

Faculty of Natural Sciences

University of Ss. Cyril and Methodius in Trnava

The 8th International Scientific Conference
Applied Natural Sciences 2023



ANS 2023

Book of abstracts



UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM



18th – 20th of September 2023
Donovaly, Slovakia

University of Ss. Cyril and Methodius in Trnava

Faculty of Natural Sciences

Applied Natural Sciences 2023 – Book of Abstracts

Session:

1. Chemistry and Environmental Science
2. Biology and Biotechnology
3. Applied Informatics
4. Young Scientists

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FOREWORD

Dear ladies and gentlemen,

It is my great honour to welcome you at the 8th International Scientific Conference „Applied Natural Sciences 2023“, ANS 2023, organized by our Faculty of Natural Sciences, University of Ss. Cyril and Methodius in Trnava in cooperation with the University of Jan Evangelista Purkyně in Ústí nad Labem, Czech Republic.

The ANS 2023 Conference embraces multiple challenges with a programme that offers plentiful opportunities for debate and discussion. We are proud that this conference was again organized with a constant encouragement and the support from several scientific journals, including the International Journal of Environmental Sciences and Technology, Nova Biotechnologica et Chimica and Journal of Applied Mathematics, Statistics and Informatics and journal Biologia. We are therefore delighted to provide a brilliant platform for you, the researchers to share and explore your knowledge, and consequently to publish and present your research work in these journals and present your research reports in this annual conclave. I am glad that you, renowned lecturers, have made your way to the Donovaly, the picturesque part of Slovakia. I would like to thank you for willing to present highlights and latest research findings during these conference days and thus for giving all participants the opportunity to benefit from contribution to knowledge.

I am delighted that, after the hiatus caused by the COVID 19 pandemic, we are continuing in the fine tradition of previous conferences in this ANS 2023 series. Designed to attract an international community of scientists who wish to share their interests in the broad and exciting areas of the life sciences, including chemistry and biomedical chemistry, biology and molecular biology, biotechnology and environmental technology, as well as applied informatics, the ANS 2023 conference will be a great success story for the ANS 2023 community. It is gratifying that the conference has a broad cross-curricular dimension and interdisciplinarity. We are very pleased to welcome around 100 participants, where a large number of participants are renowned colleagues from both academia and industry. We are also pleased that the majority of the participants are young researchers, postdoctoral fellows and PhD students who will present their latest research results at the Young Scientists Symposium. The conference programme aims to document the high level of scientific research at the participating universities, as well as to acknowledge the experience of our colleagues from Slovakia and abroad who will be attending the conference. The conference is also a platform for young scientists and PhD students to present and discuss their results. I would like to express my sincere gratitude and appreciation to all the

speakers, not only from abroad. Last but not least, I would especially like to thank the team of people from the organizing committee.

I am very pleased to have this opportunity to open ANS 2023 and to convey to you my wishes for the complete success of this conference. I would like to invite you all to contribute to the success of this conference by your participation and discussion, and wish you all inspiring lectures, informative talks and a pleasant stay in Donovaly.

doc. RNDr. Iveta Dirgová Luptáková, PhD.

The Dean of the Faculty of Natural Sciences
University of Ss. Cyril and Methodius in Trnava, Slovak Republic

RL-Toolkit: Design and implementation of a set of tools for reinforcement learning in robotics

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Abstract: This paper presents a novel toolkit for self-learning of robots in simulated environments, with a focus on maximizing task performance scores. The proposed method utilizes an artificial neural network to transform sensor measurements into an action vector, i.e., the movements of the robot's motors, employing reinforcement learning principles to maximize the quality of state transitions resulting from performed actions. The Reverb database server is employed for storing interaction data obtained during simulations. Experimental results demonstrate a significant improvement of 9.38% over the published results of the original algorithms. The design of the RL-Toolkit comprises a database server, a Weights & Biases monitoring tool, and support for three popular simulation environments (Gymnasium, DeepMind Control Suite, and PyBullet). Furthermore, an architecture design is provided for applying the RL-Toolkit to real-world robots, showcasing its potential for practical implementation.

Keywords: soft actor-critical model, deep neural network, Gymnasium, robotics, Q-value, quantile regression, Docker

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