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Federico Simonetta

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Nationality: Italian

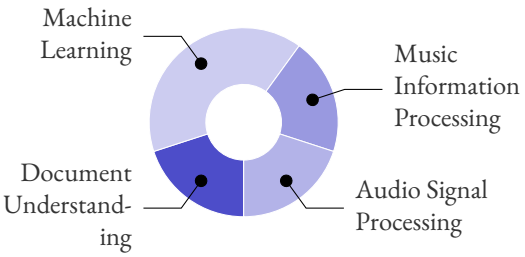
Research Interests

I have always been fascinated by the intersection of music, sound, and human cultures worldwide, and how these elements can enhance our well-being. This fascination led me to earn a Classical Guitar degree and study music composition at an academic level. During my Ph.D., I conceptualized an application to democratize music creation, aiming to make high-quality music recording accessible to everyone using affordable microphones and virtual instruments.

My interest also extends to developing statistical and machine learning tools for in-depth music analysis, with a focus on its cultural evolution. This interest led me to the symbolic level of music, particularly in the "Didone" and "Con Espressione" ERC AdG projects.

Currently, I am part of the "Laudare" ERC AdG project, where I explore methods to extract symbolic information from digital images of music sheets, a field known as historical document understanding. In addition, I mentor Bachelor and Master thesis students on applying machine learning methods to digital audio processing, covering areas like security, sound event detection, and emotion classification.

Main Interests



Scientific Output

Source	Citations	h-index
Google Scholar [link]	208	7
Scopus [link]	114	5

The full list of publications is available at the end of this document

Education

2018-2021 **Ph.D.** in Computer Science, University of Milan. Thesis: *Music Interpretation Analysis. A Multimodal Approach to Score-Informed Resynthesis of Piano Recordings*
2016-2018 **MS** in Computer Engineering, University of Padova
2015-2018 Private Music Composition Lessons (Teachers: Fabio Crosera and Gianluca Baldi), Padova
2015 **MA** in Classical Guitar, Conservatoire of Pavia
2011-2014 BS in Computer and Electronic Engineering, University of Pavia

Work

Research

2023-today Post-doc researcher, "Laudare" ERC AdG project, Gran Sasso Science Institute
2022-2023 Post-doc researcher, "Didone" ERC AdG project, Instituto Complutense de Ciencias Musicales, Universidad Complutense de Madrid
2018-2021 Ph.D. Candidate, University of Milan
2018 Research Assistant, "Con Espressione" ERC AdG project, OFAI - Austrian Research Institute for Artificial Intelligence, Vienna

Teaching

2018-2024 Co-supervisor for Bachelor and Master Thesis, University of Milan
2020-2021 Assistant for Advanced Multivariate Statistics (Python lab), University of Milan (Data Science)
2020-2021 Exam Assistant for various courses, University of Milan (Data Science)
2020 Assistant for Java Programming, University of Milan (Mathematics)
2020 Assistant for Mathematics Fundamentals, University of Milan (Economical Sciences)
2020 Teacher for Introduction to Audio Processing, Fondazione Luigi Clerici
2018 Assistant for Computer Science Skills, University of Milan (Medicine)
2016-2018 Tutor for Java Programming, University of Padova (Information Engineering)

Total hours spent in lectures: ~224
Total thesis supervised: 12 Bachelor (11 completed), 9 Master of Science (6 completed)

Oral Communications at International Workshops and Conferences

2023 Contrafact in the Middle Ages. Online. *Perspectives on the integration of machine learning techniques into musicological research*
2023 Sound and Music Computing Conference. Stockholm, Sweden. *musif: a Python package for symbolic music feature extraction*
2023 24th International Society for Music Information Retrieval Conference. Milano, Italy. *Optimizing Feature Extraction for Symbolic Music*
2022 24th IEEE International Workshop on Multimedia Signal Processing. Online. *Acoustics-specific Piano Velocity Estimation*
2021 23rd IEEE International Workshop on Multimedia Signal Processing. Tampere, Finland. *Audio-to-Score Alignment Using Deep Automatic Music Transcription*

2020 17th Sound and Music Computing Conference. Online. *ASMD: an automatic framework for compiling multimodal datasets with audio and scores*

2019 6th International Conference on Digital Libraries for Musicology. Delft, Netherlands. *On the Adoption of Standard Encoding Formats to Ensure Interoperability of Music Digital Archives: The IEEE 1599 Format*

2019 20th International Conference of the ISMIR. Delft, Netherlands. *A Convolutional Approach to Melody Line Identification in Symbolic Scores*

2019 First International Workshop on Multilayer Music Rrepresentation and Processing. Milan, Italy. *Multimodal Music Information Processing and Retrieval: Survey and Future Challenges*

Participation to funded projects

2023-today *The Italian Lauda: Disseminating Poetry and Concepts Through Melody (12th-16th centuries)*
ERC AdG Project, PI: prof. Francesco Zimei. Gran Sasso Science Institute.

2022-2023 *The Sources of Absolute Music: Mapping Emotions in Eighteenth-Century Italian Opera*

2021-2022 ERC AdG Project, PI: prof. Álvaro Torrente. Instituto Complutense de Ciencias Musicales. *Advanced methods for sound and music computing*
Piano di Sostegno della Ricerca, Linea 2, University of Milan.

2018 *Getting at the Heart of Things: Towards Expressivity-aware Computer Systems in Music*
ERC AdG project, PI: prof. Gherard Widmer. Austrian Research Institute for Artificial Intelligence.

Scientific and Program Committees

Reviewer

- "IEEE Transactions on Audio, Speech, and Language Processing" (journal)
- "PLOS ONE" (journal)
- "ACM Computing Surveys" (journal)
- "Transactions of the International Society of Music Information Retrieval" (journal)
- "IEEE Transactions on Neural Networks and Learning Systems" (journal)
- "IEEE International Conference on Audio, Speech, and Signal Processing (ICASSP)": 2024, 2025
- "Audio Mostly" Conference: 2024
- "International Society of Music Information Retrieval Conference (ISMIR)": 2020, 2021, 2022, 2023
- "Sound and Music Computing Conference (SMC)": 2019, 2020, 2021, 2022, 2023, 2024
- "Computer-Supported Music Education (CSME)" – CSEDU: 2020, 2021, 2022, 2023, 2024
- "First International Workshop on Multilayer Music Representation and Processing (MMRP19)" (Indexed on IEEE Xplore): 2019

Other

- AM'24 Short Paper Chair (Indexed on ACM Digital Library)
- MMRP'19 Organizing Committee (Indexed on IEEE Xplore)

- IEEE 1599 Standard – Working Group Member ("IEEE Recommended Practice for Defining a Commonly Acceptable Musical Application Using XML")

Languages

	Understanding		Speaking		Writing
	Listening	Reading	Production	Interaction	
English	B2	C2	C1	B2	C1
Spanish	B2	C1	B2	B2	B1
Italian	mother tongue				

Software

All my research software are Open Source. Additional software projects are available free as in speech: https://federicosimonetta.eu.org/software.

Notable software

- **musif**: a Python module to extract musicological features from symbolic music scores;
- **EWLD**: > 5000 leadsheets enriched with metadata;
- **ASMD**: Python framework for compiling, using, and distributing music datasets;
- **PyCarla**: a Python module to synthesize MIDI events both online and off-line using audio plugins (VST, AU, LV2, SF2, SFZ, etc.);

Coding Capabilities

Python

Julia, HTML5, Shell, Latex

C/C++, Java, Lua, Rust

R, SQL, PHP, Go

Main libraries used: PyTorch, Keras, Scikit-Learn, statsmodels, Scikit-Optimize, Pandas, Scipy, Essentia, Librosa, pyjulia, Binder, Cython, Numba.

Transversal skills

- My experience as musician and composer enhanced my **creativity**;
- The activity of academic research improved my abilities to **think outside of the box**;
- In the research projects that I have joined since the Master Thesis, I have developed good **team working** abilities for preparing academic reports and publications, discussing issues, and taking collective decisions;
- The experience in inter-disciplinary projects has improved my **communication** and **inter-relational** skills;
- I have taken part to 9 international conferences, building strong **public relations** abilities;
- During my teaching experience I have learned to **promote** people skills, as well as to **flexibly** face any difficulty that people can find while learning;
- I have **organized** many music concerts and events and I have participated in the **organization** of two international conferences (MMRP 2019 and AM 2024);