udec.cl

Pisanti WABI 2022 (22nd Conference on Algorithms in Bioinformatics), Potsdam, Germany

https://algo-conference.org/2022/wabi/

Prencipe ICDCN 2022, Doctoral Symposium (23rd International Conference on Distributed Computing and Networking, Doctoral Symposium), Delhi, India

https://icdcn2022.iiitd.edu.in/docsymp.html

Prencipe ICDCN 2022, Doctoral Symposium (23rd International Conference on Distributed Computing and Networking, Doctoral Symposium), online

https://icdcn2022.iiitd.edu.in/docsymp.html

Prencipe SIROCCO 2022 (29TH International Colloquium on Structural Information and Communication Complexity), Padeborm, Germany

https://sirocco2022.cs.upb.de/

Prencipe SSS 2022 (24th International Symposium on Stabilization, Safety, and Security of Distributed Systems), Clermont-Ferrand, France

https://sss2022.limos.fr/

Ricci Complex Networks 2022 (11th International Conference on Complex Networks and their Applications), Palermo, Italy.

https://2022.complexnetworks.org/

Ricci IEEE COINS 2022 (IEEE Int. Conference on Omni-layer Intelligent Systems), Track: Distributed Ledger Technologies and Blockchain, Barcelona, Spain.

https://coinsconf.com/2022/

Ricci ICUMT 2022 (14th International Congress on Ultra Modern Telecommunications and Control Systems), Valencia, Spain.

https://icumt.info/2022/

Ricci ESORICS 2022 (27th European Symposium on Research in Computer Security), Copenhagen, Denmark, 26-30 September 2022

https://esorics2022.compute.dtu.dk/

Ricci 5th IEEE International Conference on Blockchain (IEEE Blockchain 2022), Espoo, Finland, August 22-25, 2022.

Ricci ACM/IEE CCGrid 2022 (22nd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing), Taormina, Italy

https://fcrlab.unime.it/ccgrid22/

Ricci IEEE DSC 2022 (5th IEEE Conf. on Dependable and Secure Computing), Edinburgh, UK.

https://attend.ieee.org/dsc-2022/

Ricci FAB 2022 (5th International Symposium on Foundations and Applications of Blockchain), Berkeley, USA.

https://scfab.github.io/2022/

Ricci IWBOSE 2022 (5th International Workshop on Emerging Trends in Software Engineering for Blockchain)

https://www.agile-group.org/iwbose2022/

Ricci DLT 2022 (4th Distributed Ledger Technology Workshop, co-located with ITASEC 2022), Rome, Italy

https://dlt2022.github.io/

Rosone IWOCA 2022 (33rd International Workshop on Combinatorial Algorithms), Trier, Germany

https://www.uni-trier.de/en/universitaet/fachbereiche-faecher/fachbereich-iv/faecher/informatikwissenschaften/professuren/theoretische-informatik/research/conferences-and-workshops/iwoca-2022

Rosone WABI 2022 (22nd International Workshop on Algorithms in Bioinformatics), Potsdam, Poland

https://algo-conference.org/2022/wabi/

Ruggieri AI*IA 2022 (International Conference of the Italian Association for Artificial Intelligence), Udine, Italy

https://aixia2022.uniud.it/

Ruggieri AISTATS 2022 (Artificial Intelligence and Statistics), online

http://aistats.org/aistats2022/

Ruggieri ECML/PKDD 2022 (The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases), Grenoble, France

https://2022.ecmlpkdd.org/

Ruggieri IJCAI-ECAI 2022 (The 31st International Joint Conference on Artificial Intelligence), Vienna, Austria

https://ijcai-22.org/

Ruggieri UAI 2022 (Conference on Uncertainty in Artificial Intelligence), Eindhoven, The Netherlands

https://www.auai.org/uai2022/

Ruggieri WebConf 2022 (The Web Conference), Lyon, France

https://www2022.thewebconf.org/

Scutellà INOC 2022 (International Network Optimization Conference 2022), Aachen, Germany

https://sites.google.com/view/inoc2022/

Semini FormaliSE 2022 (IEEE/ACM 10th International Conference on Formal Methods in Software Engineering), Pittsburgh, PA, USA

https://conf.researchr.org/home/icse-2022/Formalise-2022

Semini REFSQ (28th International Working Conference on Requirement Engineering: Foundation for Software Quality), Birmingham, UK

https://2022.refsq.org/

Semini SPLC 2022 (26th ACM International Systems and Software Product Line Conference), Graz, Austria

https://2022.splc.net/

Semini VaMoS (16th International Working Conference on Variability Modelling of Software-Intensive Systems), Florence, Italy

https://vamos2022.isti.cnr.it/

Sirbu MIMODE 2022 (Migration and Mobility Research in the Digital Era), a satellite event of the Conference on Complex Systems 2022, Palma de Mallorca, Spain

https://www.demogr.mpg.de/en/news-events-6123/news-press-releases-4630/news/migration-and-mobility-research-in-the-digital-era-mimode-2022-10728

Sirbu DSHealth 2022 (KDD 2022 Workshop on Applied Data Science for Healthcare), Washington DC, USA

https://dshealthkdd.github.io/dshealth-2022/

Sirbu IJCAI-ECAI 22 (Special track on AI for Good (AI4G)), Vienna, Austria

https://ijcai-22.org/

Soldani AI4Health (IEEE International Workshop on Artificial Intelligence for Health), Taormina, Italy

https://www.ai4health.icar.cnr.it/ai4health2022/index.html

Soldani AMP 2022 (Agility with Microservices Programming 2022), Copenaghen, Denmark

https://amp.fe.up.pt/2022/

Soldani ASPAI 2022 (5th International Conference on Advances in Signal Processing and Artificial Intelligence), Corfu, Greece

https://www.aspai-conference.com

Soldani BDIOT 2022 (6th International Conference on Big Data and Internet of Things), Chongqing, China

http://www.bdiot.org/bdiot22.html

Soldani CCIOT 2022 (7th International Conference on Cloud Computing and Internet of Things), Okinawa, Japan

http://www.cciot.org/2022.html

Soldani CLOSER 2022 (12th International Conference on Cloud Computing and Services Science), online

https://closer.scitevents.org/?y=2022

Soldani CoopIS 2022 (28th International Conference on Cooperative Information Systems), Bolzano, Italy

https://coopisconference.org

Soldani DASA 2022 (International Conference on Decision Aid Sciences and Applications), Thailand

https://conf.mfu.ac.th/online/dasa22.mfu.ac.th/

Soldani eLmL 2022 (14th International Conference on Mobile, Hybrid, and On-line Learning), Porto, Portugal

https://www.iaria.org/conferences2022/eLmL22.html

Soldani ESOCC 2022 (9th European Conference on Service-Oriented and Cloud Computing), online

https://esocc-conf.eu

Soldani FIST 2022 (1st International Workshop on the Foundations of Infrastructure Specification and Testing), online

https://sites.google.com/view/fist-2022/home

Soldani IEEE SITIS 2022 (16th International Conference on Signal Image Technology and Internet-based Systems), Dijon, France

https://www.sitis-conference.org/2022/

Soldani IEEE SOSE 2022 (16th IEEE International Conference On Service-Oriented System Engineering), San Francisco, USA

http://www.ieeesose.net

Soldani SERVICE COMPUTATION 2022 (14th International Conference on Advanced Service Computing), Barcelona, Spain

https://www.iaria.org/conferences2022/SERVICECOMPUTATION22.html

Soldani SIoTEC (3rd International Workshop on Secure IoT, Edge and Cloud systems), Taormina, Italy

https://siotec2022.netsons.org

Torquati SC22 (The International Conference for High Performance Computing, networking, Storage, and Analysis), Dallas, USA

https://sc22.supercomputing.org/planning-committee/

Torquati IDC 2022 (Intelligent Distributed Computing symposium), Bremen, Germany

https://www.idc2022.de/!/organisation

Torquati HLPP 2022 (15th International Symposium on High-level Parallel Programming and Applications), Porto, Portugal

http://hlpp2022.dcc.fc.up.pt/

Torquati ICA3PP 2022 (The 22nd International Conference on Algorithms and Architectures for Parallel Processing), Copenhagen, Denmark

https://ica3pp2022.compute.dtu.dk/committees.html

Torquati PARMA-DITAM 2022 (Joint workshop on Parallel Programming and Run-Time Management Techniques for Many-core Architecture and on Design Tools and Architectures for Multicore Embedded Computing Platforms), Budapest, Hungary

https://parma-ditam-workshop.github.io/2022/

5.6 Invited and keynote speakers at conferences and workshops

Bacciu ICDM IncreLearn 2022, 3rd IncrLearn Workshop 2022, co-located with the 22nd IEEE International Conference on Data Mining, Orlando, Florida

https://incrlearn.sciencesconf.org/

Bacciu IPG 2022, International Practice Group Spring Conference, Firenze, Italy

https://www.ipg-online.org/conferences/

Bacciu WMC 2022, 10th International Workshop on Mixed Critical Systems (co-located with Hipeac 2022), Budapest, Hungary

https://www.hipeac.net/2022/budapest/#/

Forti IEEE PerAwareCity-WSCC 2022 (Joint Workshop on Pervasive Smart Sustainable Cities 2022, co-located with IEEE International Conference on Pervasive Computing and Communications (IEEE PerCOM)), Pisa, Italy

https://sites.google.com/view/perawarecity-wscc-2022/

Rosone WCTA 2022 (17th Workshop on Compression, Text, and Algorithms), Concepción, Chile (also online)

http://spire2022.inf.udec.cl/wcta.html

5.7 Tutorial speakers at conferences

Pisanti IGGSy 2022 (International Genome Graph Symposium 2022), Ascona, Switzerland

https://iggsy.org/

5.8 Conference organization

Local organization of the following international conferences in Computer Science settings:

Bacciu (Publicity chair) IEEE WCCI 2022 (IEEE World Congress on Computational Intelligence), Padua, Italy

https://wcci2022.org/

Corbara CLEF 2022 (Conference and Labs of the Evaluation Forum 2022), Bologna, Italy

https://clef2022.clef-initiative.eu/index.php

Frangioni EURO XXXII (The 32nd European Conference on Operations Research), Espoo, Finland

https://euro2022espoo.com/

Gallicchio (Local Arrangement chair) IEEE WCCI 2022 (IEEE World Congress on Computational Intelligence), Padua, Italy

https://wcci2022.org/

Micheli AII 2022 (2nd International conference on Applied Intelligence and Informatics Conference), Reggio Calabria, Italy

http://www.aii2022.org

Micheli IEEE WCCI 2022 (IEEE World Congress on Computational Intelligence), Padua, Italy

https://wcci2022.org/

Michienzi OASIS 2022 (2nd Workshop on Open Challenges in Online Social Networks (OASIS), held in conjunction with 33rd ACM Conference on Hypertext and Social Media), Barcelona, Spain

https://sites.google.com/di.unipi.it/oasis2022/program

Passaro NL4AI 2022 (Workshop on Natural Language for Artificial Intelligence), Udine, Italy

http://sag.art.uniroma2.it/NL4AI/

Poloni ALAMA 2022-ALN2gg (ALAMA 2022-ALN2gg - Linear Algebra, Matrix Analysis and Applications), Alcalá de Henares, Spain

https://congresosalcala.fgua.es/alama2022/ficha/4118/presentation/

Prencipe FUN 2022 (11th International Conference on Fun with Algorithms), La Favignana, Sicily, Italy

https://sites.google.com/view/fun2022/home

Torquati (Artifact Chair e Track Chair) Euro-Par 2022 (28th International Conference on Parallel and Distributed Computing), Glasgow, UK

https://2022.euro-par.org/organization/ (Artifact Chair)

https://2022.euro-par.org/calls/papers/ (Track Chair)

6 Research positions

In order to enhance the research activity of the Department, several research fellow positions have been assigned in 2022 so as to favour the participation of researchers at the very beginning of their scientific career, as well as to foster international collaborations. Specifically (data source: administrative secretariat of the Department):

1. 11 Junior Research grant positions (*Borse di studio e approfondimento* in Italian) have been opened on the following topics:
   (a) *Machine learning for experimental analysis of data from sensors on corrugated cardboard production lines*
   (b) *Fine-tuning and testing of Natural Language Understanding module and related learning resources in a pipeline for implementing conversational agents*
   (c) *Analysis of Whole Slide Imaging data to assess the presence of PD-L1 biomarker in breast cancers*
   (d) *Study and implementations of data structures for dense retrieval*
   (e) *Study and implementation of data structures for representing colored de Bruijn graphs*
   (f) *Humanistic intelligence platform for the H2020 TEACHING automotive use case*
   (g) *Explainability and Interpretability for Few Shot Learning Models*
   (h) *Engineering continual learning as a software service*
   (i) *Design and Implementation of a multi-protocol communication layer supporting both TCP/IP and MPI for the FastFlow distributed run-time*
   (j) *Compressed data structures for indexing variable-length key datasets*
   (k) *Compressed data structures for approximate DB queries and key-value stores*
2. 13 Senior Research grant positions (*Borse di ricerca* in Italian) have been opened on the following topics:
   (a) *Development of machine/deep learning methods for making predictions in the biomedical field* (3 grants)
   (b) *Carrying out activities to improve the efficiency of judicial offices through ICT technologies, for the innovation of the justice system and the implementation of the "Office for Trial"* (5 grants)
   (c) *Decentralized solutions for the allocation and management efficient next-generation applications in distributed computing architectures*
   (d) *Implementation of a web Genome browser for visualization and analysis of "omics" data for the study of Rett syndrome* (2 grants)
   (e) *Collection, processing and systematization of data from various primary and secondary sources related to innovation and entrepreneurship activities by Italian and foreign universities and research centers, with impact assessment on SoBigData research infrastructure*
   (f) *Analysis of Whole Slide Imaging data to assess the presence of PD-L1 biomarker in breast cancers*
3. 23 Research fellow positions (*Assegni di ricerca* in Italian) have been opened:
   (a) 2-year positions:
      i. *Development of AI-based techniques to support diagnosis and treatment of children with cerebral palsy*
      ii. *Study and development of privacy-friendly models of explainable AI*
      iii. *Data-Driven Approaches for Resilient And Sustainable Transportation Services - ADDSTRES*
      iv. *Vocal Biomarkers & Language Intelligence for Health - VOBILAI4H*
   (b) 1-year positions:

i. *Continuous Machine Learning for Predictive Maintenance*

ii. *Conditional Language Models for Business Process Optimization: automatic natural language text generation driven by industry factual constraints through Artificial Intelligence, Natural Language Processing and Generation techniques*

iii. *Study of explainable and ethical AI models in cooperative learning systems*

iv. *Conditional Language Models for Business Process Optimization: automatic natural language text generation driven by industry factual constraints through Artificial Intelligence, Natural Language Processing and Generation techniques - CLMs4BPO*

v. *Deep neural network integration and automatic reasoning*

vi. *Reservoir Computing and Neural Networks for modeling emergent dynamic processes*

vii. *Human-centered, Explainable Artificial Intelligence for Collaborative Decision Making: - advanced eXplainable AI (XAI) paradigms in support of synergistic human-machine interaction and collaboration*

viii. *Development of a Machine Learning system for the analysis of ECG and omics data*

ix. *Design and Application of computational technologies in biomedical and pharmaceutical field*

x. *Identification of relevant genetic features in predicting the efficacy of 4CMenB*

xi. *Integrating domain knowledge into the process of explaining artificial intelligence systems*

xii. *Formal methods for verification of novel computational models*

xiii. *Data science for sports and health: big data analytics methods to analyze the state of recovery, well-being, and fitness (cognitive, physical, and technical-tactical) of athletes by studying their psychophysiological responses to internal and external stimuli*

xiv. *Specification and verification of temporal properties for graph-based hyper-doctrine models*

xv. *Data analysis techniques for mapping soft-skills for applications in Industry 4.0 contexts*

xvi. *Identification of relevant genetic characteristics in predicting the effectiveness of 4CMenB*

xvii. *Modeling and Numerical Simulation of Complex Systems*

xviii. *Vocal Biomarkers Language Intelligence for Health*

xix. *Data-Driven Approaches for Resilient And Sustainable Transportation Services - ADDSTRES*

7 PhD Schools

We report here some basic information on the two PhD Schools managed by the Department, i.e., the one in *Computer Science* and the one in *Artificial Intelligence for Society*. Furthermore, we report on the consortium of the national interest PhD *Blockchain and Distributed Ledger Technology*: the Department participates to this consortium by coordinating its Curriculum 2: *Social systems and smart societies* (source: direct communication with the Coordinators and the Secretariat of the PhD Schools).

For additional information we refer to the respective web sites:

- PhD School in Computer Science: https://dottorato.di.unipi.it/
- National PhD in Artificial Intelligence for Society: https://phd-ai-society.di.unipi.it/
- National PhD in Blockchain and Distributed Ledger Technology:
  https://isas.unicam.it/dni/blockchain-and-DLT

We specify that the National PhD in Artificial Intelligence for Society is part of the National PhD in Artificial Intelligence, see https://www.phd-ai.it/ for details.

7.1 PhD School in Computer Science

In 2022, the board of the PhD School in Computer Science included the following members:

- **Antonio Brogi, Coordinator**, Davide Bacciu, Stefano Chessa, Marco Danelutto, Paolo Ferragina, Gian-Luigi Ferrari, Antonio Frangioni, Luca Gemignani, Roberto Grossi, Danilo Numeroso, Corrado Priami, Laura Emilia Maria Ricci, Maria Grazia Scutellà, from the Department of Computer Science of the University of Pisa.
- Michele Boreale, Rosario Pugliese, from the University of Florence.
- Sara Brunetti from the University of Siena.
- Fabio Martinelli (CNR-IIT, Institute of Informatics and Telematics), Chiara Renso (CNR-ISTI, Information Science and Technology Institute), Paolo Santi (CNR-IIT), Roberto Scopigno (CNR-ISTI), from the National Research Council of Italy (*Consiglio Nazionale delle Ricerche* in Italian).
- Ricardo Baeza-Yates (Northeast University), Sajal Das (Missouri University of Science and Technology), Joshua Guttman (Worchester Polytechnic Institute and MITRE Corporation), Daria Mochly-Rosen (Stanford University), from USA.
- Leo Liberti, Catuscia Palamidessi, from Ecole Polytechnique and CNRS, France.
- Frank Leymann, from the University of Stuttgart, Germany.

Across 2022, the PhD students enrolled in the Computer Science PhD were (arranged per cycle):

- Cycle XXXIV: Alderighi Thomas, Bienh Uls Benedikt, Ceragioli Lorenzo, Errica Federico, Miaschi Alessio, Setzu Mattia, Sucameli Irene, Vinciguerra Giorgio.
- Cycle XXXV: Baccini Federica, Bocci Alessandro, Citraro Salvatore, Di Sarli Daniele, Iadarola Giacomo, Lagani Gabriele, Landolfi Francesco, Lisi Andrea, Machado Bruno, Manolas Iason, Molinari Alessio, Oliveira Fernanda, Palma Giulia, Punzi Giulia, Rotelli Daniela, Rulli Cosimo, Sansone Francesco, Sattar Asma, Tortelli Tarlis, Valenti Andrea, Vogel Adriano Jose, Zedda Eleonora.
- Cycle XXXVI: Berti Alessandro, Boffa Antonio, Bussi Laura, Cornacchia Giuliano, De Caro Valerio, Di Giorgio Alessandro, Fuchs Andrew, Gravina Alessio, Loporchio Matteo, Numeroso Danilo, Pedrotti Andrea, Resta Michele, Rucci Davide, Tortorella Domenico, Tosoni Francesco.

- Cycle XXXVII: Alabasi Wesam Nitham, Ascari Flavio, Cardia Marco, Cinquini Martina, Corbucci Luca, Di Pasquale Federica, Gaglianese Marco, Guerra Andrea, Kapitako Jeconia, Lomurno Giuseppe, Massa Jacopo, Massidda Riccardo, Mwaniki Moses Njagi, Ottimo Alberto, Pugliese Chiara, Ramjattan Reshawn, Semola Rudy, Tonci Nicolo', Tortola Domenico.
- Cycle XXXVIII: Bisicchia Giuseppe, Coleman Eric Nuertey, De Vincenzi Marco, Gharb Hamid, Joubbi Sara, Pham Tran Huong Giang, Piccoli Elia, Scandurra Elena, Simone Lorenzo, Tedeschi Gabriele, Waheed Tauheed.

7.2 National PhD in Artificial Intelligence for Society

In 2022, the board of the PhD in Artificial Intelligence for Society included the following members, plus two elected representatives of the PhD students:

- **Dino Pedreschi, Coordinator**, Anna Monreale, Vice-coordinator, Fabio Gadducci, Alessio Malizia, Alessio Micheli, Nadia Pisanti, Salvatore Ruggieri from the Department of Computer Science of the University of Pisa.
- Roberta Bracciale, Marco Cococcioni, Adriano Fabris, Francesco Marcelloni, Monica Pratesi, Chiara Maria Angela Roda from the University of Pisa.
- Fosca Giannotti from Scuola Normale Superiore, Pisa.
- Francesca Chiaromonte, Giovanni Comandè, Tommaso Cucinotta, Andrea Piccaluga, Andrea Vandin from Scuola Sant'Anna, Pisa.
- Chiara Boldrini, Marco Conti, Maurizio Tesconi from CNR-IIT.
- Giuseppe Manco, Mirco Nanni, Raffaele Perego, Salvatore Rinzivillo from CNR-ISTI.
- Rosa Lanzilotti, Nicole Novielli from the University of Bari.
- Emanuele Mingione from the University of Bologna.
- Giuseppe Riva from Università Cattolica del Sacro Cuore.
- Michela Baccini, Andrew Bagdanov, Paolo Nesi from the University of Florence.
- Stefania Costantini from University of L'Aquila.
- Diego Garlaschelli, Tiziano Squartini, from Scuola IMT Lucca.
- Rita Cucchiara, Costantino Grana, Marco Lippi from University of Modena e Reggio Emilia.
- Johanna Monti from Università degli Studi di Napoli L'Orientale.
- Valentina Poggioni from the University of Perugia.
- Adriano Barra from the University of Salento.
- Massimo Tistarelli from Università degli Studi di Sassari.
- Stefano Melacci from the University of Siena.
- Andrea Passerini, Elena Pavan, Niculae Sebe from the University di Trento.

Across 2022, the PhD students enrolled in the National PhD in Artificial Intelligence for Society were (arranged per cycle):

- Cycle XXVII: Costanza Alfieri, Maddalena Amendola, Giada Anastasi, Alberto Baldrati, Simone Barandoni, Isacco Beretta, Valerio Bonsignori, Gianpaolo Bontempo, Giovanni Camarda, Eleonora Cappuccio, Francesco Carli, Irina Carnat, Roberto Casaluce, Enrico Collini, Tommaso Crepax, Nicola Dall'Asen, Daniele D'Armineto, Michele Fontana, Simone Gallo, Mitisha Gaur, Gianluca Guidi, Muhammad Imran, Daniele Lotito, Lorenzo Mannocci, Marta Marchiori Manerba, Emanuele Marconato, Giovanni Mauro, Marco Minici, Davide Morelli, Virginia Morini, Cosimo Palma, Emanuele Parisini, Vittorio Pippi, Robert Lee Poe, Samuele Poppi, Nischay Purnkear, Andrea Rafanelli, Bin Ren, Guido Rocchietti, Muhammad Waheed Sabir, Elena Sajno, Quirino Saraceni, Gaia Saveri, Giuseppe Saviano, Gianluca Sperduti, Edoardo Urettini, Serena Versino, Qifan Yang, Filippo Zimmaro, Maciej Krzysztof Zuziak.

- Cycle XXVIII: Abramski Katherine Elizabeth, Alessandrelli Andrea, Aliyev Gurban, Arzilli Guglielmo, Balzan Francesco, Banerjee Debodeep, Baraldi Lorenzo, Barbera Cesare, Berti Barbara, Cabras Alessandro, Calderonio Vincenzo, Caponecchia Vittoria, Carmisciano Luca, Cau Erica, Cocchi Federico, Colavito Giuseppe, Daole Mattia, De Gasperi Stefano, Dini Irene, Domenichini Diana, Failla Andrea, Fantini Alessia, Favilli Andrea, Fedele Andrea, Figliè Roberto, Fontanesi Michele, Gambetta Daniele, Garofalo Marco, Gibelli Nicolò, Grande Elio, Gregorini Matteo, Ignesti Giacomo, Jameel Usama, Landi Cristiano, Lazzari Nicolas, Lorello Luca Salvatore, Maggio Alessandro, Maggioni Edoardo, Mainas Francesca, Mannari Chiara, Marini Lorenzo, Masini Stefano, Maslennikova Aleksandra, Mazzoni Federico, Mekam Pouatcha Mathurin Aime, Monaldini Andrea, Munarini Monique, Nespoli Alice, Palmieri Luigi, Paperini Elisa, Pipoli Vittorio, Poggiali Alessandro, Punzi Clara, Quarantiello Luigi, Reis De Almeida Passos Nelson Aloysio, Romeo Carlo, Rossi Michele, Ruffini Fabrizio, Sacco Federica, Sanchi Marco, Tonati Samuele, Tramacere Stefano, Volpi Giulia, Zafaranchi Arman, Zeshan Muhammad Umar.

7.3 National PhD in Blockchain and Distributed Ledger Technology

In 2022, the Curriculum Social systems and smart societies of the PhD has been coordinated by Laura Ricci.

Furthermore, across 2022 the PhD students enrolled in the National PhD in Blockchain and Distributed Ledger Technology were:

- Cycle XXVIII: Francesco Donini, Ricardo Daniel Lopes Almeida, Andrea Pelosi.

8 Visiting Fellows

Thanks to its scientific prestige and highly international profile, the Department of Computer Science often hosts scientific events and seminars that external researchers attend, and research staff of the Department often receives visits of colleagues from other Italian institutions and from abroad. We report here on the researchers who visited the Department in 2022 (source: direct communication with the CAI of the Department Prof. Andrea Corradini, i.e., the delegate of the Department for the international relationships).

Dr. Khaleel Ahmad, PhD at the Maulana Azad National Urdu University, Hyderabad, Telangana (India), visited the Computer Science Department under the invitation of Prof. Laura Ricci from July 11, 2022 to January 12, 2023. Together with Prof. Ricci and other colleagues, Khaleel Ahmad worked on the project activity entitled "Blockchain-Enabled Vaccine Intelligent Network to Implement Immunization Program".

Prof. Juan Luis Herrera González, University of Extremadura (Spain), visited the Computer Science Department under the invitation of Prof. Antonio Brogi from March 28 to June 28, 2022. Together with Prof. Brogi and other colleagues, Prof. Herrera González worked on the project activity entitled "Energy-aware management of software applications in Cloud-IoT ecosystems".

Prof. Grigorios Loukides, King's College London, London (UK), visited the Computer Science Department under the invitation of Prof. Nadia Pisanti from September 26 to October 26, 2022. Together with Prof. Pisanti and other colleagues, Prof. Loukides worked on the project activity entitled "Privacy preserving in biomedical data".

9 Peer-reviewed publications

In this section, we report the complete list of the research products published in 2022 and having members of the Department among the authors. This section has been populated with data taken from the official file sent to the *Area 01 Committee* by the Research Office of the University in July 2023, limited to the entries published in 2022, and then integrated with information from the researchers.

9.1 Journal papers

The following papers have been published in peer reviewed international journals in 2022 by the members of the Department:

[1] G. Agosta, M. Aldinucci, C. Álvarez, R. Ammendola, Y. Arfat, O. Beaumont, M. Bernaschi, A. Biagioni, T. Boccali, B. Bramas, C. Brandolese, B. Cantalupo, M. Carrozzo, D. Cattaneo, A. Celestini, M. Celino, I. Colonnelli, P. Cretaro, P. D'Ambra, M. Danelutto, and alt. Towards extreme scale technologies and accelerators for eurohpc hw/sw supercomputing applications for exascale: The TEXTAROSSA approach. *Microprocess. Microsystems*, 95:104679, 2022.

[2] M. Andreozzi, A. Frangioni, L. Galli, G. Stea, and R. Zippo. A MILP approach to DRAM access worst-case analysis. *Comput. Oper. Res.*, 143:105774, 2022.

[3] D. Atzeni, D. Bacciu, D. Mazzei, and G. Prencipe. A systematic review of wi-fi and machine learning integration with topic modeling techniques. *Sensors*, 22(13):4925, 2022.

[4] D. Bacciu and D. Numeroso. Explaining deep graph networks via input perturbation. *IEEE Transactions on Neural Networks and Learning Systems*, 2022.

[5] R. Bagnara, A. Bagnara, F. Biselli, M. Chiari, and R. Gori. Correct approximation of IEEE 754 floating-point arithmetic for program verification. *Constraints An Int. J.*, 27(1-2):29–69, 2022.

[6] G. Barthe, R. Crubillé, U. D. Lago, and F. Gavazzo. On Feller continuity and full abstraction. *Proc. ACM Program. Lang.*, 6(ICFP):826–854, 2022.

[7] F. F. Bazán and G. Mastroeni. First- and second-order optimality conditions for quadratically constrained quadratic programming problems. *J. Optim. Theory Appl.*, 193(1):118–138, 2022.

[8] A. Bechini, A. Bondielli, J. L. C. Bárcena, P. Ducange, F. Marcelloni, and A. Renda. A news-based framework for uncovering and tracking city area profiles: assessment in covid-19 setting. *ACM Trans. Knowl. Discov. Data*, 16(6):125:1–125:29, 2022.

[9] G. Bernardini, A. Conte, G. Gourdel, R. Grossi, G. Loukides, N. Pisanti, S. P. Pissis, G. Punzi, L. Stougie, and M. Sweering. Hide and Mine in Strings: hardness, algorithms, and experiments. *IEEE Trans. Knowl. Data Eng.*, 35(6):5948–5963, 2023.

[10] G. Bernardini, P. Gawrychowski, N. Pisanti, S. P. Pissis, and G. Rosone. Elastic-degenerate string matching via fast matrix multiplication. *SIAM J. Comput.*, 51(3):549–576, 2022.

[11] A. Bernasconi, A. Berti, V. Ciriani, G. M. Del Corso, and I. Fulginiti. XOR-AND-XOR logic forms for autosymmetric functions and applications to quantum computing. *IEEE Trans. Comput. Aided Des. Integr. Circuits Syst.*, 42(6):1861–1872, 2023.

[12] A. Bernasconi, S. Cimato, V. Ciriani, and M. C. Molteni. Multiplicative complexity of XOR based regular functions. *IEEE Trans. Computers*, 71(11):2927–2939, 2022.

[13] A. Bernasconi, V. Ciriani, and T. Villa. Exploiting symmetrization and D-reducibility for approximate logic synthesis. *IEEE Trans. Computers*, 71(1):121–133, 2022.

[14] R. Bevilacqua, G. M. Del Corso, and L. Gemignani. Orthogonal iterations on companion-like pencils. *J. Sci. Comput.*, 91(1):6, 2022.

[15] F. M. Bianchi, C. Gallicchio, and A. Micheli. Pyramidal Reservoir Graph Neural Network. *Neurocomputing*, 470:389–404, 2022.

[16] G. Bigi, L. Lampariello, and S. Sagratella. Combining approximation and exact penalty in hierarchical programming. *Optimization*, 71(8):2403–2419, 2022.

[17] C. Bodei, F. Gadducci, and G. Lettieri. Una storia nazionale: il museo degli strumenti per il calcolo. *Annali di Storia delle Università italiane*, 26(1):137–149, 2022.

[18] A. Boffa, P. Ferragina, and G. Vinciguerra. A learned approach to design compressed rank/select data structures. *ACM Trans. Algorithms*, 18(3):24:1–24:28, 2022.

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9.2 Conference papers

The following papers have been published in proceedings of national and international conferences in 2022 by the members of the Department:

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9.3 Book chapters

The following book chapters have been published in 2022 by the members of the Department:

[1] M. Cococcioni, A. Cudazzo, M. Pappalardo, and Y. D. Sergeyev. Multi-objective lexicographic mixed-integer linear programming: An infinity computer approach. In *Numerical Infinities and Infinitesimals in Optimization*, pages 119–149. Springer, 2022.

[2] G. Lanza, M. Passacantando, and M. G. Scutellà. A fast heuristic approach for the assignment and sequencing storage location problem under a two level storage policy. In *Optimization in Artificial Intelligence and Data Sciences: ODS, First Hybrid Conference, Rome, Italy, September 14-17, 2021*, pages 151–161. Springer, 2022.

[3] A. Micheli and M. Podda. Deep learning in cheminformatics. In *Deep Learning in Biology and Medicine*, pages 157–195. World Scientific, 2022.

[4] P. Milazzo. Process algebras in systems biology. *Systems Biology Modelling and Analysis: Formal Bioinformatics Methods and Tools*, pages 35–67, 2022.

9.4 Editorships

9.4.1 Conferences Proceedings

The following conference proceedings have been edited in 2022 by the members of the Department:

[1] V. Gervasi and A. Vogelsang, editors. *Requirements Engineering: Foundation for Software Quality - 28th International Working Conference, REFSQ 2022, Birmingham, UK, March 21-24, 2022, Proceedings*, volume 13216 of *Lecture Notes in Computer Science*. Springer, 2022.

9.4.2 Journals

The following journals have been edited in 2022 by the members of the Department:

[1] G. Bigi, J. E. Martìnez-Legazb, and E. Minisci, editors. *Editorial: Special Issue "17th Workshop on Advances in Continuous Optimization (EUROPT 2019)*, volume 71, Issue 8 of *Optimization: A Journal of Mathematical Programming and Operations Research: Optimization*, 2022.