



# Fabian Fumagalli (he/him)

## Research

### SHAP-IQ: Uncovering Interactions for Explainable AI [1-4]

#### Efficient and Reliable Local Feature Attributions and Feature Interactions [1-4]

- computation of fair and reliable attributions for any model, e.g. vision transformers, language models, scikit-learn [2,4], or tabular data with XGBoost or LightGBM [3]

#### Trustworthy Explanations in Other Machine Learning Domains

- e.g. data valuation, LLM prompting, hyperparameter optimization

### Efficient Explanations for Data Streams and Changing Models [5-7]

#### Global Feature Importance [5,6] and Feature Effects [7] under Distribution Shifts

- applicable for sensor networks, financial models, and IoT

### Selected Publications (First Authors Bold)

[1] **M. Muschalik** et al., shapiq: Shapley Interactions for Machine Learning, **NeurIPS 2024**

[2] **F. Fumagalli** et al., KernelSHAP-IQ: Weighted Least-Square Optimization for Shapley Interactions, **ICML 2024**

[3] **M. Muschalik, F. Fumagalli** et al., Beyond TreeSHAP: Efficient Computation of Any-Order Shapley Interactions, **AAAI 2024**

[4] **F. Fumagalli, M. Muschalik** et al., SHAP-IQ: Unified Approximation of Any-Order Shapley Interactions, **NeurIPS 2023**

[5] **F. Fumagalli, M. Muschalik** et al., Incremental Permutation Feature Importance (iPFI): Towards Online Learning on Data Streams, **Machine Learning Journal 2023**

[6] **M. Muschalik, F. Fumagalli** et al., iSAGE: An Incremental Version of SAGE for Online Explanation on Data Streams, **ECML PKDD 2023**

[7] **M. Muschalik, F. Fumagalli** et al., iDPD: On Partial Dependence Plots in Dynamic Modeling Scenarios, **World Conference on Explainable AI (xAI) 2023**

## Open Source Projects

### shapiq python package [1]

- SHAP interaction quantification
- Shapley Interactions for 11 ML domains



### Links

- [GitHub](#)
- [PyPi](#)
- [Docs](#)
- [Blog post](#)

## Work Experience

### PhD Candidate in Explainable AI | 10/2021 - now

Bielefeld University | AG Machine Learning

### SAS & Data Science Consultant | 10/2017 - 10/2021

#### CBTW (former PTC, mayato)

- international project and client responsibility
- high-performance cloud solutions
- optimization and modeling regulatory processes for banking

### Data Scientist Intern | 01/2017 - 06/2017

#### Munich Re

- machine learning for health insurance

### Teaching Assistant | 10/2014 - 10/2016

Freie Universität Berlin

## Education

### Mathematics M.Sc. | 10/2015 - 10/2018

Technische Universität Berlin

- stochastics, financial mathematics, mathematical deep learning

### Statistics (ERASMUS+) | 08/2016 - 12/2016

Norwegian University of Science and Technology

### Mathematics B.Sc. | 10/2012 - 11/2015

Freie Universität Berlin

## Contact me

ffumagalli@techfak.uni-bielefeld.de

[Website](#)

born September, 27, 1993

## Languages

**German (Native)**

**English (Proficient)**

**Italian (Elementary)**

## Academia

### Workshop Organizer

DynXAI at ECML PKDD 2023

TempXAI at ECML PKDD 2024

### Reviewer

ICLR'25, NeurIPS'24, ICML'24, AAAI'25,

AISTATS'25, MLJ, ESANN'24

## Awards & Certificates

### Best Paper Award

XAI'23

ECML'23 (MLJ Journal Spotlight)

### Top Reviewer

ICML'24, NeurIPS'24

### Certificates

SAS Viya Machine Learning Specialist

SAS Visual Business Analyst

SAS Base Programmer

## Programming

### Python

e.g. torch, scikit-learn, numpy, scipy, pandas, matplotlib...

### SQL

### SAS Base

### JavaScript

## Personal

### Voluntary Trainer | 11/2011 - 08/2016

TuS Lichterfelde e.V.