## PERSONAL INFORMATION  FRANCESCO SOVRANO

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| PREFERRED JOB | Researcher, University Professor |

### WORK EXPERIENCE _____

**Feb 2023 - present**

Senior Researcher
Research and supervision of PhD, Master and Bachelor students
University of Zurich - ZURICH Switzerland
*Business or sector* R&D and patents , computer science, data processing and acquisition

**Mar 2022 - Apr 2022**

University Research Assistant
1. Definition of AI methods and techniques applied to European legislation;
2. Definition of at least two experiments using NLP, ML techniques, knowledge extraction;
3. Realization of AI prototypes and conversion of documents into XML AKN format; 4. Realization of graphical-statistical visualizations of the results of the experiments.
Alma Mater Studiorum - Università di Bologna (BO) Italy
*Business or sector* R&D and patents , computer science, data processing and acquisition

**Dec 2021 - Dec 2021**

University Research Assistant
Contract on the European Project LEOS - Legislation Editing Open Software: series of reports and other artefacts on 'Drafting legislation in the era of AI and digitisation'.
Alma Mater Research Institute for Human-Centered Artificial (BO) Italy
*Business or sector* R&D and patents , computer science, data processing and acquisition

**Jul 2019 - Oct 2021**

University Research Assistant
Research activity within the MIREL project, funded by the Justice program of the European Union under the Grant Agreement n. 690974. "MIREL: MIning and REasoning with Legal texts" - Grant Agreement Number 690974.
Alma Mater Studiorum - Università di Bologna (BO) Italy
*Business or sector* R&D and patents , education, training, research and development

**Sep 2019 - Sep 2021**

University Research Assistant
InterLex - Grant Agreement No.800839: Research activities within the InterLex project, funded by the European Union's Justice programme under Grant Agreement No.800839.
Alma Mater Studiorum - Università di Bologna (BO) Italy
*Business or sector* R&D and patents , computer science, data processing and acquisition

**Apr 2020 - May 2020**

Consultant
Studio sull'applicazione dell'Intelligenza Artificiale in ambito legale.
Consorzio Interuniversitario Nazionale per l'Informatica , Via Ariosto n. 25 - ROMA (RM) Italy
*Business or sector* R&D and patents , computer science, data processing and acquisition

**Sep 2019 - Sep 2019**

Teacher
Teaching assignment within the LEX 2019 Summer School
Fondazione Flaminia - RAVENNA (RA) Italy
*Business or sector* Human Resources , computer science, data processing and acquisition

### EDUCATION AND TRAINING _____

**2018 - 2023**  Data Science and Computation                                     EQF level 8
Alma Mater Studiorum - Università di Bologna - Department of Computer Science and Engineering
Doctor of Philosophy (Ph.D.)

| 2016 - 2018 | Computer Science | EQF level 7 |

Alma Mater Studiorum - Università di Bologna - School of Science
2nd cycle degree/Master of Science (2 years)
*Principal subjects/occupational skills covered:*
- Machine Learning
- Artificial Intelligence & Parallel Algorithms
- Natural Language Processing
- Information Retrieval & Data Mining
- Cryptography
- Digital Forensics
- Complex Systems & Network Science
- Cloud Programming
- Usability & User Experience
- Emerging Programming Paradigms
- Compilers and Interpreters

## PERSONAL SKILLS

**Mother tongue(s)**   Italian

**Foreign language(s)**

| UNDERSTANDING | | | | SPEAKING | | | | WRITING | |
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| Listening | | Reading | | Spoken interaction | | Spoken production | | | |
| C2 | Proficient | C2 | Proficient | C1 | Proficient | C1 | Proficient | C1 | Proficient |

English

English: C1 Advanced - Score 199 - Cambridge English, 07 2023 - European level: C1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
Common European Framework of Reference for Languages

Linguistic experience(s)

**Other experience acknowledged by the course of study**
Marco Polo
Language: English
Duration of studies in months: 4
Foreign country where the academic studies were carried out: Cambridge (United Kingdom)
Description: Research period abroad at the University of Cambridge (UK).
Activity: held a seminar, participated in research meetings with members of the Department.
Topic of the research collaboration: improvement of the performance of multi-agent reinforcement learning methods in the presence of explanations, in explanation- aware architectures.

**European Union program**
Marie Sklodowska-Curie Research and Innovation Staff Exchange
Language: English
Duration of studies in months: 4
Foreign country where the academic studies were carried out: Pittsburgh (United States of America)
Description: Research activity with mobility period abroad funded by the GHAIA (Geometric and Harmonic Analysis with Interdisciplinary Applications) project, H2020-MSCA-RISE-2017 (Marie Sklodowska-Curie Research and Innovation Staff Exchange), Grant Agreement n. 777822.

**European Union program**
Marie Sklodowska-Curie Research and Innovation Staff Exchange
Language: English
Duration of studies in months: 1
Foreign country where the academic studies were carried out: Palo Alto (CA) (United States of America)
Description: Research activity and mobility period abroad funded by the MIREL (MIning and REasoning with Legal texts) project, H2020-MSCA-RISE-2015 (Marie Sklodowska-Curie Research and Innovation Staff Exchange), Grant Agreement n. 690974.

**Job-related skills**
- Scientific Publications: see my Google Scholar page https://scholar.google.it/citations?user=iTXcdhIAAAAJ&hl=en&oi=ao
- Works: I published an app for iOS and Android: an online multiplayer video game called Rise of Kiruru; link https://play.google.com/store/apps/details?id=com.kiruru.rok
- Open-source software: see my GitHub page https://github.com/Francesco-Sovrano

**Digital competences**

| SELF-ASSESSMENT | | | | |
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| INFORMATION PROCESSING | COMMUNICATION | CONTENT CREATION | SAFETY | PROBLEM SOLVING |

## PUBLICATIONS

**Doctorate thesis**

"How to explain: from theory to practice" ; Francesco Sovrano ; University of Bologna (2023)
doi.org/10.48676/unibo/amsdottorato/10943

**Journal articles**

"An objective metric for explainable AI: how and why to estimate the degree of explainability" ; Francesco Sovrano, Fabio Vitali ; Knowledge-Based Systems (2023)
doi.org/10.1016/j.knosys.2023.110866

**Conference proceedings**

"Toward Eliminating Hallucinations: GPT-based Explanatory AI for Intelligent Textbooks and Documentation" ; Francesco Sovrano, Kevin Ashley and Alberto Bacchelli (2023)
ceur-ws.org/Vol-3444/itb23_s3p2.pdf

**Journal articles**

"Explanatory artificial intelligence (YAI): human-centered explanations of explainable AI and complex data" ; Francesco Sovrano, Fabio Vitali ; Data Mining and Knowledge Discovery (2022)
doi.org/10.1007/s10618-022-00872-x

"Combining shallow and deep learning approaches against data scarcity in legal domains" ; Francesco Sovrano, Monica Palmirani, Fabio Vitali ; Government Information Quarterly (2022)
doi.org/10.1016/j.giq.2022.101715

**Conference proceedings**

"How to Quantify the Degree of Explainability: Experiments and Practical Implications" ; Francesco Sovrano, Fabio Vitali ; 2022 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE) ; IEEE (2022)
doi.org/10.1109/FUZZ-IEEE55066.2022.9882574

"YAI4Edu: an Explanatory AI to Generate Interactive e-Books for Education" ; Francesco Sovrano, Kevin Ashley, Peter Brusilovsky, Fabio Vitali ; Fourth International Workshop on Intelligent Textbooks 2022 co-located with 23d ; CEUR Workshop Proceedings (2022)
ceur-ws.org/Vol-3192/itb22_p4_short8391.pdf

**Journal articles**

"Generating User-Centred Explanations via Illocutionary Question Answering: From Philosophy to Interfaces" ; Francesco Sovrano, Fabio Vitali ; ACM Transactions on Interactive Intelligent Systems (2022)
doi.org/10.1145/3519265

"Metrics, Explainability and the European AI Act Proposal" ; Francesco Sovrano, Salvatore Sapienza, Monica Palmirani, Fabio Vitali ; J ; Larisa Ivascu (2022)
doi.org/10.3390/j5010010

"Explanation-Aware Experience Replay in Rule-Dense Environments" ; Francesco Sovrano; Alex Raymond; Amanda Prorok ; IEEE Robotics and Automation Letters (2021)
doi.org/10.1109/LRA.2021.3135927

**Conference proceedings**

"Hybrid AI Framework for Legal Analysis of the EU Legislation Corrigenda" ; Palmirani, Monica; Sovrano, Francesco; Liga, Davide; Sapienza, Salvatore; Vitali, Fabio ; FRONTIERS IN ARTIFICIAL INTELLIGENCE AND APPLICATIONS ; JURIX 2021: 34th International Conference on Legal Knowledge and Information Systems (2021)
dx.doi.org/10.3233/FAIA210319

"A Survey on Methods and Metrics for the Assessment of Explainability Under the Proposed AI Act" ; Sovrano, Francesco; Sapienza, Salvatore; Palmirani, Monica; Vitali, Fabio ; FRONTIERS IN ARTIFICIAL INTELLIGENCE AND APPLICATIONS ; JURIX 2021: 4th International Conference on Legal Knowledge and Information Systems (2021)
dx.doi.org/10.3233/FAIA210342

**Book chapter**

"Making Things Explainable vs Explaining: Requirements and Challenges Under the GDPR" ; Francesco Sovrano, Fabio Vitali, Monica Palmirani ; AI Approaches to the Complexity of Legal Systems XI-XII ; Víctor Rodríguez-Doncel, Monica Palmirani, Micha Araszkiewicz, Pompeu Casanovas, Ugo Pagallo, Giovanni Sartor (2021)
dx.doi.org/10.1007/978-3-030-89811-3_12

**Conference proceedings**

"A dataset for evaluating legal question answering on private international law" ; F. Sovrano, M. Palmirani, B. Distefano, S. Sapienza, F. Vitali ; Proceedings of the Eighteenth International Conference on Artificial Intelligenc (2021)
doi.org/10.1145/3462757.3466094

"From Philosophy to Interfaces: an Explanatory Method and a Tool Inspired by Achinstein's Theory of Explanation" ; F. Sovrano, F. Vitali (2021)
doi.org/10.1145/3397481.3450655

"Legal Knowledge Extraction for Knowledge Graph Based Question-Answering" ; F. Sovrano, M. Palmirani, F. Vitali (2020)
doi.org/10.3233/FAIA200858

"Hybrid Refining Approach of PrOnto Ontology" ; M. Palmirani, G. Bincoletto, V. Leone, S. Sapienza, F. Sovrano ; International Conference on Electronic Government and the Information Systems Pe ; International Conference on Electronic Government and the Information Systems Perspective (2020)
dx.doi.org/10.1007/978-3-030-58957-8_1

"Modelling GDPR-Compliant Explanations for Trustworthy AI" ; F. Sovrano, F. Vitali, M. Palmirani ; International Conference on Electronic Government and the Information Systems Pe ; International Conference on Electronic Government and the Information Systems Perspective (2020)
dx.doi.org/10.1007/978-3-030-58957-8_16

"Deep learning based multi-label text classification of UNGA resolutions" ; F. Sovrano, M. Palmirani, F. Vitali ; ICEGOV 2020: Proceedings of the 13th International Conference on Theory and Prac ; Università di Bologna (2020)
doi.org/10.1145/3428502.3428604

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| Journal articles | "Crawling in Rogue's dungeons with deep reinforcement techniques" ; A. Asperti; D. Cortesi; C. de Pieri; G. Pedrini; F. Sovrano ; IEEE Transactions on Games ; IEEE (2020)<br>dx.doi.org/10.1109/TG.2019.2899159 |
| Conference proceedings | "PrOnto Ontology Refinement Through Open Knowledge Extraction" ; M. Palmirani, G. Bincoletto, V. Leone, S. Sapienza, F. Sovrano ; Legal Knowledge and Information Systems. JURIX 2019. The Thirty-second Annual Co ; JURIX 2019 (2019)<br>dx.doi.org/10.3233/FAIA190326 |

"The difference between Explainable and Explaining: requirements and challenges under the GDPR" ; F. Sovrano, F. Vitali, M. Palmirani ; XAILA 2019 EXplainable AI in Law 2019. Proceedings of the 2nd EXplainable AI in ; XAILA 2019 EXplainable AI in Law 2019 (2019)
ceur-ws.org/Vol-2681/

"Combining Experience Replay with Exploration by Random Network Distillation" ; Francesco Sovrano ; Computational Intelligence and Games, CIG, IEEE Symposium on, 2019 ; Department of Computer Science and Engineering (DISI), University of Bologna (2019)
doi.org/10.1109/CIG.2019.8848046

"Crawling in Rogue's Dungeons with (Partitioned) A3C" ; A. Asperti; D. Cortesi; F. Sovrano ; LOD 2018. Lecture Notes in Computer Science,vol 11331. ; Machine Learning, Optimization, and Data Science (2019)
dx.doi.org/10.1007/978-3-030-13709-0_22

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| Degree thesis | "Deep Reinforcement Learning and sub-problem decomposition using Hierarchical Architectures in partially observable envs" ; Francesco Sovrano ; Università di Bologna (2018)<br>amslaurea.unibo.it/16718/ |
| Other | "Rise of Kiruru" ; Francesco Sovrano (2017)<br>play.google.com/store/apps/details?id=com.kiruru.rok |
| Journal articles | "A Modular Deep-learning Environment for Rogue" ; A. Asperti, C. De Pieri, M. Maldini, G. Pedrini, F. Sovrano ; WSEAS Transactions on Systems and Control (2017)<br>www.wseas.org/multimedia/journals/control/2017/a785903-070.php |
| Degree thesis | "A proposito di Crittografia a chiave asimmetrica e numeri primi: tecniche note e proposta di un nuovo test di primalità" ; Francesco Sovrano ; Università di Bologna (2016)<br>amslaurea.unibo.it/10897/ |