**Image processing from discrete mathematical approach and graph theory approach**

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**Abstract:**

Image processing includes many tools with handling of images as well as work with different types of data representing like images. Segmentation is one part of image analysis. In this contribution we focus on segmentation techniques from graph theory and discrete mathematics approach. There are more techniques, one we consider is denoted in literature as “graph cutting” , the second one is called “intelligent scissors” and the third one is called “GrabCut”. We will introduced the method of graph cutting“, intelligent scissors” and “GrabCut” its application with artificial as well as real data, as medical, bio-medical data, SAT images. The main idea of “graph cutting’” is representing the image like a graph, and creation a network from the image. In this network we apply the algorithm for finding maximum cut in the network (Ford Fulkerson algorithm, Prim’s algorithm ), which corresponds to a minimal cut in network. It is known that this is corresponding problem like: finding minimal cut is the same problem like finding segmentation in the picture. In “intelligent scissors” we use optimization of Dijsktra algorithm. We apply and optimize this technique for different types of real data. We created own common software and we also created a collaboration with Medical Faculty of Comenius University in Bratislava, Slovakia. We will show different types of applications in biomedical data, as well as we will show how this program and methods can handle with different types of noise.

**Biography of presenting author** (should not exceed 100 words)

Assoc. prof. Dr. Maria Zdimalova, PhD., studied at Comenius University in Bratislava, at the Faculty of Mathematics, physics and informatics in Slovakia: Mathematics and Physics. She graduated as MS in 2003. She continued PhD studies at the Slovak University of Technology in Bratislava at the Faculty of Civil Engineering, Department of Mathematics and Descriptive Geometry. She received her PhD degree in 2010 from “Applied Mathematics” at the same institution. After that she continues as the researcher and assistant professor at the same Institution. In 2019 she received the degree and position of associate professor at the same institution.Maria Zdimalova currently works at the Department of Mathematics and Descriptive Geometry, Slovak University of Technology in Bratislava. Maria does research in Applied Mathematics, Algebra and Graph Theory. Their current project is 'Arch Math: Mathematics and Architecture, Design, Fashion, Art,.' Algebraic Graph Theory as well as Graph Algorithms in Image Processing. **Disciplines:** Applied Mathematics. **Skills and expertise**: Discrete Mathematics, Graph Τheory, Applied Mathematics, Combinatorics, Algebra, Graph Algorithms, Graphs, Uncertainty Analysis, Image Processing, Mathematics Education, Finite Fields, Uncertainty, Art in math, Theoretical Computer Science, Mathematical Modelling. Currently she has 30 publications in Scopus.

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