

Alessandro Renda

Ph.D. Smart Computing

Curriculum Vitae prepared on June 25, 2021

PERSONAL INFORMATION

PLACE AND DATE OF BIRTH: Trieste, 20 December 1990
NATIONALITY: Italian
EMAIL: alessandro.renda@ing.unipi.it

CURRENT POSITION

NOV 2020 - PRESENT **Research Associate**
Dept. Information Engineering, University of Pisa.
PROJECT: Development of data mining algorithms for data streams

EDUCATION AND TRAINING

NOV 2017 - APR 2021 **Ph.D. in Smart Computing**,
University of Firenze, Pisa, Siena
THESIS TITLE: Algorithms and Techniques for Data Stream Mining
ADVISOR: Ing. Alessio Bechini

JAN 2014 - JUL 2017 **Master of Science in Biomedical Engineering**
University of Pisa
FINAL MARK: 110/110 cum laude
THESIS TITLE: Deep Learning for Emotion Classification through Facial Expression Images: Design and Development of Ensemble Solutions.
SUPERVISORS: Ing. Alessio Bechini, Prof. Francesco Marcelloni.

SEPT 2009 - JUL 2013 **Bachelor of Science in Information Engineering**
University of Trieste
FINAL MARK: 104/110

RESEARCH SCHOLARSHIPS

AUG 2017 - OCT 2017 **Dept. Information Engineering**, University of Pisa.
TITLE: "Use of optimization algorithms in the design of multiplex PCR libraries for DNA analysis with NGS tools"
DURATION: 3 months

RESEARCH PROJECTS AS PARTICIPANT

- JAN 2021 - PRESENT **Dept. Information Engineering**, University of Pisa.
FUNDING: Horizon 2020: GA 101015956 - European Commission.
TITLE: "Hexa-X: A flagship for B5G/6G vision and intelligent fabric of technology enablers connecting human, physical, and digital worlds."
- MAJ 2018 - NOV 2019 **Dept. Information Engineering**, University of Pisa.
FUNDING: POR FESR 2014-2020 - Regione Toscana.
TITLE: "SIBILLA: Design and development of a Business Intelligence system for Industry 4.0, with collaboration and automatic interaction functionalities, Big Data Analytics and machine learning to extract knowledge and perform predictive analysis by integrating big data acquired from the Web and from Internet of Things (IoT) architectures"

SERVICE TO THE RESEARCH COMMUNITY

Reviewing activity for **International Journals**:

- IEEE Transactions on Fuzzy Systems
- IEEE Access
- Expert Systems With Applications
- Soft Computing
- Online Social Network and Media
- Wireless Networks

Reviewing activity for **International Conferences and Workshops**:

- EuCNC 2021
- Helmeto 2021
- IEEE EAIS2020
- APPLEPIES2018

PARTICIPATION AT CONFERENCES, WITH CONTRIBUTED TALKS

- 19-24 JUL 2020 World Congress on Computational Intelligence, **FUZZ-IEEE @ WCCI 2020**, Glasgow, United Kingdom (Virtual)
- 20-21 FEB 2020 International Conference on Information and Computer Technologies, **ICICT 2020**, London, United Kingdom
- 23-26 JUN 2019 International Conference on Fuzzy Systems, **FUZZ-IEEE 2019**, NewOrleans, Louisiana USA
- 13-16 SEP 2018 4th International Conference on Machine Learning, Optimization & Data science, **LOD 2018**, Volterra, Italy
- 28 AUG - 5 SEP 2018 The 2nd Erice International Conference on Mathematical and Computational Epidemiology – **MathCompEpi2018**, Erice, Italy

TEACHING ACTIVITY

- A.Y. 2020-2021 **Dept. Information Engineering**, University of Pisa.
Assistant Lecturer of Computational Intelligence and Deep Learning
M.Sc. in Artificial Intelligence and Data Engineering. 20 Hours. 40 students.
- Nov 2020 **School of Engineering**, University of Pisa.
Seminar at the course Data Mining and Machine Learning
“Introduction to Python and SkLearn, Text Mining in Python”.
M.Sc. in Artificial Intelligence and Data Engineering. 6 Hours. 30 students.
- A.Y. 2019-2020 **Dept. Information Engineering**, University of Pisa.
Assistant Lecturer of Computational Intelligence
M.Sc. in Embedded Computing Systems. 20 Hours. 40 students.
- A.Y. 2018-2019 **Dept. Information Engineering**, University of Pisa.
Assistant Lecturer of Computational Intelligence
M.Sc. in Embedded Computing Systems. 20 Hours. 40 students.
- Nov 21, 2019 **School of Engineering**, University of Pisa.
Seminar at the course Advanced Data Mining and Machine Learning
Research Activity Presentation. 1 Hour. 40 students.
- Nov 15, 2019 **School of Engineering**, University of Pisa.
Seminar: “Research in Artificial Intelligence: The Case of the Project Sibilla”. 1 Hour. 20 students.

CO-SUPERVISED THESIS AND TUTORING ACTIVITY

- A. Botti. Master Thesis, co-supervisor with Prof. A. Bechini, R. D’aurizio, F. Marcelloni.
“Addressing High-dimensional Biclustering of Cancer Omics Data: Indications from Computational Experimentations”.
- G. Anastasi. Master Thesis, co-supervisor with Prof. F. Marcelloni, P. Ducange.
“Design and implementation of Federated Clustering Algorithms”.
- M. Criscione. Master Thesis, co-supervisor with Prof. P. Ducange, F. Marcelloni.
Title: “Design and Implementation of an Adaptive Fuzzy Density-based Clustering Algorithm for Streaming data”.
- L. D. Gervasio. Master Thesis, co-supervisor with Prof. A. Bechini.
Title: “Development of a deep learning system for patient-specific real-time arrhythmia detection: Addressing choice of features and data imbalance”.
- D. Agosti. Master Thesis, co-supervisor with Prof. A. Bechini, B. Lazzerini, F. Marcelloni.
Title: “Exploitation of web and social network data for event detection and opinion mining: an enterprise application use case.”
- G. Guerrisi. Master Thesis, co-supervisor with Prof. A. Bechini.
Title: “A Novel Deep Learning Solution for Predicting the Secondary Structure of RNA.”
- A. Aliperti. Master Thesis, co-supervisor with Prof. A. Bechini, F. Marcelloni.
Title: “A novel fuzzy density-based clustering algorithm for streaming data”.

LANGUAGES

ITALIAN: **Mothertongue**
ENGLISH: **Certificated C1 level in Academic Writing and Speaking Skills.**

EXTRACURRICULAR ACTIVITY

SUMMER SCHOOL **DeepLearn2019**, Warsaw, Poland
The 3rd International Summer School on Deep Learning

UNIVERSITY COURSES **24 CFU - Training credits for teaching**
Anthropo-psycho-pedagogical disciplines and teaching methodologies and technologies.

UNIVERSITY COURSES **Advanced training courses**
European Project Planning: Techniques and Methods

ONLINE COURSES **Machine Learning** - Columbia University (from edx.org)

RESEARCH ACTIVITY

He has recently focused on the following areas of research:

- Data Stream Mining
- Web Mining and Social Sensing

A discussion of the main scientific results obtained in these fields is reported in the following.

DATA STREAM MINING

The capability of mining knowledge from data streams has gained increasing attention in recent years. However, traditional clustering algorithms need to be revised in order to cope with the challenges imposed by the streaming setting. The main intuition of our work lies in the adoption of concepts from fuzzy set theory to improve the accuracy of a density based clustering algorithm, adequately tailored to the streaming setting. In [C1] SF-DBSCAN (Streaming Fuzzy DBSCAN) has been proposed as a first fuzzy extension of DBSCAN algorithm for data streams. Besides inheriting the benefits of density-based clustering algorithms it leverages the introduction of a fuzzy membership function that enhances its modelling capability and allows discovering clusters with fuzzy overlapping borders. In [J3] we have extended the previous proposal with the aim of ensuring its computational efficiency and enhancing its capability to adapt to concept drift. The issue of input parameter setting in a fuzzy extension of DBSCAN has been addressed in [C3] through the proposal of a novel heuristic.

WEB MINING AND SOCIAL SENSING

Social Networks and microblogs represent a modern and valuable source of information for mining the public opinion towards specific topics. In [J1], we have designed and implemented a stance detection system to monitor the polarity of the opinion towards the vaccination topic by considering the messages posted on Twitter. A long-term monitoring campaign allowed us to verify that our text classification system is able to uncover users' involvement and opinion shifts, possibly associated with specific socio-political events related to the vaccination topic. In [J4] we have proposed a novel methodological workflow for a fine-grained and more plausible characterization of the public opinion about the vaccination topic on temporal and spatial scales. In [J5] we have proposed a novel method for addressing event-driven concept drift in tweets classification.

Knowledge discovery from the web and social networks is also of the utmost importance in the field of Business Intelligence (BI). In the context of the Sibilla Regional Project we have developed a software prototype for a Web Crawling and Data Mining (WCDM) module, exploiting web crawling, preprocessing, text analysis, and data mining techniques. The goal of the WCDM module (embedded in a BI system for Industry 4.0) is to capture events that can lead to business opportunity, as well as to uncover trends of brand reputation and user opinion towards specific topics. Part of the project results have been presented in [C4].

PAST RESEARCH TOPICS

Deep Learning for Facial Expression Recognition (FER): Among affective computing tasks, the recognition of the emotion expressed by a person enables applications in different fields. Our work has focused on the application of Deep Learning techniques to perform automatic FER from images. First, in [J2], a proper Convolutional Neural Network for features extraction and inference has been designed. Then, we have investigated several aspects of ensemble learning: the effectiveness of several strategies to generate the variability among base classifiers, the performance of different aggregation schemes and the effect of increasing the number of base classifiers. These topics have been further discussed in [C2]: here the comparison of two simple ensemble design strategies has been carried out under two different scenarios: training from scratch an ad-hoc model and fine-tuning a pre-trained model.

LIST OF PUBLICATIONS

INTERNATIONAL JOURNALS

- J5. A. Bechini, A. Bondielli, P. Ducange, F. Marcelloni, and **A. Renda**. Addressing event-driven concept drift in twitter stream: A stance detection application. *IEEE Access*, 9: 77758–77770, 2021. doi: 10.1109/ACCESS.2021.3083578
- J4. A. Bechini, P. Ducange, F. Marcelloni, and **A. Renda**. Stance analysis of twitter users: the case of the vaccination topic in italy. *IEEE Intelligent Systems*, pages 1–1, 2020b. doi: 10.1109/MIS.2020.3044968
- J3. A. Bechini, F. Marcelloni, and **A. Renda**. Tsf-dbscan: a novel fuzzy density-based approach for clustering unbounded data streams. *IEEE Transactions on Fuzzy Systems*, pages 1–1, 2020c. doi: 10.1109/TFUZZ.2020.3042645
- J2. **A. Renda**, M. Barsacchi, A. Bechini, and F. Marcelloni. Comparing ensemble strategies for deep learning: An application to facial expression recognition. *Expert Systems with Applications*, 136:1 – 11, 2019b. ISSN 0957-4174. doi: <https://doi.org/10.1016/j.eswa.2019.06.025>
- J1. E. D’Andrea, P. Ducange, A. Bechini, **A. Renda**, and F. Marcelloni. Monitoring the public opinion about the vaccination topic from tweets analysis. *Expert Systems with Applications*, 116:209–226, 2019. doi: 10.1016/j.eswa.2018.09.009

INTERNATIONAL CONFERENCES

- C6. A. Bechini, A. Bondielli, J.L. Corcuera Bárcena, P. Ducange, F. Marcelloni, and **A. Renda**. Mining the Stream of News for City Areas Profiling: a Case Study for the City of Rome. In *7th IEEE International Workshop on Sensors and Smart Cities (SSC2021)*, (accepted)
- C5. **A. Renda**, P. Ducange, G. Gallo, and F. Marcelloni. XAI Models for Quality of Experience Prediction in Wireless Networks. In *2021 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, (accepted)
- C4. A. Bechini, B. Lazzerini, F. Marcelloni, and **A. Renda**. Integration of web-scraped data in cpm tools: The case of project sibilla. In *Proceedings of Fifth International Congress on Information and Communication Technology*, pages 279–287. Springer Singapore, 2021. ISBN 978-981-15-5859-7. doi: https://doi.org/10.1007/978-981-15-5859-7_27
- C3. A. Bechini, M. Criscione, P. Ducange, F. Marcelloni, and **A. Renda**. FDBSCAN-APT: A Fuzzy Density-based Clustering Algorithm with Automatic Parameter Tuning. In *2020 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, pages 1–8, 2020a. doi: 10.1109/FUZZ48607.2020.9177702
- C2. **A. Renda**, M. Barsacchi, A. Bechini, and F. Marcelloni. Assessing Accuracy of Ensemble Learning for Facial Expression Recognition with CNNs. In *Machine Learning, Optimization, and Data Science*, pages 406–417. Springer International Publishing, 2019a. doi: 10.1007/978-3-030-13709-0_34
- C1. A. Aliperti, A. Bechini, F. Marcelloni, and **A. Renda**. A Fuzzy Density-based Clustering Algorithm for Streaming Data. In *2019 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, pages 1–6, June 2019. doi: 10.1109/FUZZ-IEEE.2019.8858909

PRIVACY

In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document