

Vita, Work, and Publications of

Fabrizio Angiulli

1 Personal data

Place and date of birth: February 24, 1970, Turin, Italy

Nationality: Italian

Current Position: Full Professor of Computer Engineering, DIMES Department, University of Calabria, Italy

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2 Short Bio, Education, Positions

- *February 24, 1970:* Birth in Turin, Italy
- *1996:* Diploma Universitario degree (Bachelor) in Computer and System Engineering with highest honors, University of Calabria, Italy
- *1999:* Laurea degree (Master) in Computer Engineering with highest honors, University of Calabria, Italy
- *January 2001 – August 2006:* Research Technician at the Institute of High Performance Computing and Networking of the Italian National Research Council (ICAR-CNR), Italy
- *September 2006 – December 2011:* Assistant Professor of Computer Engineering, DEIS Department, University of Calabria, Italy
- *December 2011 – December 2018:* Associate Professor of Computer Engineering, DEIS Department, University of Calabria, Italy
- *Since December 2018:* Full Professor of Computer Engineering, DIMES Department, University of Calabria, Italy

3 Research themes

A list of main research subjects that have been pursued through years follows.

- Data Mining:
 - Anomaly detection using deep learning
 - Theoretical aspects of knowledge discovery

- Outlier detection and explanation in data
- Supervised and unsupervised classification
- Nearest-neighbor methods
- Distributed and parallel mining algorithms
- Mining uncertain data
- Artificial Intelligence:
 - eXplainable Artificial Intelligence (XAI)
 - Computational complexity of rule induction
 - Anomaly detection in knowledge bases
 - Computing minimal models of CNF theories
- Database theory and applications:
 - Metaquery answering
 - Indexing in metric spaces
 - Closest pair computation

4 Teaching

4.1 Academic Teaching

A list of the teaching activities follows.

- *2003–04*
 - *Computer Architectures*, graduate Electronic and Telecommunication Engineering, University “Mediterranea” of Reggio Calabria, Italy
 - *Introduction to Computer Science*, undergraduate Computer Engineering, University of Calabria, Italy
- *2004–05*
 - *Artificial Intelligence*, graduate Computer and Biomedical Engineering, University Magna Græcia” of Catanzaro, Italy
 - *Computer Architectures*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Introduction to Computer Science*, undergraduate Computer Engineering, University of Calabria, Italy
- *2005–06*
 - *Artificial Intelligence*, graduate Computer and Biomedical Engineering, University Magna Græcia” of Catanzaro, Italy

- *Computer Architectures*, undergraduate Computer Engineering, University of Calabria, Italy
- *Introduction to Computer Science*, undergraduate Computer Engineering, University of Calabria, Italy
- 2006–07
 - *Artificial Intelligence*, graduate Computer and Biomedical Engineering, University Magna Græcia” of Catanzaro, Italy
 - *Computer Architectures*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Databases and Information Systems*, undergraduate Management Engineering, University of Calabria, Italy
 - *Computer Programming*, undergraduate Management Engineering, University of Calabria, Italy
- 2007–08
 - *Artificial Intelligence*, graduate Computer and Biomedical Engineering, University Magna Græcia” of Catanzaro, Italy
 - *Databases and Information Systems*, undergraduate Management Engineering, University of Calabria, Italy
 - *Computer Programming*, undergraduate Management Engineering, University of Calabria, Italy
- 2008–09
 - *Databases and Information Systems*, undergraduate Management Engineering, University of Calabria, Italy
 - *Computer Programming*, undergraduate Management Engineering, University of Calabria, Italy
- 2009–10
 - *Computer Programming*, undergraduate Computer Engineering, University of Calabria, Italy
- 2010–11
 - *Computer Architectures II*, graduate Computer Engineering, University of Calabria, Italy
 - *Advanced Data Mining Concepts*, Ph.D. in Computer and System Engineering, University of Calabria, Italy
- 2011–12
 - *Computer Architectures II*, graduate Computer Engineering, University of Calabria, Italy;

- *Advanced Data Mining Concepts*, Ph.D. in Computer and System Engineering, University of Calabria, Italy;
- *2012–13*
 - *Computer Programming*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures II*, graduate Computer Engineering, University of Calabria, Italy;
 - *Advanced Data Mining Concepts*, Ph.D. in Computer and System Engineering, University of Calabria, Italy;
- *2013–14*
 - *Computer Programming*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures II*, graduate Computer Engineering, University of Calabria, Italy;
 - *Advanced Data Mining Concepts*, Ph.D. in Computer and System Engineering, University of Calabria, Italy;
- *2014–15*
 - *Computer Programming*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures II*, graduate Computer Engineering, University of Calabria, Italy;
 - *Image Analysis*, graduate Computer Engineering, University of Calabria, Italy;
- *2015–16*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
 - *Image Analysis*, graduate Computer Engineering, University of Calabria, Italy;
- *2016–17*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy

- *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
- *2017–18*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
- *2018–19*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
- *2019–20*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
 - *Machine and Deep Learning*, graduate Computer Engineering, University of Calabria, Italy;
- *2020–21*
 - *Logic Networks and Computer Organization*, undergraduate Computer Engineering, University of Calabria, Italy
 - *Computer Architectures*, graduate Computer Engineering, University of Calabria, Italy;
 - *Machine and Deep Learning*, graduate Computer Engineering, University of Calabria, Italy;

4.2 Supervision of Master Theses and Doctoral Dissertations

Since 2000, supervision of several master and Ph.D. theses. The following is a list of supervised Ph.D. theses.

- Fabio Fassetti (cycle XX): “Discovering Exceptional Individuals and Properties in Data” (F. Fassetti currently holds a Researcher position at the DIMES Department, University of Calabria, Italy)

- Estela Narvaez (cycle XXIX): “Data Mining Techniques for Large and Complex Data” (E. Narvaez currently holds a Professor position at the Universidad Nacional de Chimborazo (UNACH), Riobamba, Ecuador)
- Luciano Argento (cycle XXX): “Anomalies in Cyber Security: Detection, Prevention and Simulation Approaches”
- Luca Ferragina (cycle XXXV): currently investigating anomaly detection strategies using deep learning
- Simona Nisticò (cycle XXXVI): currently investigating explainable artificial intelligence techniques for machine learning

5 Services

5.1 Editorial board member

- Since August 2012, *Associate Editor* in the area of *Data Mining and Knowledge Discovery* of the *AI Communications* journal, the European journal of Artificial Intelligence

5.2 Program committee member

- 2005:** WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2006:** AIDM: *International Workshop on Integrating AI and Data Mining*, in conjunction with the Australian Joint Conference on Artificial Intelligence — SAC: *ACM Symposium on Applied Computing* Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2007:** AIDM: *International Workshop on Integrating AI and Data Mining*, in conjunction with the Australian Joint Conference on Artificial Intelligence — SAC: *ACM Symposium on Applied Computing* Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2008:** ICWAPR: *International Conference on Wavelet Analysis and Pattern Recognition* — IFIP-AI: *IFIP International Conference on Artificial Intelligence* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2009:** ICTAI: *International Conference on Tools with Artificial Intelligence* — IDA: *International Symposium on Intelligent Data Analysis* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining.
- 2010:** ADBIS: *East-European Conference on Advances in Databases and Information Systems*, Track on Warehousing and OLAPing Complex, Spatial

and Spatio-Temporal Data — IDA: *International Symposium on Intelligent Data Analysis* — IFIP-AI: *IFIP International Conference on Artificial Intelligence* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining.

- 2011:** AAAI: *AAAI Conference on Artificial Intelligence* — EIDWT: *International Conference on Emerging Intelligent Data and Web Technologies* — MCP: *AI*IA International Workshop on Mining Complex Patterns* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining.
- 2012:** AAAI: *AAAI Conference on Artificial Intelligence* — IDA: *International Symposium on Intelligent Data Analysis* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2013:** DATA ANALYTICS: *International Conference on Data Analytics* — IDA: *International Symposium on Intelligent Data Analysis* — IJCAI: *International Joint Conference on Artificial Intelligence* — NBiS: *International Conference on Network-Based Information Systems* — ODD: *ACM KDD Workshop on Outlier Detection and Description* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2014:** IDA: *International Symposium on Intelligent Data Analysis* — ODD: *ACM KDD Workshop on Outlier Detection and Description* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2015:** ICDM: *International Conference on Data Mining*, PhD Forum — IDA: *International Symposium on Intelligent Data Analysis* — IJCAI: *International Joint Conference on Artificial Intelligence* — ODD: *ACM KDD Workshop on Outlier Detection and Description* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2016:** ECML-PKDD: *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* — IDA: *International Symposium on Intelligent Data Analysis* — IJCAI: *International Joint Conference on Artificial Intelligence* — ODD: *ACM KDD Workshop on Outlier Detection and Description* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2017:** ECML-PKDD: *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* — IDA: *International Symposium on Intelligent Data Analysis* — IJCAI: *International Joint Conference on Artificial Intelligence* — SAC: *ACM Symposium on Applied Computing*, Track on Data Mining — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.

- 2018:** ECML-PKDD: *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* — IDA: *International Symposium on Intelligent Data Analysis* — ODD: *ACM KDD Workshop on Outlier Detection and Description* — SAC: *ACM Symposium on Applied Computing, Track on Data Mining* — WI: *IEEE/WIC/ACM International Conference on Web Intelligence*.
- 2019:** ECML-PKDD: *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* — ADF: *2nd ACM KDD Workshop on Anomaly Detection in Finance* — SAC: *ACM Symposium on Applied Computing, Track on Data Mining* — AIxIA: *18th International Conference of the Italian Association for Artificial Intelligence*.
- **Area Chair** of the *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* (ECMLPKDD), 2019
 - **Area Chair** of the *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* (ECMLPKDD), 2020
 - **Area Chair** of the *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery* (ECMLPKDD), 2021
 - **Senior Program Committee Member** of the IJCAI 2020

5.3 Journal reviewer

A list of journals for which he has acted as a reviewer follows.

- *ACM Transactions on Knowledge Discovery in Data* (TKDD);
- *IEEE Transactions on Knowledge and Data Engineering* (TKDE);
- *IEEE Transactions on Pattern Analysis and Machine Intelligence* (TPAMI);
- *IEEE Transactions on Neural Networks* (TNN);
- *IEEE Transactions on Systems, Man and Cybernetics - Part B* (SMCB);
- *Machine Learning*, Springer (MACH);
- *Pattern Recognition*, Elsevier (PR);
- *Journal of Machine Learning Research* (JMLR);
- *The VLDB Journal*, Springer (VLDB J.);
- *Data Mining and Knowledge Discovery*, Springer (DAMI);
- *Information Systems*, Elsevier (IS);
- *Knowledge and Information Systems*, Springer (KAIS);

- *Journal of Symbolic Computation*, Elsevier (JSC);
- *Information Sciences*, Elsevier (INS);
- *Data & Knowledge Engineering*, Elsevier (DKE);
- *Statistical Analysis and Data Mining*, John Wiley & Sons (SAM);
- *Pattern Recognition Letters*, Elsevier (PRL);
- *AICommunications*, IOS Press (AICom);
- *International Journal on Artificial Intelligence Tools*, World Scientific (IJAIT);
- *Journal of Computer Science and Technology*, Springer (JCST);
- *Transportation Research - Part C*, Elsevier (TRC);
- *The Open Artificial Intelligence Journal*, Bentham Open (TOAIJ);
- *Journal of the Zhejiang University - Computers & Electronics* (JZUS-C),
- *Rivista di Informatica*, AICA.

5.4 Conference reviewer

A list of conferences for which he has acted as a reviewer follows.

- AAAI: *Conf. of the American Association for Artificial Intelligence*;
- ADMA: *Int. Conf. on Advanced Data Mining and Applications*;
- AIDM: *Int. Workshop on Integrating AI and Data Mining*;
- BIO-LOGICAL: *Workshop on Logic-based approaches in Bioinformatics - Int. Conf. AI*IA*;
- DASFAA: *Database Systems For Advanced Applications*;
- DEXA: *Int. Conf. on Database and Expert Systems Applications*;
- DBPL: *Int. Symposium on Database Programming Languages*;
- DaWak: *Int. Conf. on Data Warehousing and Knowledge Discovery*;
- DBA: *Int. Conf. on Databases and Applications*;
- DS: *Int. Conf. on Discovery Science*;
- ECSQARU: *European Conf. on Symbolic and Quantitative Approaches to Reasoning with Uncertainty*;
- IAT: *IEEE/WIC/ACM Int. Conf. on Intelligent Agent Technology*;

- ICDM: *IEEE Int. Conf. on Data Mining*;
- ICDT: *Int. Conf. on Database Theory*;
- ICTAI: *Int. Conf. on Tools with Artificial Intelligence*;
- IDA: *Int. Symp. on Intelligent Data Analysis*;
- IDEAS: *Int. Database Engineering & Application Symposium*;
- IFIP-AI: *IFIP Int. Conf. on Artificial Intelligence*;
- IJCAI: *Int. Joint Conf. on Artificial Intelligence*;
- ITCC: *IEEE Int. Conf. on Information Technology: Coding and Computing*;
- JELIA: *European Conf. on Logics in Artificial Intelligence*;
- PKDD: *European Conf. on Principles and Practice of Knowledge Discovery in Databases*;
- PODS: *ACM Symposium on Principles of Database Systems*;
- SAC: *ACM Symposium on Applied Computing*;
- SEBD: *Convegno Nazionale su Sistemi Evoluti per Basi di Dati*;
- SDM: *SIAM Int. Conf. on Data Mining*;
- SSDBM: *Int. Conf. on Scientific and Statistical Database Management*;
- SUM: *Int. Conf. on Scalable Uncertainty Management*;
- WI: *IEEE/WIC/ACM Int. Conf. on Web Intelligence*.

6 Projects

- *ADAPT* (1999): funded by EU. Technological transfer. Member of the project team at DEIS.
- *Models and techniques for integration, querying and metaquerying of data warehouses* (2000–2002): funded by the Research Ministry of Italy. Data warehouses. Member of the project team at DEIS.
- *Ambienti intelligenti ed adattativi di sostegno all'e-government ed all'e-learning nelle pubbliche amministrazioni locali* (2000-2006): funded by the Research Ministry of Italy. Knowledge management. Member of the project team at DEIS and supervisor of the Data Cleaning task. (This project was selected as one of the 32 “Projects of Excellence” by the Research Ministry out of the over two thousands funded within the PON program 2000-2006).

- *Rule induction, metaquerying and structured pattern extraction over biological databases* (2003–2004), funded by the Research Ministry of Italy. Bioinformatics. Member of the project team at DEIS.
- *Piattaforme abilitanti per griglie computazionali ad elevate prestazioni orientate ad organizzazioni virtuali scalabili* (2003-2005): funded by the Research Ministry of Italy. Grid computing. Member of the project team at ICAR-CNR.
- *Automa* (January 2007 – June 2008): funded by Regione Calabria and the Research Ministry of Italy. Software systems for automotive logistics support. Member of the project team at DEIS.
- *OpenKnowTech* (May 2009 – June 2011): funded by EU. Open source software development. Member of the project team at DEIS and supervisor of the logistic process analysis task.
- *Rialto Plus* (July 2009 – December 2010): funded by Regione Calabria. Business Intelligence. Leader of the project team at DEIS.
- *Geo-Analytical System* (2011 – 2012): funded by Regione Calabria. Geo-referenced business analysis. Member of the project team at DEIS.
- *TETRIS* (April 2012 – May 2013): funded by the Economics Development Ministry of Italy. Image processing. Member of the project team at DEIS.
- *IDEAS* (January 2010 – June 2012): funded by the Economics Development Ministry of Italy. Design and development of open source services. Member of the project team at DEIS.
- *FRAME* (June 2011 – May 2013): funded by the Research Ministry of Italy. Multimedia data management and retrieval. Leader of the project team at DEIS.
- *Cybersecurity* (January 2015 – June 2016): funded by the Research Ministry of Italy. Multimedia data management and retrieval. Member of the project team at DIMES.
- *IDSERVICE* (January 2017 – December 2019): funded by the Research Ministry of Italy. Blockchain and digital identity. Member of the project team at DIMES.
- *SPIDASEC* (November 2017 – October 2019): funded by Regione Calabria. SPID advanced security. Leader of the project team at DIMES.
- *SIARTE* (November 2017 – October 2019): funded by Regione Calabria. Analysis of tax data. Leader of the project team at DIMES.

7 List of Publications of Fabrizio Angiulli

Articles in International Journals

- [1] G. Pang, F. Angiulli, M. Cucuringu, H. Liu. Guest Editorial: Non-IID Outlier Detection in Complex Contexts. Special Issue of *IEEE Intelligent Systems* (IS), 2021.
- [2] F. Angiulli, F. Fassetti. Uncertain Outlier Detection with Arbitrarily Shaped Data Objects. *Journal of Intelligent Information Systems* (JIIS), Springer, published online: 25 October 2020.
- [3] F. Angiulli, S. Basta, S. Lodi, C. Sartori. Reducing distance computations for distance-based outliers. *Expert Systems with Applications* (ESWA), Elsevier, 147:113215, June 2020.
- [4] F. Angiulli. CFOF: A Concentration Free Measure for Anomaly Detection. *ACM Transactions on Knowledge Discovery from Data* (TKDD), 14(1):Article 4, January 2020.
- [5] F. Angiulli, E. Narvaez. Pruning Strategies for Nearest Neighbor Competence Preservation Learners. *Neurocomputing* (NEUCOM), Elsevier, 308:8-20, September 2018.
- [6] F. Angiulli. On the Behavior of Intrinsically High-Dimensional Spaces: Distances, Direct and Reverse Nearest Neighbors, and Hubness. *Journal of Machine Learning Research* (JMLR), 18(170):1-60, 2018.
- [7] F. Angiulli, L. Argento, A. Furfaro, A. Parise. A Hierarchical Hybrid Framework for Modelling Anomalous Behaviours. *Simulation Modelling Practice and Theory* (SIMPAT), Elsevier, 82:103-115, March 2018.
- [8] F. Angiulli, L. Argento, A. Furfaro. Exploiting content spatial distribution to improve detection of intrusions. *ACM Transactions on Internet Technology* (TOIT), 18(2):Article 25, February 2018.
- [9] F. Angiulli, F. Fassetti, G. Manco, L. Palopoli. Outlying Property Detection with Numerical Attributes. *Data Mining and Knowledge Discovery* (DAMI), Springer, 31(1):134-163, 2017.
- [10] F. Angiulli, S. Basta, S. Lodi, C. Sartori. GPU Strategies for Distance-based Outlier Detection. *IEEE Transactions on Parallel and Distributed Systems* (TPDS), 27(11):3256-3268, 2016.
- [11] F. Angiulli, F. Fassetti. Towards generalizing the unification with statistical outliers: the Gradient Outlier Factor measure. *ACM Transactions on Knowledge Discovery from Data* (TKDD), 10(3):Article 27, January 2016.
- [12] F. Angiulli, R. Ben-Eliyahu-Zohary, L. Palopoli. Restricted default theories: expressive power and outlier detection tasks. *Theoretical Computer Science* (TCS), 564:107-130, January 2015.

- [13] F. Angiulli, R. Ben-Eliyahu - Zohary, F. Fassetti, L. Palopoli. On the Tractability of Minimal Model Computation for Some CNF Theories. *Artificial Intelligence (AIJ)*, Elsevier, 210:56-77, May 2014.
- [14] F. Angiulli, F. Fassetti. Exploiting Domain Knowledge to Detect Outliers. *Data Mining and Knowledge Discovery (DAMI)*, Springer, 28(2):519-568, March 2014.
- [15] N. Di Mauro, P. Frasconi, F. Angiulli, D. Bacciu, M. de Gemmis, F. Esposito, N. Fanizzi, S. Ferilli, M. Gori, F. A. Lisi, P. Lops, D. Malerba, A. Micheli, M. Pelillo, F. Ricci, F. Riguzzi, L. Saitta, G. Semeraro. Italian Machine Learning and Data Mining research: The last years. *Intelligenza Artificiale*, Special Issue Celebrating 25 years of the Italian Association for Artificial Intelligence, 7(2):77-89, November 2013.
- [16] F. Angiulli, F. Fassetti. Nearest Neighbor-Based Classification of Uncertain Data. *ACM Transactions on Knowledge Discovery from Data*, accepted for publication on April 9, 2012.
- [17] F. Angiulli, S. Basta, S. Lodi, C. Sartori. Distributed Strategies for Mining Outliers in Large Data Sets. *IEEE Transactions on Knowledge and Data Engineering*, accepted for publication on March 17, 2012.
- [18] F. Angiulli, F. Fassetti, L. Palopoli. Discovering Characterizations of the Behavior of Outlier Sub-Populations. *IEEE Transactions on Knowledge and Data Engineering*, accepted for publication on February 23, 2012.
- [19] F. Angiulli, F. Fassetti. Indexing Uncertain Data in General Metric Spaces. *IEEE Transactions on Knowledge and Data Engineering*, 24(9):1640-1657, September 2012.
- [20] F. Angiulli. Prototype-based Domain Description for One-Class Classification. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 34(6):1131-1144, June 2012.
- [21] F. Angiulli, G. Greco, L. Palopoli. Detecting and Repairing Anomalous Evolutions in Noisy Environments. *Annals of Mathematics and Artificial Intelligence*, Springer, 60(3-4):179-228, December 2010.
- [22] F. Angiulli, R. Ben-Eliyahu - Zohary, L. Palopoli. Outlier detection for simple default theories. *Artificial Intelligence*, Elsevier, 174(15):1247-1253, October 2010.
- [23] Fabrizio Angiulli, Fabio Fassetti. Distance-based outlier queries in data streams: the novel task and algorithms. *Data Mining and Knowledge Discovery – Special Issue on Outlier Detection for Knowledge Discovery*, Springer, 20(2):290-324, March 2010.

- [24] F. Angiulli, A. Astorino. Scaling Up Support Vector Machines using Nearest Neighbor Condensation. *IEEE Transactions on Neural Networks*, 21(2):351-357, February 2010.
- [25] Fabrizio Angiulli, Fabio Fassetti, Luigi Palopoli. Detecting Outlying Properties of Exceptional Objects. *ACM Transactions on Database Systems*, 34(1):Article 7, April 2009.
- [26] F. Angiulli, F. Fassetti. DOLPHIN: an Efficient Algorithm for Mining Distance-Based Outliers in Very Large Datasets. *ACM Transactions on Knowledge Discovery from Data*, 3(1):Article 4, March 2009.
- [27] F. Angiulli, R. Ben-Eliyahu - Zohary, L. Palopoli. Outlier Detection using Default Reasoning. *Artificial Intelligence*, Elsevier, 172(16-17):1837-1872, November 2008.
- [28] F. Angiulli, E. Cesario, C. Pizzuti. Random Walk Biclustering for Microarray Data. *Information Sciences*, Elsevier, 178(6):1479-1497, March 2008.
- [29] F. Angiulli, G. Greco, L. Palopoli. Outlier Detection by Logic Programming. *ACM Transactions on Computational Logic*, 9(1):Article No. 7, December 2007.
- [30] F. Angiulli, G. Folino. Distributed Nearest Neighbor Based Condensation of Very Large datasets. *IEEE Transactions on Knowledge and Data Engineering*, 19(12):1593-1606, December 2007.
- [31] F. Angiulli. Fast Nearest Neighbor Condensation for Large dataset Classification. *IEEE Transactions on Knowledge and Data Engineering*, 19(11):1450-1464, November 2007.
- [32] F. Angiulli. Condensed Nearest Neighbor Data Domain Description. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 29(10):1746-1758, October 2007.
- [33] F. Angiulli, S. Basta, C. Pizzuti. Distance-Based Detection and Prediction of Outliers. *IEEE Transactions on Knowledge and Data Engineering*, 18(2):145-160, February 2006.
- [34] F. Angiulli. Enumerating Consistent Metaquery Instantiations. *AICommunications*, IOS Press, 18(2):117-141, 2005.
- [35] F. Angiulli, C. Pizzuti. An Approximate Algorithm for Top- k Closest Pairs Join Query in Large High Dimensional Data. *Data & Knowledge Engineering*, Elsevier, 53(3):263-281, June 2005.
- [36] F. Angiulli, C. Pizzuti. Approximate k -Closest-Pairs in Large High-Dimensional datasets. *Journal of Mathematical Modelling and Algorithms*, Kluwer, 4(2):149-179, June 2005.

- [37] F. Angiulli, C. Pizzuti. Outlier Mining in Large High-Dimensional datasets. *IEEE Transactions on Knowledge and Data Engineering*, 17(2):203-215, February 2005.
- [38] F. Angiulli, G. Ianni, L. Palopoli. On the Complexity of Inducing Categorical and Quantitative Association Rules. *Theoretical Computer Science*, Elsevier, 314(1-2):217-249, 25 February 2004.
- [39] F. Angiulli, R. Ben-Eliyahu-Zohary, G. Ianni, L. Palopoli. Computational Properties of Metaquerying Problems. *ACM Transactions on Computational Logic*, 4(2):149-180, April 2003.
- [40] F. Angiulli, L. Palopoli, R. Torlone. The GPR System: An Architecture for Integrating Active and Deductive Rules for Complex Databases Objects. *Theory and Practice of Object Systems*, John Wiley & Sons, 3(4):285-301, 1997.

Book Chapters and Conference Articles

- [41] F. Angiulli, F. Fassetti, L. Ferragina. Improving deep unsupervised anomaly detection by exploiting VAE latent space distribution. In *Proceedings of the 23rd International Conference on Discovery Science (DS)*, Thessaloniki, Greece, October 19-21, 2020.
- [42] F. Angiulli, F. Fassetti, L. Palopoli, C. Serrao. A Density Estimation Approach for Detecting and Explaining Exceptional Values in Categorical Data. In *Proceedings of the 22nd International Conference on Discovery Science (DS)*, Split, Croatia, October 28-30, 2019.
- [43] A. Furfaro, L. Argento, D. Saccà, F. Angiulli, F. Fassetti. An Infrastructure for Service Accountability based on Digital Identity and Blockchain 3.0. In *Proceedings of the IEEE Conference on Computer Communications Workshops (INFOCOM)*, Paris, France, April 2- May 2, 2019.
- [44] F. Angiulli, F. Fassetti, A. Furfaro, A. Piccolo, D. Saccà. Achieving Service Accountability through Blockchain and Digital Identity. In *Proceedings of the 30th International Conference on Advanced Information Systems Engineering Forum (CAiSE)*, Tallin, Estonia, June 11-15, 2018.
- [45] F. Angiulli. Data Mining: Outlier Detection. In *Encyclopedia of Bioinformatics and Computational Biology*, Elsevier, 2018.
- [46] F. Angiulli, F. Fassetti, L. Palopoli and D. Ursino. A Tour from Regularities to Exceptions. In *A comprehensive guide through the Database research over the last 25 years*, Series *Studies in Big Data*, vol. 31, p. 307-322, Springer, 2018.

- [47] F. Angiulli. Concentration Free Outlier Detection. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD)*, Skopje, Macedonia, September 18-22, 2017. Series *Lecture Notes in Computer Science*, Springer, vol. 10534, p. 3-19.
- [48] F. Angiulli, R. Ben-Eliyahu-Zohary, F. Fassetti and L. Palopoli. Modular Construction of Minimal Models. *Proceedings of the 14th International Conference on Logic Programming and Nonmonotonic Reasoning (LPNMR)*, Hanasaari Conference Center, Espoo, Finland, July 3-6, 2017. Series *Lecture Notes in Computer Science*, Springer, vol. 10377, p. 43-48.
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