Discrete Morse theory and its applications, Project between the Ministries of Sciences of Slovenia and Serbia as a part of bilateral cooperation between two countries (2020-2021)

Project approved by Ministries of Sciences of Slovenia and Serbia as a part of bilateral cooperation between two countries.

Duration: January 2020 - December 2021

Project number:

Institutions:

from Slovenia: **Institute for mathematics, physics and mechanics (Ljubljana)**
from Serbia: **Mathematical Institute SANU (Belgrade)**

Project coordinators:

1. **Aleš Vavpetič**, Institute for mathematics, physics and mechanics, Univerzity of Ljubljana, Slovenia (email: ales.vavpetic@fmf.uni-lj.si)
2. **Đorđe Baralić**, Mathematical Institute SANU, Knez Mihailova 36, 11 000 Belgrade, Serbia (email: djbaralic@mi.sanu.ac.rs)

Other project members:

from **Slovenia**

1. **Petar Pavešić**, Institute for mathematics, physics and mechanics, Univerzity of Ljubljana
2. **Žiga Virk**, Faculty of mathematics and physics, Univerzity of Ljubljana
3. **Boštjan Lemež**, Institute of Mathematics, Physics and Mechanics, Univerzity of Ljubljana
4. **Matija Cencelj**, Institute for mathematics, physics and mechanics, Univerzity of Ljubljana
5. **Leon Lampret**, Faculty of mathematics and physics, Univerzity of Ljubljana

from **Serbia**

1. **Rade Živaljević**, Mathematical Institute SANU, Belgrade
2. **Filip Jevtić**, Mathematical Institute SANU, Belgrade
3. **Mladen Zekić**, Mathematical Institute SANU, Belgrade
4. **Marija Jelić Milutinović,** Faculty of Mathematics, University of Belgrade
5. **Jelena Ivanović**, Faculty of Architecture, University of Belgrade

Project goals:
The project has three main objectives: the training of researchers, the integration of two research groups with joint participation in international projects, and joint work on concrete research projects and applications of discrete Morse theory. Slovenian and Serbian teams want to

intensify their research in the discrete Morse theory as it is one of the most actual topic in combinatorics and applied algebraic topology. Wide scope of applications of this theory in machine learning, data science and other areas opens a lot of space for collaboration and future projects with various research groups and industry. Both research group would try to take advantage of this possibility and fact that they already have reputable researchers in this area and apply for international research grants. Joint bilateral project is good starting points for both groups to work together on wide scope of research questions of common interest andtraining young researchers in this area. Mutual exchange of visits will open possibility to organize minicourses for PhD students and researchers in discrete and algebraic Morse theory.

Among the selected research themes are the following:

- topology and geometry in discrete setting
- applications of discrete Morse theory
- topological complexity
- independence complexes of graphs