

2nd INFORMS Conference on Quality, Statistics and Reliability

July 1 – 4, 2024 – Milan and Lake Como, Italy

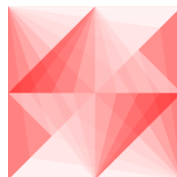
informs QUALITY, STATISTICS & RELIABILITY



Hosted by



POLITECNICO
MILANO 1863



IC
LABS



MICS

Made in Italy
Circolare e Sostenibile



TABLE OF CONTENT

MESSAGE FROM CHAIRS	3
ORGANIZERS	4
PROGRAM OVERVIEW	6
KEYNOTE SPEAKERS	7
PANELS	12
PROGRAM	13
SPONSORS	24
VENUE	25



BIANCA MARIA COLOSIMO
Department of Mechanical Engineering
Politecnico di Milano

MESSAGE FROM CHAIRS

“We are more than happy to welcome you to the 2nd INFORMS Conference on Quality, Statistics and Reliability (ICQSR), the largest professional association for decision and data sciences. This event brings together a diverse collection of academic and industry experts to discuss and identify future research directions at a crucial time for our field.

Indeed, we are at several crossroads in quality and reliability data science for decision making. As new solutions emerge, the impressive capabilities of various AI systems must be considered and integrated with existing research streams to define novel approaches for complex and big data mining in quality and reliability. The size, speed, and complexity of data are also increasing at impressive rates, and new solutions need to be identified to appropriately manage all these potential sources of information.

We are honored to host an exciting lineup of worldwide experts as keynote speakers and panelists, along with many brilliant scholars and young scientists who will help us identify promising directions and exchange ideas for future research in this area.

Hosting this conference in Europe, specifically in Italy, after the first one in the US, underscores the global scale of the challenges we face and the wide-reaching impact of the solutions we aim to design and implement. On behalf of the organizing committee, we extend our heartfelt gratitude to all our sponsors, volunteers, and contributors. Their dedication of time and resources has been an essential element in making ICQSR a remarkable event”.



“This edition strengthens the link between the “Quality, Reliability and Statistics” section of INFORMS and the “European Network for Business and Industrial Statistics” (ENBIS).

This synergistic connection enriches this ICQSR conference by combining their specific and shared expertise in statistical methods and data analytics, propelling the mission of fostering innovative, impactful research and bridging the gap between scientific exploration and practical application”.

BIAGIO PALUMBO
Department of Industrial Engineering
University of Naples Federico II

We are all looking forward to being inspired, participating in stimulating discussions, and gaining invaluable insights to make ICQSR 2024 a memorable and rewarding experience for all of us.

Thank you for attending and joining us in this dynamic convergence of ideas and innovation.

Bianca Maria Colosimo

Biagio Palumbo



Bianca Maria Colosimo | Politecnico di Milano

CONFERENCE CO-CHAIRS



Biagio Palumbo | University of Naples Federico II

PROGRAM COMMITTEE

Co-Chair

Ran Jin | Virginia Tech

Marco Grasso | Politecnico di Milano

Jian Liu | University of Arizona

Members

Eunshin Byon | University of Michigan

Nan Chen | National University of Singapore

Qianmei (May) Feng | University of Houston

Qingpei Hu | Chinese Academy of Sciences

Antonio Lepore | Università di Napoli Federico II

Alessandra Menafoglio | Politecnico di Milano

Ramin Moghaddass | University of Miami

Giovanna Capizzi | Università di Padova

Piercesare Secchi | Politecnico di Milano

Xiaochen Xian | University of Florida

Qiong Zhang | Clemson University

ICQSR BEST PAPER AWARD COMMITTEE

Chair

Ramin Moghaddass | University of Miami

Co-chairs:

May Feng | University of Houston

Antonio Lepore | University of Naples Federico II

Alessandra Menafoglio | Politecnico di Milano

Qiong Zhang | Clemson University

PROGRAM OVERVIEW

LOCAL ORGANIZING COMMITTEE AND ON-SITE SUPPORT

Members

Matteo Bugatti

Stefania Cacace

Yixin Chen

Patrizia Gironi

Marcella Netti

Paolo Parenti

Egon Prioglio

Stefano Raimondo

Chiara Scrocciolani

Talha Sunar

Panagiotis Tsiamyrtzis

Giovanni Zanderigo

Hang Zheng

PROGRAM OVERVIEW

MORNING

Start at 8.00 a	Start at 8.00 a	Start at 8.00 a	Start at 10.00 a	MON, July 01, 2024	Registration Welcome	Keynote Session Julie Swann Smarter Decisions for a Better World with OR, AI, and INFORMS Room A	Keynote Session Alain Bensoussan Stochastic maintenance for a large fleet of structures Room A	ICQSR Best Paper Award Room A	End at 12.30 p
					Registration Welcome	Keynote Session Hui Szu Ng Analytics for Decarbonization Room A	Panel2 New era in AI for QSR Room A	Keynote Session Yu Ding Data Science and Wind Energy Room A	
					ThA01 Advances in high-dimensional data analysis Room A	ThB01 QSR Flash talks Room A	ThC01 History and frontiers in Quality Engineering Room A	Panel3 QSR in Industry 5.0 Room A	
					ThA02 Application of generative AI and LLM in quality engineering Room B		ThC02 AI and Analytics for Condition Monitoring and Maintenance Room B		
LUNCH									

PROGRAM OVERVIEW

AFTERNOON

LUNCH	Start at 1.30 p	Visit PoliMI Additive Manufacturing Labs + MADE Industry 4.0 Competence Centre	Como Lake transfer 5.00 p		
	Start at 1.30 p	Panel1 Leader Forum International collaboration for future QSR Room A	TB01 ENBIS Session Room A	TC01 Design and analysis of expensive computer experiments Room A TC01 Data Analytics and AI in Critical Industry Room B	TD01 Advanced Analytics with Human in the Loop Room A TD02 Data Science for Quality and Reliability Improvement Room B End at 6.30 p
	Start at 1.30 p	WA01 System Reliability Modellig and Inference Room A WA02 System Reliability & Resilience Modeling and Maintenance Room B	WB01 Quality monitoring in I4.0 and Additive Manufacturing Room A WB02 Methods for anomaly detection, prognosis and transfer learning Room B	WC01 Manufacturing & Field Reliability Improvement Using Degradation & Failure-Time Data Room A WC02 Statistical Process Control and Quality Engineering Room B End at 5.00 p	Start at 7.30 p DINNER

KEYNOTE

JULIE SWANN

SCHEDULE: TUE, JULY 02, 09:00 AM – 10:00 AM
ROOM A (PLENARY)



Smarter Decisions for a Better World with OR, AI, and INFORMS

ABSTRACT

INFORMS helps academics and practitioners who drive Smarter Decisions for a Better World using operations research, management science, analytics, and artificial intelligence. Dr. Swann will give examples of how these methods can contribute to solving complex, critical problems across a variety of domains, from healthcare to manufacturing, supply chains, and beyond. Dr. Swann will draw upon her own experiences as well as innovations of AI and OR from practice. Dr. Swann will also outline some of the current initiatives of INFORMS, many of which have the potential to connect with the QSR area.

BIOSKETCH

Julie Swann is the Department Head and A. Doug Allison Distinguished Professor of the Edward P. Fitts Department of Industrial and Systems Engineering at NC State University. She is an affiliate faculty in the Joint Department of Biomedical Engineering at NC State and the University of North Carolina at Chapel Hill. Swann is a Fellow of IISE, INFORMS and AIMBE as well as president of INFORMS. Throughout her career, Swann has conducted research, outreach and education to improve how health and humanitarian systems operate worldwide. Her work with analytics relates to public health, public policy, epidemiology, infectious disease, supply chain management, and disaster response. This work allowed her to serve as a science advisor for the H1N1 pandemic response at the Centers for Disease Control and Prevention. Along with the CDC, Swann has collaborated with health and humanitarian organizations such as: The American Red Cross, The Carter Center, CARE USA, Children's Healthcare of Atlanta, Emory University Hospital, State Departments of Public Health and many other companies. Worldwide, she has contributed to the education of thousands of practitioners in health and humanitarian systems through the co-creation and teaching in a professional certificate program at Georgia Tech. This contribution includes teaching in the MASHLM program in Lugano, Switzerland, and co-chairing the annual Health and Humanitarian Logistics Conference.

KEYNOTE



ALAIN BENSOUSSAN

SCHEDULE: TUE, JULY 02, 10:20 AM – 11:20 AM

ROOM A (PLENARY)

Stochastic maintenance for a large fleet of structures

ABSTRACT

The traditional way of maintenance for equipment or structures consists in periodically assessing their level of degradation and taking decision to repair the observed damage if any. Of course, if there is a failure arriving any time, a procedure is decided on the spot. This is analogous to what is done for the health of human beings. The terminology of health of structures is also used accordingly. Since the development of Big Data and the possibility of equipping structures with measurement instruments providing information in real time about their degradation, the traditional maintenance approach has appeared far from being optimal. Big Data offers also the possibility of building knowledge models for the degradation, which are quite generally probabilistic. The availability of these models also calls for new approaches of maintenance. The maintenance decision is better characterized as a maintenance policy or rule or feedback, since it depends on the information which is available, in this context, in real time. Markov Decision Processes turn out to be a much better approach than the traditional one.

BIOSKETCH

Alain Bensoussan is Lars Magnus Ericsson Chair and the Director of ICDRiA (International Center for Decision and Risk Analysis) at the University of Texas at Dallas. He has been Chair Professor of Risk and Decision Analysis at Polytechnic University of Hong Kong, from 2009 to 2012, then at the City University Hong Kong, from 2013 to 2023. He has been World Class University Distinguished Professor at Ajou University, Korea, from 2010 to 2014. He is Professor Emeritus at the University Paris Dauphine. Professor Bensoussan served as President of National Institute for Research in Computer Science and Control (INRIA) from 1984 to 1996; President of the French Space Agency (CNES) from 1996 to 2003; and Chairman of the European Space Agency (ESA) Council from 1999 to 2002. He is a member of the French Academy of Sciences, French Academy of Technology, Academia Europaea, and International Academy of Astronautics. His distinctions include AMS Fellow, IEEE Fellow, SIAM Fellow, Von Humboldt award, and the NASA public service medal. Professor Bensoussan is a decorated Officer of Legion d'Honneur, Commandeur Ordre National du Merite from France and Officer Bundes Verdienst Kreuz from Germany. He has received the W.T. and Idalia Reid Prize from SIAM in 2014 and the IEEE Systems Control Award in 2024. He was the awardee of the Polycarp Kusch Lecture at UTD, 2024. He is Fellow of the Institute of Advanced Studies of Lingnan University Hong Kong, since 2024.

KEYNOTE

HUI SZU NG

SCHEDULE: WED, JULY 03, 08:00 AM – 09:00 AM

ROOM A (PLENARY)



Analytics for Decarbonization

ABSTRACT

As the consequences of global warming become increasingly evident, there's a growing urgency to transition towards a sustainable, low-carbon future. Decarbonization, which involves reducing the carbon footprint across various industry sectors, is a critical step towards achieving this goal. In this talk, we will look at the role data science and analytics has played in facilitating decarbonization and the research work ongoing at the Department of Industrial System Engineering and Management @National University of Singapore, to develop tools and analytics to understand the trends and pathways to decarbonization. An in-depth focus on international shipping's commitment and actions will also be provided.

BIOSKETCH

Hui Szu NG is Associate Professor and Head at the Department of Industrial Systems Engineering and Management, National University of Singapore (NUS). She holds B.S., M.S., and Ph.D. degrees in Industrial and Operations Engineering from the University of Michigan. Prior to joining NUS, she was a Research Fellow at the Singapore Institute of Manufacturing Technology (Agency for Science, Technology and Research). Her research interests include computer simulation analysis and optimization, applications of simulation to maritime transportation and maritime transport emissions and efficiency. Szu Hui has been active in maritime research since joining NUS, completing various projects on shipping emissions and decarbonization, and also on shipping network design and operations management for various government agencies and shipping companies. She is currently the Research Track Leader for shipping transport and efficiency at the Centre of Maritime Studies, and a research affiliate for maritime transport at the Energy Studies Institute at NUS. She has been appointed by the International Maritime Organization (IMO) as an expert to view and endorse various studies and reports, including the Fourth IMO GHG Study (MEPC 75-7-15), the Comprehensive impact assessment of the short-term measures (MEPC 76-7-13) and the Comprehensive impact assessment of the mid-term measures. She has also been invited to speak at IMO's expert workshops and at COP28. Szu Hui was awarded the Singapore Maritime Institute Fellowship in 2024.

KEYNOTE

YU DING

SCHEDULE: WED, JULY 03, 11:30 AM – 12:30 AM

ROOM A (PLENARY)



Data Science and Wind Energy

ABSTRACT

Wind energy is one of the fastest-growing clean energy sources. Despite the significant growth in the past two decades, wind energy missed some intermediate goals set forth earlier. One critical element needed for accelerating wind energy growth is to significantly reduce its operational cost and further boost its market competitiveness. In his book, *Data Science for Wind Energy*, the speaker demonstrated how statistical and machine learning methods can help address research needs in wind energy applications. The speaker will discuss some of the challenges encountered in wind applications and present use cases in which statistical and machine learning models and solutions make sensible impacts.

BIOSKETCH

Yu Ding is the Anderson-Interface Chair and Professor in the H. Milton Stewart School of Industrial and Systems Engineering at Georgia Tech. Prior to joining Georgia Tech, he was the Mike and Sugar Barnes Professor of Industrial and Systems Engineering at Texas A&M University. Dr. Ding's research is in the area of data & quality science and system informatics. He is the author of the CRC Press book, *Data Science for Wind Energy* and a co-author of the Springer Nature book, *Data Science for Nano Image Analysis*. His research work is recognized by the 2019 IISE's Technical Innovation Award, 2022 INFORMS' Impact Prize, 2024 IISE Energy Systems Division's Career Achievement Award, 2024 ASME's Blackall Machine Tool and Gage Award, and 2024 SME's S. M. Wu Research Implementation Award. Dr. Ding is a Fellow of IISE and ASME, and is serving as the Editor-in-Chief of IISE Transactions for the term of 2021-2024.

PANELS

Leader Forum | International collaboration for future QSR

Chair: **Jian Liu**, University of Arizona, **Yisha Xiang**, University of Houston

Tue, July 2nd, 01:30 p – 03:00 p

Suk Joo Bae, Hanyang University

Russell Barton, Penn State University

Biagio Palumbo, University of Naples Federico II

Julie Swann, NC State University

Fugee Tsung, HKUST School of Engineering

Houmin Yan, The City University of Hong Kong

New era in AI for QSR

Chair: **Bianca Maria Colosimo**, Politecnico di Milano

Wed, July 3rd, 09:30 a – 11:10 a

Irad Ben-Gal, Telaviv University

Luca Dedè, Politecnico di Milano

Romano Iazurlo, Leonardo

Ran Jin, Virginia Tech

Mathilde Mougeot, ENSIIE & ENS Paris-Saclay

Kamran Paynabar, Georgia Tech

Fugee Tsung, HKUST School of Engineering

QSR in Industry 5.0

Chair: **Marco Grasso**, Politecnico di Milano

Thu, July 4th, 11:30 a – 01:00 p

Andrea Camisani, Camozzi Ingersoll Machine Tools

Qiang Huang, University of Southern California

Yuan Luo, Institute of AI in medicine, Northwestern University

Elisa Negri, Politecnico di Milano | MICS Made in Italy Circolare e Sostenibile

Shiyu Zhou, University of Wisconsin-Madison

PROGRAM — PRE-CONFERENCE WORKSHOP, MONDAY, JULY 01, 2024

10:00: a – 10:30 a **Registration Open**

Welcome

Session MA01 **Data Modelling, Monitoring and Decision Making for Smart Manufacturing**

Contributed

Chairs: Marco Grasso, Politecnico di Milano, Juan Du, The HKUST (Guangzhou)

Sala Consiglio

10:30 a – 11:30 a

Big data methods for in-situ monitoring of additive manufacturing processes

Marco Grasso, Matteo Bugatti, Bianca Maria Colosimo

Politecnico di Milano, Department of Mechanical Engineering, Milan, Italy

Statistical Methods in Industry 4.0

Christian Capezza, Fabio Centofanti, Antonio Lepore, Biagio Palumbo

Department of Industrial Engineering, Università degli Studi di Napoli Federico II, Naples, Italy

Session MA02 **Quality and Reliability Improvement in Advanced Manufacturing**

Invited

Chairs: Zhang Chen, Tsinghua University

Sala Consiglio

11:30 a – 12:30 p

Novel Bayesian optimization algorithms for robust engineering design with computer experiments

Han Mei, College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China

In-Situ Quality Process Monitoring in Additive Manufacturing

Yuanyuan Gao¹, Ruiyu Xu², Jianguo Wu²

¹Astronautics, Nanjing, China,

²Peking University, Beijing, China

Reinforcement Learning for Process Control in High-Temperature Superconductor Manufacturing

Qianmei Feng^{1,2}, Shenglin Peng¹, Ying Lin^{1,2}, Siwei Chen^{2,3,4,5}, Mahesh Paidpilli^{2,3,4}, Chirag Goel^{2,3}, Eduard Galstyan^{2,3,4}, Venkat Selvamannickam^{2,3,4}

¹Department of Industrial Engineering, University of Houston, Houston, TX, USA,

²Advanced Manufacturing Institute, University of Houston, Houston, TX, USA,

³Department of Mechanical Engineering, University of Houston, Houston, TX, USA,

⁴Texas Center for Superconductivity, Houston, TX, USA,

⁵Princeton Plasma Physics Laboratory, Princeton, NJ, USA

12:30 p – 01:30 p **Lunch**

Visit Session **LAB TOUR**

01:30 p – 05:00 p

Additive Manufacturing Labs, Department of Mechanical Engineering, Politecnico di Milano

05:00 p

Transfer to Lake Como

PROGRAM – ICQSR 2024 CONFERENCE – TUESDAY, JULY 02, 2024

08:00 a – 08:30 a Registration Open

Welcome

Plenary Session

Keynote Speech

Co-chairs: Jian Liu, University of Arizona, Bianca Maria Colosimo, Politecnico di Milano

ROOM A

09:00 a – 10:00 a

Smarter Decisions for a Better World with OR, AI, and INFORMS

Prof. Julie Swann, North Carolina State University - INFORMS

10:00 a – 10:20 a

Coffee Break

Plenary Session

Keynote Speech

Co-chairs: Biagio Palumbo, University of Naples Federico II, Jian Liu, University of Arizona

ROOM A

10:20 a – 11:20 a

Stochastic maintenance for a large fleet of structures

Prof. Alain Bensoussan, University of Texas at Dallas

11:20 a – 11:30 a

Short Break

Paper Session

ICQSR Best Paper Competition

Chair: Antonio Lepore, University of Naples Federico II

ROOM A

11:30 a – 12:30 p

MFRL-BI: Design of a Model-free Reinforcement Learning Process Control Scheme by Using Bayesian Inference

Yanrong Li¹, Juan Du², Wei Jiang¹, Fugue Tsung²

¹Shanghai Jiao Tong University

²The Hong Kong University of Science and Technology/Guangzhou

Distribution-Free Online Change Detection for Low-Rank Images

Tingnan Gong, Seong-Hee Kim and Yao Xie, Georgia Tech

CODA: Temporal Domain Generalization via Concept Drift Simulator

Chia-Yuan Chang¹, Yu-Neng Chuang², Zhimeng Jiang¹, Kwei-Herng Lai², Anxiao Jiang¹, Na Zou³

¹Texas A&M University

²Rice University

³University of Houston

Exploring Drug Candidates: All ϵ -Best Arms Identification in Linear Bandits

Zhekai Li¹, Tianyi Ma², Cheng Hua¹, Ruihao Zhu³

¹Shanghai Jiao Tong University

²University of Michigan – Shanghai Jiao Tong University Joint Institute

³Cornell SC Johnson College of Business

12:30 p – 01:30 p

Lunch

Panel 1

Leader forum - International collaboration for future QSR

Chair: Jian Liu, University of Arizona, Yisha Xiang, University of Houston

ROOM A

01:30 p – 03:00 p

Suk Joo Bae, Hanyang University, Department of Industrial Engineering
Russell Barton, Penn State University
Biagio Palumbo, University of Naples Federico II, Department of Industrial Engineering
Julie Swann, Fitts Department of Industrial and Systems Engineering, NC State University
Fugee Tsung, The Hong Kong University of Science and Technology/Guangzhou
Houmin Yan, The City University of Hong Kong

Session TB01

ENBIS Session

Chair: **Biagio Palumbo**, University of Naples Federico II

ROOM A

03:00 p – 04:00 p

Transfer Learning in Industrial applications

Mathilde Mougeout, ENSIIE & ENS Paris-Saclay

Predictive Ratio Cusum (PRC): A Bayesian Approach in Online Change Point Detection of Short Runs

Konstantinos Bourazas¹, **Frederic Sobas²** and **Panagiotis Tsiamyrtzis^{3,4}**

¹ Dept. of Economics, Athens University of Economics and Business, Greece

² Multisite Hemostasis Laboratory, Hospices Civils de Lyon, France

³ Department of Mechanical Engineering, Politecnico di Milano, Italy &

⁴ Dept. of Statistics, Athens University of Economics and Business, Greece

A Novel Multivariate Functional EWMA Control Chart for Profile Monitoring

Christian Capezza¹, **Giovanna Capizzi²**, **Fabio Centofanti¹**, **Antonio Lepore¹**, **Biagio Palumbo¹**

¹ University of Naples Federico II, Department of Industrial Engineering

² University of Padova, Department of Statistical Sciences

04:00 p – 04:30 p

Coffee Break

Session TC01

Design and analysis of expensive computer experiments

Invited

Chair **Simon Mak**, Duke University, Durham, NC, USA

ROOM A

04:30 p – 05:30 p

Simulation model calibration with dynamic stratification

Bingjie Liu¹, **Pranav Jain²**, **Sara Shashaani²**, **Eunshin Byon¹**

¹ University of Michigan, Ann Arbor, MI, USA

² North Carolina State University, Raleigh, NC, USA

ESPs: a new cost-efficient sampler for expensive posterior distributions

Benedetta Bruni¹, **Flora Shi²**, **Yi (Irene) Ji¹**, **Simon Mak¹**

¹ Duke University, Durham, NC, USA

² Massachusetts Institute of Technology, Cambridge, MA, USA

On the testing of statistical software

Ryan Lekivetz, SAS Institute, Cary, NC, USA

Experimental design for expensive path planning simulators via integer programming

Yen-Chun Liu¹, **Simon Mak¹**

Session TC02
Contributed

Data Analytics and AI in Critical Industry
Chair **Xiaoning Jin**, Northeastern University

ROOM B

04:30 p – 05:30 p

Sequential Sponsored-Products and Off-Amazon Advertising Optimization for Etailers

Houmin Yan, Gary Feng, Yina Ning, Yangyang Xie

City University of Hong Kong, Department of Management Sciences, Hong Kong

Enhancing Manufacturing Design with Active Learning and Constrained Bayesian Optimization

Xiaoning Jin, Guoyan Li

Northeastern University, Mechanical and Industrial Engineering, MA, USA

Center to Stream Health in Place (C2SHIP): Big Data and Opportunities for Collaborations

Shu-Fen Wung, Janet Roveda

University of Arizona, Tucson, AZ, USA

Session TD01
Invited

Advanced Analytics with Human in the Loop
Chair: **Irad Ben-Gal**, Tel Aviv University

ROOM A

05:30 p – 06:30 p

The skill-fit model: utilizing skills to advance machine learning based job recommendation systems

Alon Atzil¹, Hila Chalutz-Ben Gal¹

¹Bar-Ilan University

A Two-Phase Classification & Optimization Model with Limited Human Resource Allocation

Danit Shifman Abukasis¹, Chen Ben-Mayor¹, Itay Margolin², Gonen Singer¹

¹Bar-Ilan University, Faculty of Engineering, Ramat Gan, 52900, Israel

²Intuit Inc.

Design for Human Explainability - Using DOE for an Efficient XAI

Aviv Notovich¹, David Steinberg², Irad Ben-Gal¹

¹Industrial Engineering Department, Tel Aviv University

²Statistics Department, Tel Aviv University

Session TD02
Invited

Data Science for Quality and Reliability Improvement
Chair: **Suk Joo Bae**, Hanyang University

ROOM B

05:30 p – 06:30 p

Image Degradation-Based Stochastic Process and Condition Monitoring for Manufacturing Process

Munwon Lim, Suk Joo Bae

Hanyang University, Seoul, South Korea

Deep Latent Factor Model for Spatio-Temporal Forecasting

Wonmo Koo, Eun-Yeol Ma, Heeyoung Kim

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea.

Domain-Knowledge-Informed Functional Outlier Detection for Line Quality Control Systems

Sungil Kim

UNIST, Ulsan, South Korea

07:30 p

Social Dinner

PROGRAM - ICQSR 2024 CONFERENCE – WEDNESDAY, JULY 03, 2024

Plenary Session	Keynote Speech	
	Co-chairs: Jian Liu , University of Arizona, Nan Chen , National University of Singapore	ROOM A

08:00 a – 09:00 a

Analytics for Decarbonization
Prof. Hui Szu Ng, National University of Singapore

09:00 a – 09:30 a	Coffee Break
--------------------------	---------------------

Panel 2	Panel - New era in AI for QSR	
	Chair: Bianca Maria Colosimo , Politecnico di Milano	ROOM A

9:30 a – 11:10 a

Irad Ben-Gal, Telaviv University
Luca Dedè, Politecnico di Milano
Romano Iazurlo, Leonardo
Ran Jin, Virginia Tech
Mathilde Mougeot, ENSIE & ENS Paris-Saclay
Kamran Paynabar, Georgia Tech
Fugee Tsung, The Hong Kong University of Science and Technology/Guangzhou

11:10 a – 11:30 a	Short Break
--------------------------	--------------------

Plenary Session	Keynote Speech	
	Co-chairs: Bianca Maria Colosimo , Politecnico di Milano, Biagio Palumbo , University of Naples Federico II	ROOM A

11:30 a – 12:30 p

Data Science and Wind Energy
Prof. Yu Ding, Georgia Tech

12:30 a – 13:30 a	Lunch
--------------------------	--------------

Session WA01	System Reliability Modellig and Inference	
Invited	Chair: Qingpei Hu , University of Chinese Academy of Sciences	ROOM A

01:30 p – 02:30 p

A causal perspective on importance measures
Zitong Lu, Min Xie
Department of Systems Engineering, City University of Hong Kong

Software Reliability Modelling and Analysis Constrained by the Shape of the MVF
Kangan Chen¹, Jian Liu², Qingpei Hu³

¹School of Mathematics Science, University of Chinese Academy of Sciences,

²Department of Systems and Industrial Engineering, University of Arizona

³Academy of Mathematics and Systems Science, Chinese Academy of Sciences

Subsampling Strategies for Heavily Censored Big Lifetime Data

Yixiao Ruan, Qingpei Hu, Dan Yu

Academy of Mathematics and Systems Science, Chinese Academy of Sciences,
School of Mathematics Science, University of Chinese Academy of Sciences

Session WA02

Invited

System Reliability & Resilience Modeling and Maintenance

Chair: **Jian Zhou**, Nanjing University of Science and Technology, Nanjing, China

ROOM B

01:30 p – 02:30 p

Reliability engineering for hybrid renewable energy systems: Challenges and research opportunities

Reem Nasser¹, Dariusz Mazurkiewicz², Yiliu Liu¹

¹Norwegian University of Science and Technology, Trondheim, Norway,

²Lublin University of Technology, Lublin, Poland

Dynamic resource matching in manufacturing using deep reinforcement learning

Saunak Panda, Yisha Xiang

¹University of Houston, Houston, the United States

Microgrid expansion planning with resilience and environmental benefits under single and multiple structures

Jian Zhou, Xiaoting Nie

¹Nanjing University of Science and Technology, Nanjing, China

Session WB01

Contributed

Quality Monitoring in I4.0 and Additive Manufacturing

Chair: **Marco Grasso**, Politecnico di Milano

ROOM A

02:30 p – 03:30 p

Online Defect Detection in Extrusion-Based Bioprinting Using In-Situ Thermal Imaging

Egon Prioglio, Bianca Maria Colosimo

Politecnico di Milano, Department of Mechanical Engineering

Infer and Control Effects of Lurking Variables for 3D Printing Quality Control

Qiang Huang, University of Southern California, Epstein Department of Industrial and Systems Engineering

Faults in PCBs using Advanced Deep Learning Techniques for Handling Data Imbalance

Marzieh Hashemzadeh Saadat, Farnoosh Naderkhani

Concordia Institute for Information System Engineering, Concordia University, Montreal, CANADA

Session WB02

Contributed

Methods for anomaly detection, prognosis and transfer learning

Chair: **Ana Maria Estrada**, Purdue University

ROOM B

02:30 p – 03:30 p

An Adaptive Sampling Strategy for Real-time Anomaly Detection with Unmanned Sensing Vehicles

Ana Maria Estrada Gomez, Yue Jiang

Purdue University

Multi-modal data fusion for prognosis after mild traumatic brain injury

Jing Li, Catherin Chong

Georgia Tech, H. Milton Stewart School of Industrial and Systems Engineering

A novel solution for Transfer Learning in 3D Bioprinting

Filippo Bracco¹, Kamran Paynabar², Bianca Maria Colosimo¹

¹Department of Mechanical Engineering, Politecnico di Milano

²Georgia Tech, H. Milton Stewart School of Industrial and Systems Engineering

03:30 p – 04: 00 p

Coffee Break

**Session WC01 -
Invited**

Manufacturing & Field Reliability Improvement Using Degradation & Failure-Time Data

Chair: **Suk Joo Bae**, Hanyang University, Seoul, Korea

ROOM A

04:00 p – 05:00 p

Nonlinear Quantile Regression for Accelerated Destructive Degradation Data

Suk Joo Bae, Moowon Lim

Hanyang University, Seoul, Korea

An On Line Approach For Joint Optimization Of Data Driven Predictive Maintenance and Production Planning

Xiaoyan Zhu¹, Hanchao Wang¹, Tao Yuan²

¹School of Economics and Management, University of Chinese Academy of Sciences, Beijing, China

²Department of Industrial and Systems Engineering, Ohio University, Athens, Ohio, United States

Early Anomaly Detection in Automotive Warranty Data through Bias Correction and Sequential Testing

Seongjoon Kim¹, Sina Park¹, Hyojung Kim¹

¹Chosun University, Gwangju, Republic of Korea

**Session WC02 -
Contributed**

Statistical Process Control and Quality Engineering

Chair: **Russell Barton**, The Pennsylvania State University

ROOM B

04:00 p – 05:20 p

From Features to Benefits: A Data-Driven Approach for the Economic Design of Adaptive Quality Control

Zhaoguang Xu¹, Stefan Minner²

¹Dalian University of Technology

²Technical University of Munich

Fourier Methods for Statistical Monitoring of Queues

Russell R. Barton, The Pennsylvania State University, Smeal College of Business

A Robust Statistical Process Monitoring Framework for Multivariate Functional Quality Characteristics

Antonio Lepore, Christian Capezza, Fabio Centofanti, Biagio Palumbo

Università degli Studi di Napoli Federico II, Department of Industrial Engineering

Anomaly Detection in Profile Monitoring through Functional Conformal Prediction

Simone Vantini¹, Teresa Bortolotti¹, Bianca Maria Colosimo²

¹MOX, Department of Mathematics, Politecnico di Milano

²Department of Mechanical Engineering, Politecnico di Milano

PROGRAM - ICQSR 2024 CONFERENCE – THURSDAY, JULY 04, 2024

Session ThA01 Contributed	Advances in high-dimensional data analysis Chair: Marco Grasso , Politecnico di Milano	ROOM A
--	---	--------

08:00 a – 09:00 a

Multi-agent Sequential Decision Making for Optimal Design
Raed Al Kontar, University of Michigan

Ordinal Discriminative Dimensionality Reduction for Functional Profiles of Biosensor Signals
Giulia Patanè¹, **Federica Nicolussi¹**, **Alexander Krauth²**, **Gunther Gaugliz²**, **Bianca Maria Colosimo³**, **Luca Dede¹**, **Alessandra Menafoglio¹**

¹MOX, Department of Mathematics, Politecnico di Milano

²University of Tuebingen,

³Department of Mechanical Engineering, Politecnico di Milano

Robust Multivariate Singular Spectrum Analysis by RODESSA
Fabio Centofanti¹, **Mia Hubert²**, **Biagio Palumbo¹**, **Peter J. Rousseeuw²**

¹University of Naples Federico II, Department of Industrial Engineering

²Section of Statistics and Data Science, Department of Mathematics, KU Leuven, Belgium

Session ThA02 Invited	Application of generative AI and LLM in quality engineering Chair: Chen Zhang (Tsinghua University), Hao Yan (Arizona State University), Ziyue Li (University of Cologne)	ROOM B
--	--	--------

08:00 a – 09:00 a

Large-Language-Models (LLMs) for Time Series Analysis
Ziyue Li, Department of Information Systems, University of Cologne, Germany

Hierarchical Multi-label Classification for Fine-level Event Extraction from Aviation Accident Reports
Xinyu Zhao, **Hao Yan**, **Yongming Liu**
Arizona State University, Tempe, USA

Multi-Agent Causal Discovery Using Large Language Models
Chen Zhang, Department of Industrial Engineering, Tsinghua University, Beijing, China

Session ThB01 Contributed	QSR Flash talks Chair: Seong-joon Kim , Chosun University, Gwangju, Republic of Korea	ROOM A
--	--	--------

09:00 a – 10:00 a

Data-driven Condition Monitoring Framework for Heat Exchanger Slagging in Coal-fired Power Plants
Seonggwon Son¹, **Hyeongju Yu²**, **Seongjoon Kim¹**

¹Chosun University, Gwangju, Republic of Korea

²Korea Midland Power (KOMIPO), Boryeong, Republic of Korea

Battery Consumption Prediction Model for Micro Electric Vehicles: A Real-World Prediction Approach

Ingyu Choi¹, Seongjoon Kim¹

¹Chosun University, Gwangju, Republic of Korea

Early Detection of Field Reliability Issues Using Hazard Rate Models on Warranty Data

Yuri Kim¹, Inkyu Choi¹, Seongjoon Kim¹

¹Chosun University, Gwangju, Republic of Korea.

Reliability Modeling and Maintenance Optimization of Performance-Based Balanced Systems

Tianzi Tian¹, Jun Yang¹, Changzhen Zhang¹

¹Beihang University, Beijing, China

Quality evaluation for wind turbine design by an uncertain HoQ

Wanwan Zhang, Norwegian University of Science and Technology, Trondheim, Norway

Application of Lean Principles in the Pakistani Cattle Feed Industry

Arsalan Fayyaz¹, ChenGuang Liu¹, Yan Xu¹, Ammara Farooq¹, Wei Xin², Fahad Khan¹

¹School of Management, Northwestern Polytechnical University, Xi'an 710072, China

²Cancer specialist in Shaanxi Provincial Hospital, Xi'an, Shaanxi, China

10:00 a – 10:20 a

Coffee Break

Session ThC01

Contributed

History and frontiers in Quality Engineering

Chair: Ying Lin, University of Houston, Houston, TX, USA

ROOM A

10:20 a – 11:20 a

A Brief History of AI Impacting Statistical Process Monitoring Research and Future Directions

Shing I Chang¹, Parviz Ghafariasl Ganjinehketab¹

¹Kansas State University, Manhattan, Kansas, USA

FCOM: A Federated Collaborative Online Monitoring Framework via Representation Learning

Tanapol Kosolwattana¹, Huazheng Wang², Raed Al Kontar³, Ying Lin¹

¹University of Houston, Houston, TX, USA

²Oregon State University, Corvallis, OR, USA

³University of Michigan, Ann Arbor, MI, USA

Multi-physics Guided Generative Diffusion Models with Manufacturing Applications

Naichen Shi¹, Hao Yan², Raed Al Kontar¹

¹University of Michigan, Ann Arbor, MI, USA

²Arizona State University, Tempe, USA

Session ThC02

Contributed

AI and Analytics for Condition Monitoring and Maintenance

Chair: Qiuzhuang Sun, The University of Sydney

ROOM B

10:20 a – 11:20 a

Managing predictive maintenance and production planning for a smart manufacturing system

Hanchao Wang¹, Xiaoyan Zhu¹, Tao Yuan²

¹University of Chinese Academy of Sciences, Beijing, China

²Ohio University, USA

Optimal Abort Policy for Mission-Critical Systems under Imperfect Condition Monitoring

Qiuzhuang Sun¹, Jiawen Hu², Zhi-Sheng Ye³

¹The University of Sydney, Australia

²UESTC, China

³National University of Singapore, Singapore

Efficient Asymptotics for Condition-Based Replacement Thresholds

Poulad Moradi Shahmansouri, University of Luxembourg

11:20 a – 11:30 a Short Break

Panel 3 QSR in Industry 5.0

Chair: **Marco Grasso**, Politecnico di Milano

ROOM A

11:30 a – 01:00 p

Andrea Camisani, Camozzi Ingersoll Machine Tools

Qiang Huang, University of Southern California

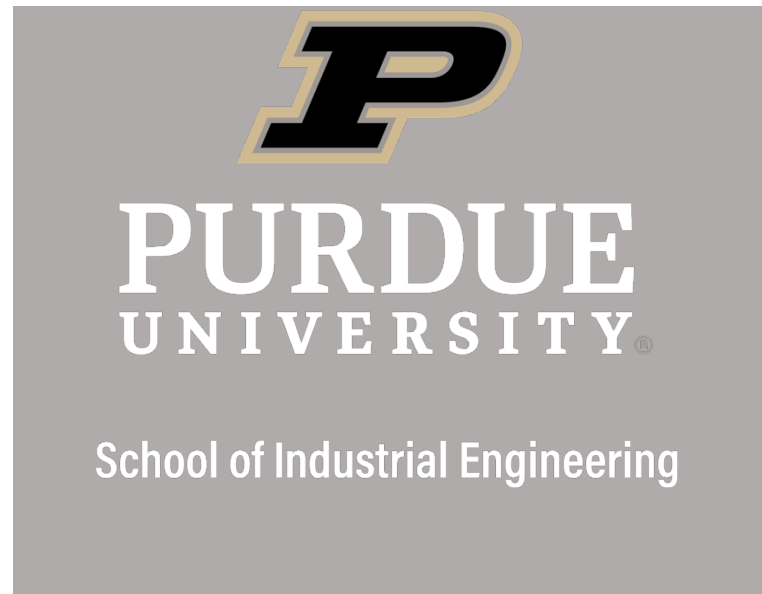
Yuan Luo, Institute of AI in medicine, Northwestern University

Elisa Negri, Politecnico di Milano | MICS Made in Italy Circolare e Sostenibile

Shiyu Zhou, University of Wisconsin-Madison

01:00 p Light lunch & Closing

SPONSORS



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II



DIPARTIMENTO DI
INGEGNERIA
INDUSTRIALE

SFERe

Statistics for Engineering Research
University of Naples Federico II
www.sfere.unina.it



Prof. Russell Barton

Smeal College of Business at
Penn State University

Building (B23)

Mechanical Engineering Department
via La Masa 1
20156 Milano, Italy



The mission of the Department of Mechanical Engineering is to promote and develop culture, research and innovation both in the sectors that traditionally characterize it, and in new areas destined to assume an increasing importance in society and in the context in which we live, such as transport and sustainable mobility, energy technologies, biomechanics and service robotics, bio, smart and hybrid materials, processing technologies and systems, space and defense.

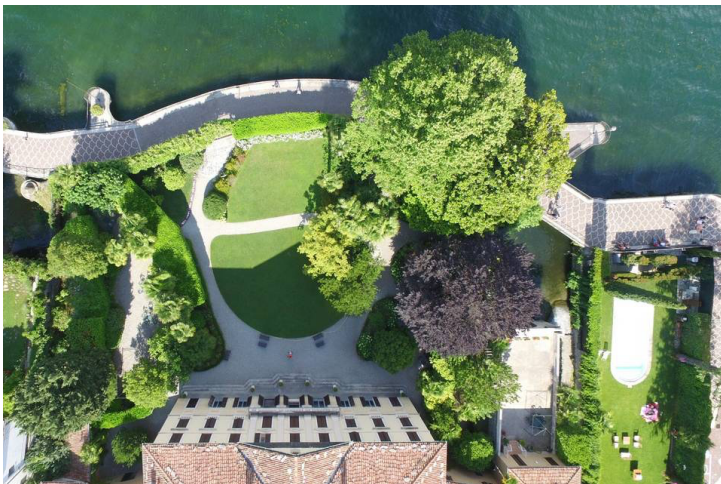
CONFERENCE VENUE – VILLA PARRAVICINI REVEL

Villa Parravicini Revel

Via Museo Giovio, 6
22100, Como CO



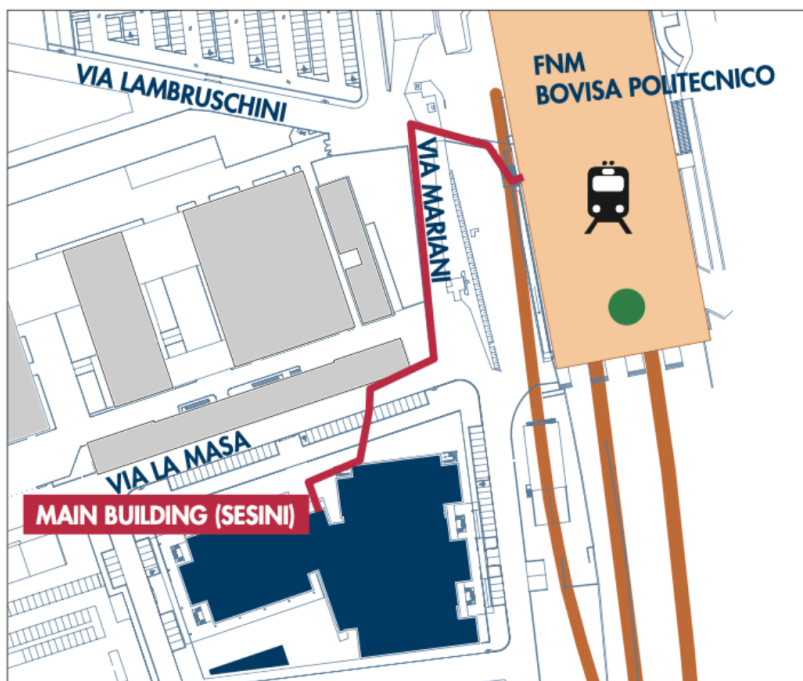
VILLA PARRAVICINI REVEL



Villa Revel Parravicini, located in the heart of Como, is an extraordinary example of neoclassical architecture, immersed in an atmosphere of undeniable historical and cultural charm. After passing through various noble hands, the villa was acquired in the early 20th century by General Genova Thaon de Revel, a prominent figure in the Italian Risorgimento. In 1910, the villa passed to Ottavia, the General's daughter, who in turn designated her niece Camilla Parravicini Sossnovsky as the heir.

VENUE – HOW TO REACH THE PRE-CONFERENCE WORKSHOP VENUE IN MILAN

From Milano Bovisa train station (<5 min walking):



Once outside, turn right and go down the stairs. Then turn left in via Privata Mariani and, at the end of the street, turn right in via La Masa. The Department of Mechanical Engineering is on your left (“Building B23 (Sesini)”, see the photo above). The complete route is highlighted in red in the map above.

From Milano Central train station:

You can either walk to the “R” line stop “REPUBBLICA” (5-10 min.) and take the S13 and S10 lines on the platform no. 2 or take the underground, M2 green line to “Garibaldi” station and then take the S13 and S10 lines on the platform no. 2.

The destinations of the “S” lines should be SARONNO or BOVISA. At the news stands you can buy single fare tickets as well as one-day tickets for unlimited fares in one day. Get off at Bovisa Politecnico station and follow the indications above.

From Malpensa airport:

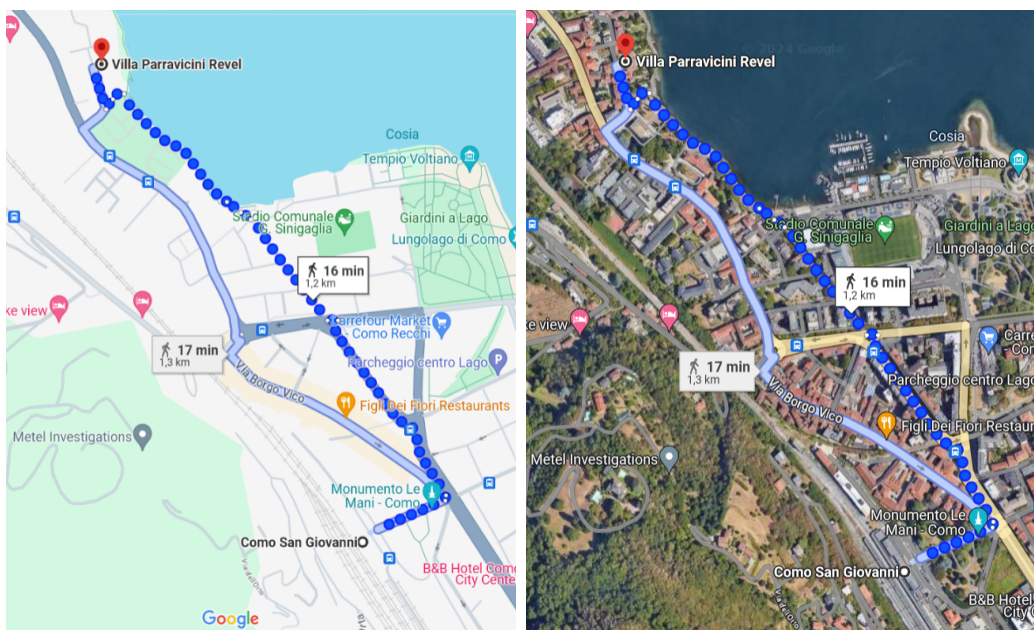
Take the Malpensa Express train that leaves Terminal 1 every 30 min. The trip lasts about 35-40 minutes and the tickets can be bought at the ticket office of Malpensa railway station or on the train paying a small extra fee. More info here: <https://www.malpensaexpress.it/en/>. Get off at Bovisa Politecnico station and follow the indications above.

From Milan-Linate airport:

Take the underground line M4 from the airport to Milano Dateo Station. Then take a suburban train “Passante Ferroviario” to Milano Bovisa Politecnico station. Please check whether the train stops at Bovisa Politecnico station or not. Get off at Bovisa Politecnico station and follow the indications above.

VENUE – HOW TO REACH THE CONFERENCE VENUE IN COMO

From Como San Giovanni train station (16 min walking):



From Malpensa airport to Como city:

To reach Como from Malpensa Airport, take the Malpensa Express train (departing from both terminals) to Milan and get off at Saronno. More info here: <https://www.malpensaexpress.it/en/>. Then, at Saronno train station, take the train line Milano Cadorna – Como Lago.

From Milan-Linate airport to Como city:

To reach Como from Milan-Linate Airport, take one of the shuttle services just outside the airport to Milan Central Station. Then, from there, take the train to Como S. Giovanni station. Alternatively, you may also take a taxi from Milan-Linate airport (a taxi fare will be around 60€ – 80€, depending on road traffic and the time of day).

From Milan train stations to Como city:

To reach Como from Milan's main train stations, choose the route that is most convenient for you based on your starting point:

- from Milano Bovisa to Como Lago (take this route if your starting point is the Bovisa campus – pre-conference venue)
- from Milano Porta Garibaldi to Como Lago
- from Milano Cadorna to Como Lago
- from Milano Porta Garibaldi to Como S. Giovanni
- from Milano Centrale to Como S. Giovanni

On July 1st (at the end of the pre-conference workshop) a private bus transfer to Como (city centre) will be made available for all pre-conference workshop attendees at the end of the lab tour visit in Politecnico di Milan.

VENUE – ACCOMMODATIONS IN COMO

The whole Como Lake area is very crowded in July because of the high season, with limited accommodation availability. Hotel prices are subject to increase in the coming weeks / months, and room availability may decrease very quickly. It is therefore necessary to reserve hotel rooms as soon as possible! Here below you may find a list of recommended hotels.

Hotels in the city center, in a walking distance from the venue:

- Albergo Firenze***
- Hotel Borgovico***
- Hotel Borgo Antico***
- Park Hotel Meublè***
- Albergo Del Duca***
- Hotel Metropole Suisse****
- 73 Boutique Hotel****
- Hilton Lake Como****
- Hotel Barchetta****
- Hotel Avenue****

Hotels just outside the city center

- Hotel Ibis Como (Grandate)***
- Hotel Cruise****

What to do in Como and Lake Como

- Itineraries in Como: https://www.visitcomo.eu/en/discover/itineraries_excursions/itineraries-in-town/index.html
- Alessandro Volta's temple: https://www.visitcomo.eu/en/discover/museums/tempio_voltiano/index.html
- Explores villas in Como: https://www.visitcomo.eu/en/discover/parks_villas/villas/index.html
- An overview of the most beautiful towns around Lake Como: <https://mylakecomo.co/en/places/>
- Additional information: <https://mylakecomo.co/en/>

Examples of guided tours

- One day at Bellagio: <https://lakecomotourism.it/lake-como-tours/one-day-at-bellagio/>
- Most beautiful villas in Lake Como: <https://lakecomotourism.it/lake-como-tours/tour-of-the-most-beautiful-villas-of-lake-como/>

