

Nataliia Shakhovska,
Jianbo Jiao,
Ivan Izonin,
Stephane Chretien.
(Eds.)



Proceedings of the 7th International Conference on
Informatics & Data-Driven Medicine (IDDM 2024)

Birmingham, United Kingdom
November, 2024

Shakhovska N., Jiao J., Izonin I., Chretien S. (Eds.): The 7th International Conference on Informatics & Data-Driven Medicine (*IDDM 2024*), Birmingham, United Kingdom, November 14-16, 2024, CEUR-WS.org, online

This volume represents the proceedings of the 7th International Conference on Informatics & Data-Driven Medicine, held in Bratislava, Slovakia, in November 2024. It comprises 31 contributed papers and 1 abstract that were carefully peer-reviewed and selected from 82 submissions.

Copyright © 2024 for the individual papers by the papers' authors.
Copying is permitted only for private and academic purposes. This volume is published and copyrighted by its editors.

Preface

We are pleased to present you the proceedings of the 7th International Conference on Informatics & Data-Driven Medicine, held in Bratislava, Slovakia, on November 14-16, 2024.

The main aim of the IDDM conference is a discussion of the recent research results in all areas of Computer Sciences in Medicine, Medical Data Retrieval, Finding the Hidden Associations within the complete set of data, and Intelligent Systems Development.

The Conference is soliciting literature review, survey, and research papers comments including, while not limited to, the following areas of interest:

- Small Data Approaches in Medicine
- Bioinformatics for Healthcare Applications
- Analysis and Prediction for Covid'19 Data
- Big Data and IoT in Medical Applications
- Medical Image Processing
- Deep Learning Models in Healthcare and Biomedicine
- Machine Learning Approaches for Medicine
- IT-enabled Healthcare Services
- Complex Health Monitoring Systems

The Conference joined scientists from Ukraine, United Kingdom, France, Czech Republic, Estonia, Algeria, Germany, Tunisia, Poland, Egypt, Lithuania, Slovakia, Romania and Nigeria.

The language of the IDDM Conference is English.

Due to the COVID'2019 pandemic, the IDDM conference took the form of an online presentation of peer-reviewed individual papers.

The Organizing Committee received 82 submissions, 31 accepted for presentation as short and regular papers and 1 as an abstract. These papers were published in this volume of IDDM 2024 proceedings.

The Conference would not have been possible without the support of many people. First, we would like to thank our partners: Eurizone project "Artificial Intelligence in medicine: Small Data approach" public organization "Ukrainian scientific and educational IT society". We want to thank the Program Chairs, organization staff, the members of the Technical Program Committees, and external reviewers for their excellent and tireless work. We sincerely wish that all attendees benefited scientifically from the Conference and wish them every success in their research. The humble wish of the conference organizers is that the professional dialogue among the researchers, scientists, engineers, and doctors continues beyond the event and that the friendships and collaborations forged will linger and prosper for many years to come.

November 2024

Nataliia Shakhovska,
Jianbo Jiao,
Ivan Izonin,
Stephane Chretien.

Organizers



**UNIVERSITY OF
BIRMINGHAM**

**University of Birmingham,
Birmingham, United Kingdom**

<https://www.birmingham.ac.uk/>



**Lviv Polytechnic National University,
Ukraine**

<http://www.lp.edu.ua/en>



**Slovak University of Technology in
Bratislava, Slovak Republic**

https://www.stuba.sk/english.html?page_id=132



University Lumière Lyon 2, France

<https://www.univ-lyon2.fr/>



**UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA**

Polytechnic University of Valencia, Spain

<http://www.upv.es/en/>



**National University "Zaporizhzhia
Polytechnic", Ukraine**

<https://zp.edu.ua/>



Linnaeus University

Linnaeus University, Sweden

<https://lnu.se/en/>



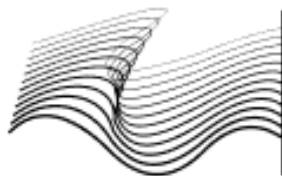
**State Institution «Kundiiev Institute of Occupational Health of the National Academy of Medical Sciences of Ukraine»,
Kyiv, Ukraine**

<https://imtuik.org/>

with the support of

Eurizone project

“Artificial Intelligence in Medicine: Small Data Approach (SmallAIM)”



blackthorn.ai
per aspera ad astra

and

Public organization "Ukrainian scientific and educational IT society."



Programme Committee Chairs

Nataliia Shakhovska, Lviv Polytechnic National University, Ukraine
Jianbo Jiao, University of Birmingham, United Kingdom
Stephane Chretien, Université Lumière Lyon 2, France

Programme Committee Members

Addisson Salazar, Polytechnic University of Valencia, Spain
Jaime Campos, Linnaeus University, Sweden
Sergey Subbotin, National University "Zaporizhzhia Polytechnic", Ukraine
Felix Albu, Valahia University of Targoviste, Romania
Winfried Auzinger, Vienna University of Technology, Austria
Yannick Estève, Avignon Université, France
Paolo Barsocchi, ISTI - C.N.R., Italy
Sergio Montenegro, Julius-Maximilians-Universität Würzburg, Germany
Christine Strauss, University of Vienna, Austria
Valentyna Chopyak, Danylo Halytsky Lviv State Medical University, Ukraine
Hakan Kutucu, Karabuk University, Turkey
Yevgeniy Bodyanskiy, Kharkiv National University of Radio Electronics, Ukraine
Leszek Rutkowski AGH University of Science and Technology, Poland
Larysa Zomchak, Ivan Franko National University of Lviv
Sergii Babichev, Jan Evangelista Purkyně University in Ústí nad Labem, Czech Republic
Roman Tkachenko, Lviv Polytechnic National University, Ukraine
Zoran Čekerevac, University Union Nikola Tesla, Serbia
Nataliia Melnykova, Lviv Polytechnic National University, Ukraine
Roman Danel, University of South Bohemia in České Budějovice, Czech Republic
Vitaliy Yakovyna, Lviv Polytechnic National University, Ukraine
Mario F. Pavone, University of Catania, Italy
Dmytro Chumachenko, National Aerospace University - "KhAI", Ukraine
Mykola Dyvak, Ternopil National Economic University, Ukraine
Volodymyr Lytvynenko, Kherson National Technical University, Ukraine
Michal Řepka, University of South Bohemia in České Budějovice, Ostrava, Czech Republic
Jacek Rogowski, Lodz University of Technology, Poland
Iurii Krak, Taras Shevchenko National University of Kyiv, Ukraine
Vitaly Levashenko, University of Zilina, Slovak Republic
Ivanna Dronyuk, Jan Długosz University in Częstochowa, Poland
Tetiana Hovorushchenko, Khmelnytskyi National University, Ukraine
Smita Shandilya, Sagar Institute of Research and Technology, Bhopal, India
Tetyana Chumachenko, Kharkiv National Medical University, Ukraine
Shishir Kumar Shandilya, Vellore Institute of Technology, VIT Bhopal University, India
Yuriy Syerov, Lviv Polytechnic National University, Ukraine
Solomiia Fedushko, Lviv Polytechnic National University, Ukraine
Viacheslav Kovtun, Vinnytsia National Technical University, Ukraine
Krishna Kant Singh, KIET Group of Institutions, India
Oleh Berezsky, West Ukrainian National University, Ukraine
Michal Greguš, Comenius University in Bratislava, Slovakia
Olga Kanishcheva, National Technical University "Kharkiv Polytechnic Institute", Ukraine
Olga Cherednichenko, National Technical University "Kharkiv Polytechnic Institute", Ukraine
Igor Korobiichuk, Warsaw University of Technology, Poland
Violetta Demchenko, State Institution «Kundiiev Institute of Occupational Health of the National Academy of Medical Sciences of Ukraine»

Additional Reviewers

Myroslav Stupnytskyi Military medical clinical center of the Western region, Ukraine
Viktor Khavalko Lviv Polytechnic National University, Ukraine Roman Kaminsky Lviv Polytechnic National University, Ukraine Anatoliy Batyuk Lviv Polytechnic National University, Ukraine
Oleh Pitsun West Ukrainian National University, Ukraine Grygoriy Melnyk West Ukrainian National University, Ukraine

Mariia Rashkevych Lviv Polytechnic National University, Ukraine
Rostyslav Kosarevych Lviv Polytechnic National University, Ukraine

Organization Committee Chair

Ivan Izonin, Lviv Polytechnic National University, Ukraine

Organization Committee Members

Nataliia Lotoshynska, Lviv Polytechnic National University, Ukraine
Lesia Mochurad, Lviv Polytechnic National University, Ukraine
Oleh Pitsun, West Ukrainian National University, Ukraine
Volodymyr Shymanskyi, Lviv Polytechnic National University, Ukraine
Khrystyna Zub, Lviv Polytechnic National University, Ukraine
Yulianna Mochurad, Danylo Halytskyi Lviv National Medical University, Ukraine
Dmytro Danylyuk, Danylo Halytsky Lviv Medical University, Ukraine
Yaroslav Tolstyak, Danylo Halytsky Lviv Medical University, Ukraine
Myroslav Havryliuk, Lviv Polytechnic National University, Ukraine
Kyrylo Yemets, Lviv Polytechnic National University, Ukraine
Olha Chala, Kharkiv National University of Radio Electronics, Kharkiv, Ukraine
Roman Muzyka, Lviv Polytechnic National University, Ukraine