

BRANKA HADJI MISHEVA

Born: 25 February 1988, Republic of Macedonia ◊ Residence: Landvogt-Wasser-Strasse 50, Winterthur, Switzerland
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WORK EXPERIENCE

BFH - Bern University of Applied Sciences

Professor of Applied Data Science and Finance

August 2022 - present

Bern, Switzerland

- **Action Co-lead** - MSCA Industrial Doctoral Network: Digital Finance; Budget: CHF 600,000
- **Project Co-lead** - SNF Weave: Network-based credit risk models in P2P lending markets; Budget: CHF 350,000
- **Scientific Grant Holder** - COST Action: FinTech and Artificial Intelligence in Finance: Towards a transparent financial industry
- **Project Lead** - Third party funding (Amt für Arbeitslosenversicherung): Machine Learning Ensemble Modelling for Predicting Unemployment Duration
- **Project Lead for BFH** - Innosuisse Research and Innovation Project: DataInc Intelligent Data Integration and Cleaning
- **Academic Lead - Data innovation alliance: Expert Group – AI in Finance and Insurance** - Academic lead of an expert group composed of participants from the banking and insurance industry in Switzerland, responsible for organizing workshops and guiding innovation and research project development between industry and academia. Expert group website
- Project partner in **submitted research proposals**:
 - * CHIST-ERA application - FIRE: Finance and Insurance artificial intelligence algorithms are Explainable
 - * Innosuisse application - The feasibility of transferring the AI methodology of ‘Self-Play’ to financial markets
 - * Innosuisse application - Robo Market Making for blockchain-based secondary credit markets
 - * SNF Funding - Accelerating growth and stability of European P2P lending
 - * SNIS - Applying remote sensing to uncover multinational companies’ local exposures to burning points in biodiversity, deforestation and water, on global scale
 - * H2020 ICT Application - DeepEdgeData: A Trusted Platform for a Data Economy for Ingesting Data into AI Training for Edge Applications
 - * Innosuisse application - AI-based Credit Scoring Models for P2P Lending Platform
 - * COST Application - Open source Energy Models, Data and Evaluations
 - * COST Application - Alternative Finance Network Europe
 - * COST Application - The European Network for Visualization and Analysis of Complex Data

ZHAW - Zurich University of Applied Sciences

Senior Researcher, School of Engineering

February 2019 - August 2022

Winterthur, Switzerland

- **Project lead** - Horizon 2020 Coordination and Support Actions Project “A Financial supervision and technology compliance training programme”; Budget: CHF 2,500,000; ZHAW Budget: CHF 210,000
 - Conduct research on AI-based credit scoring in P2P systems;

- Responsible for planning, organizing, executing and preparing the content of 48 hours of training workshops for market supervisory authorities in Switzerland and Hungary on Fintech risk management;
- Planning and organizing international workshops and conferences;
- Work Package Leadership: Research on Blockchain Applications in Finance.
- **Project lead** - Innosuisse Project: "Towards Explainable Artificial Intelligence and Machine Learning for Credit Risk Management"; ZHAW Budget: CHF 350,000
 - Project Scope: Machine Learning (ML) allows creditors to reduce lending risk by evaluating an abundance of customer data. However, these models lack the transparency required by regulators. We propose a visual analytics tool for understanding the inner-workings of ML models as they apply to credit scoring.
 - Project's website

University of Pavia - Faculty of Economics

February 2018 - February 2019

Senior Researcher and Technical Project Manager of Horizon 2020 Project

"A Financial supervision and technology compliance training programme"

Pavia, Italy

- Initiating and framing the scientific outline of the Horizon2020 project's main purpose and objectives;
 - Carrying our research in the area of AI applications in finance;
 - Creating the training material under the Big Data Technologies and AI in Finance Work Packages;
- Part of the team leading the proposal's writing efforts, including the division of work, allocation of work packages, task and individual milestones;
- Working in coordination with the global project coordinator to ensure that milestones are respected and the deliverable are submitted on time.

Sirti S.p.A - IT service management company

September 2016 - April 2018

Data Scientist

Milan, Italy

- Designing, developing, testing and implementing machine learning and deep learning systems to best predict the probability of an adverse event concerning the company's maintenance processes;
 - Carrying out various data pre-processing activities (i.e. data cleaning, transforming and augmentation);
 - Identifying and analyzing patterns in complex, large data sets (clustering and anomaly detection);
 - Creating, testing and validating various supervised learning methods so to identify, with high predictive accuracy, the next point of failure within a specific fiber optic network.
 - Creating, testing and validating unsupervised learning methods that identify clusters of network development projects which in turn helps management have an accurate estimate of development costs thus helping the processes of control and management associated with the construction of optical fiber networks.

P.Petrol [Okta] - Trade of Petroleum and Petroleum Derivatives

April 2014 - January 2015

Financial and Data Analyst

Skopje, Macedonia

- Manipulating, analyzing and interpreting complex data concerning the consumers preferences and decision-making processes;
- Design and develop statistical learning models concerning oil price movements.

EDUCATION

University of Pavia, Italy

September 2016 - July 2020

PhD in Economics and Management of Technology (track: Data Science)

Thesis Title: Measuring Financial Risks: The Application of Network Theory in Fintech Risk Management

Mentor: Prof. Dr. Paolo Giudici (e-mail: paolo.giudici@unipv.it)

Universita Cattolica, Italy
MBA in Global Business and Sustainability
Overall GPA: with DISTINCTION

December 2014 - December 2015

Staffordshire University, United Kingdom
MSc. in Economics for Business Analysis
Overall GPA: with DISTINCTION

July 2011 - November 2012

Faculty of Economics Skopje, Macedonia
BSc. in Financial Management
Overall GPA: 9.23/10 [with DISTINCTION]

September 2006 - September 2010

TECHNICAL AND LANGUAGE STRENGTHS

Computer Languages	R, Python
Statistical Software	Stata, SPSS, EViews, Microfit, JMulTi
Languages	Macedonian (mother tongue), English (full professional proficiency), Italian (advance use)

SELECTED SCIENTIFIC REVIEWING/EDITORIAL ACTIVITIES

Articles and Working Papers

- Wildi, M. and Hadji Misheva, B. (2022). A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection. Working Paper.
- Hadji Misheva, B., Osterrieder, J. and Hirs, A. (2021). Stability of Explanation: The Utility of State-of-Art XAI Methods for Financial Problem Sets. Working Paper.
- Hirs, A., Osterrieder, J. and Hadji Misheva, B. (2021). Deep reinforcement learning on a multi-asset environment for trading. arXiv:2106.08437
- Hadji Misheva, B., Jaggi, D., Posth, J., Osterrieder, J. and Gramespacher, T. (2021). Audience-dependent Explanations for AI-based Risk Management Tools: A Survey. Accepted in Frontiers of AI: Explainable, Trustworthy, and Responsible AI for the Financial Service Industry.
- Lyócsa, S., Vašaničová, P., Hadji Misheva, B. and Vateha, M. (2021). Default or Profit Scoring Credit Systems? Evidence from European and U.S. P2P Lending Market. Accepted in Financial Innovation.
- Hadji Misheva, B., Hirs, A. and Osterrieder, J. and Kulkarni, O. and Fung Lin, S. (2021) Explainable AI in Credit Risk Management (March 1, 2021). Available at SSRN: <https://ssrn.com/abstract=3795322> or <http://dx.doi.org/10.2139/ssrn.3795322>
- Hirs, A., Osterrieder, J., Hadji Misheva, B., Cao, W., Fu, Y., Sun, H., and Wong, K. (2021). The VIX index under scrutiny of machine learning techniques and neural networks, arXiv.
- Posth, J., Hadji Misheva, B., Kotlarz, P., Osterrieder, J. and Schwendner, P. (2020). The applicability of Self-Play algorithms to Trading and Forecasting Financial Markets: A feasibility study, Frontiers of AI. <https://www.frontiersin.org/articles/10.3389/frai.2021.668465/full>
- Chen, Ying, Giudici, P., Hadji Misheva, B. and Trimborn, S. (2020). Detecting Lead Behaviour in Crypto Networks. Risks 8(1), 4
- Giudici, P. and Hadji Misheva, B. (2018). P2P lending scoring models: Do they predict default? Journal of Digital Banking, 2(4):353-368
- Giudici, P., Hadji Misheva, B. and Spelta, A. (2019). Network-based risk models. Quality Engineering 32(2), 199-211

Giudici, P., Hadji Misheva, B. and Spelta, A. (2019). Network scoring models to improve credit risk management in P2P lending platforms. Frontiers in Artificial Intelligence, 2, pp.3-9

Ahelegbey, D.F., Giudici, P. and Hadji Misheva, B. (2019) Latent factor models for credit scoring in P2P systems. Physica A 522, pp.112-121

Ahelegbey, D.F., Giudici, P. and Hadji Misheva. (2019) Factorial Network Models to improve P2P credit risk management. *Frontiers in Artificial Intelligence*, 2, pp.10-18

Hadji Misheva, B., Giudici, P. and Pediroda, V. (2018). Network-based models to improve credit scoring. 2018 IEEE 5th International Conference on Data Science and Advanced Analytics accuracy

Giudici, P. and Hadji Misheva, B. (2017). Scoring models for P2P lending platforms: An evaluation of predictive performance. *Conference proceedings: Statistics and Data Science: New Challenges, New Generations*.

Bucevska, V. and Hadji-Misheva, B. (2015). Determinants of Profitability in the Banking Industry: Empirical Evidence from Selected Balkan Countries. *Eastern European Economics Journal*.

Books

- Newbold, P., Carlson, W., Thorne, B, Cerchiello, P, Giudici, P. and Hadji-Misheva, B. 2018. *Statistica*. Corso di Laurea in Statistica Università degli Studi di Pavia. Italy: Pearson.

Reviewer

- Sage Open, since 2020
- Journal of Banking and Financial Technology, since 2020
- Physica A: Statistical Mechanics and its Applications, since 2019
- Digital Finance, since 2019
- Frontiers in Artificial Intelligence, since 2019
- Royal Society Open Science, since 2019

Editor

- Co-topic Editor: *Frontiers in Artificial Intelligence: Special Issue in Explainable Artificial Intelligence Models and Methods*, since 2020
- Guest Editor: *Sustainability: Special Issue in Sustainable and Measurable Well-Being and Economy in Response to the COVID-19 Pandemic*

ORGANIZATION OF CONFERENCES AND WORKSHOPS

BFH

September 2023

8th European COST Conference on Artificial Intelligence in Finance

80 participants onsite, 80 online

Selected Talks:

- Quantinar: A Blockchain p2p Ecosystem for Scientific Research, **Prof. Dr. Wolfgang Härdle (Humboldt University Berlin)**
- Next-gen quant investing, **Harald Lohre (Robeco)**
- Graph Machine Learning for Financial Crime Analysis **Kubilay Atasu (IBM Research)**

BFH

September 2022

7th European COST Conference on Artificial Intelligence in Finance

100 participants onsite, 200 online

· Selected Talks:

- Direct Indexing and Bespoke Indexing using Optimization under Uncertainty, **Prof. Dr. Ronald Hochreiter, Vienna University of Business and Finance**
- Data for Explainable AI: Transparent, Green, and Secured, **Dr. Tuan Trinh, EIT Digital**

- Credit selection in the bond market using machine learning, **Mustafa Modjib, BEKB, Switzerland**

ZHAW

June 2020 - July 2021

Research Seminars on Fintech Disruption

online

- 30-50 participants to each seminar

• **Selected Talks:**

- Explainability of a Machine Learning Granting Scoring Model in Peer-to-Peer Lending, **Prof. Javier Arroyo, UCM**
- Investing with Cryptocurrencies - On the Informative Effects of Experts Sentiment, **Dr. Simon Trimborn, City University of Hong Kong**
- Central Bank Digital Currencies, **Henry Holden, Advisor – Bank for International Settlements - Innovation HUB**

Central Bank of Hungary

26-27 October 2020

2-day Workshop on AI Applications in Finance

online

- 50 participants from the Central Bank of Hungary

• **Selected Talks:**

- Employing explainable AI to optimize the return target function of a loan portfolio **Dr. Jan-Alexander Posth Dr. Thomas Gramespacher**
- Convergence and Divergence in European Bond Correlations, **Prof. Dr. Peter Schwendner, University of Warsaw**
- Decision Trees and SVM, **Prof. Dr. Jörg Osterrieder**

ZHAW

4 September 2019

1st European Workshop on ML-based Solutions for Finance

ZHAW

- 60-80 participants

• **Selected Talks:**

- Artificial Intelligence in Finance – A Journey of some Real Business Applications and why it is beneficiary, **Sandro Schmid, CEO of AAAccell**
- Market structure discovery with clique forests, **Prof. Dr. Tomaso Aste – UCL**
- Solvency Risk Zones in Europe During and After the Debt Crisis, **Dr. Veni Arakelian, Panteion University**

ZHAW

3 September 2019

1st European Conference on Big Data Analytics and Risk Management

ZHAW

- 80-100 participants

• **Selected Talks:**

- Regulatory change and RegTech, **Dr. Philipp Hartmann, Credit Suisse**
- Building a big data and advanced analytics platform at the BIS, **Dr. Rafael Schmidt, Bank for International Settlements**
- Fintech and BigTech credit: A global overview, **Dr. Jon Frost, Bank for International Settlements**

Scientific Editorial Activities

Founder/Advisory Roles

- Co-founder of NAVITAS, since 2018 - For further references see Navitas website

- Member of the board of advisors of Article 1, since 2017 - For further details see Article 1 website

INVITED TALKS

Institute of Economic Research SAS

The 6th International Conference on Econometrics and Statistics

15-16, November 2023

Tokyo, Japan

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

Waseda University

Meeting of the Institute of Economic Research (MIER 2023)

1-3, August 2023

Smolence, Slovakia

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

University of Coimbra

COST Women in Fintech

1, June 2023

Coimbra, Portugal

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

ZHAW

Women in ML and Data Science

12 January 2023

Winterthur, Switzerland

- **Topic:** eXplainable AI for Finance
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

University of Edinburgh

Royal Statistical Society

September 12-15, 2022

Aberdeen, Scotland

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

University of Edinburgh

Royal Statistical Society

September 12-15, 2022

Aberdeen, Scotland

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

University of Twente

FinanceCom 2022: Enterprise Applications, Markets and Services in the Finance Industry *Enschede, The Netherlands*

August 22-24, 2022

- **Topic:** eXplainable Artificial Intelligence for Financial Applications: Credit Risk and Financial Time Series
- **Focus:** AI, XAI, SHAP, LIME, Credit risk, Network theory

SIS

The 51st Scientific Meeting of the Italian Statistical Society

June 22-24, 2022

Caserta, Italy

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

EcoStat 2022

June 4-6, 2022

*5th International Conference on Econometrics and Statistics**Kyoto, Japan*

- **Topic:** A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection
- **Focus:** AI, XAI, SHAP, LIME, x-functions, time series forecast

Swiss Risk Association

November 11, 2021

*AI in Finance: Qua Vadis?**Zurich, Switzerland*

- **Topic:** eXplainable Artificial Intelligence for Credit Risk Management
- **Focus:** AI, XAI, SHAP, LIME, Credit risk, Network theory

Columbia University

September 17, 2021

*7th Annual Bloomberg-Columbia Machine Learning in Finance Workshop 2021**Columbia, USA*

- **Topic:** eXplainable Artificial Intelligence for Credit Risk Management
- **Focus:** AI, XAI, SHAP, LIME, Credit risk, Network theory

ZHAW

September 9, 2021

6th European COST Conference on Artificial Intelligence in Industry and Finance *Winterthur, Switzerland*

- **Topic:** ML-based Models for
- **Focus:** AI, XAI, SHAP, LIME, Credit risk, Network theory

Humboldt University of Berlin

June 18, 2021

*Conference on Risk Management of Financial Technologies**Berlin, Germany*

- **Topic:** Network-based scoring models to improve credit risk management in peer to peer lending platforms
- **Focus:** AI, Credit risk, Network theory

Central Bank of Hungary

April 16, 2020

*SupTech Training Workshop: AI applications in Finance**Budapest, Hungary*

- **Topic:** Introduction to Artificial Intelligence: Applications in Finance
- **Focus:** ML vs AI, Finance use cases, supervised vs unsupervised learning

Central Bank of Hungary

April 16, 2020

*SupTech Training Workshop: AI applications in Finance**Budapest, Hungary*

- **Topic:** Introduction to eXplainable AI for Financial Risk Management
- **Focus:** Need for XAI, XAI methods: local vs global explanations, Shapley, LIME, SHAP, need for XAI in finance applications

Central Bank of Hungary

April 17, 2020

*SupTech Training Workshop: AI applications in Finance**Budapest, Hungary*

- **Topic:** Introduction to Supervised and Unsupervised Learning
- **Focus:** ML, supervised learning, unsupervised learning

ZHAW

September 3, 2019

*1st European Conference on Risk Management and Big Data Analytics**Winterthur, Switzerland*

- **Topic:** Network-based models for Fintech credit
- **Focus:** Credit risk; network theory; fintech risk management; predictive utility of network centralities

ZHAW

September 3, 2019

*1st European Conference on Risk Management and Big Data Analytics**Winterthur, Switzerland*

- **Topic:** Network-based models for Fintech credit

- **Focus:** Credit risk; network theory; fintech risk management; predictive utility of network centralities

TechQuartier

2nd RegTech Session on Big Data Analytics

June 29, 2019

Frankfurt, Germany

- **Topic:** Latent factor models for credit scoring in P2P systems
- **Focus:** Latent-factor models; credit scoring; predictive accuracy

FinTech District Milan

1st RegTech Session on Big Data Analytics

March 29, 2019

Milan, Italy

- **Topic:** Network based scoring models to improve credit risk management in peer to peer lending platforms
- **Focus:** Similarity networks; Modelling interconnectedness among P2P borrowers; Augmenting credit scoring models by topological coefficients describing borrowers' importance and community structures

Fudan University

International Symposium on Financial Engineering and Risk Management

June 13th, 2018

Shanghai, China

- **Topic:** Detecting Lead Behavior in Crypto Networks
- **Focus:** Understanding dynamics of BitCoin's trading volumes; identifying leader-follower links between traders;

UniCredit

Shaping the Future

April 5th, 2018

Milan, Italy

- **Topic:** Digital Initiatives and Regulatory Burden
- **Focus:** Big data analytics, AI in finance, blockchain technologies and RegTech solutions;

UniCredit

Quant Community Conference

March 1st, 2018

Milan, Italy

- **Topic:** Network models for Financial Technology
- **Focus:** FinTech risk management, scoring models for P2P lending platforms;

Nexi

Data Science for FinTech

January 15th, 2018

Milan, Italy

- **Topic:** Network models for Financial Technology
- **Focus:** FinTech risk management, scoring models for P2P lending platforms; robo-advisory;

University of Florence

Statistics and Data Science

June 28th, 2017

Florence, Italy

- **Topic:** Network-Based Credit Scoring for P2P Platforms
- **Focus:** Correlation networks; network centrality measures; credit scoring;

University of Bergamo

Computational Management Science: Pricing, Risk and Optimization

June 28th, 2017

Bergamo, Italy

- **Topic:** P2P Scoring Models: Do they predict default?
- **Focus:** P2P lending; big data; credit scoring; predictive accuracy;