

**18th International Conference
Artificial Intelligence and Soft Computing**

Program

Zakopane, Poland, June 16-20, 2019

Program at a glance**Program at a glance**

Sunday, June 16	Monday, June 17	Tuesday, June 18	Wednesday, June 19	Thursday, June 20
	07:30-8:30 Breakfast, Room: Zakopane	07:30-8:30 Breakfast, Room: Zakopane	07:30-8:30 Breakfast, Room: Zakopane	07:30-8:30 Breakfast, Room: Zakopane
	8:30 - 8:40 Opening Ceremony, Room: Tatry Invited Talks, Chair: Leszek Rutkowski, Room: Tatry	8:30 - 9:15 Invited Talks, Chair: Ivan Zelinka, Room: Tatry	Session 8 (Room: Rysy)	
	8:40 - 9:25 Dacheng Tao	9:15 - 10:15 Jacek Koronacki	8:40-9:50 Data Mining	
	9:25 - 10:10 Witold Pedrycz	Session 4 (Room: Rysy)	Session 9 (Room: Rysy)	
	Session 1 (Room: Rysy)	10:30 - 11:40 Evolutionary Algorithms and their Applications	10:00-11:10 Computer Vision, Image and Speech Analysis	
	10:30 - 11:40 Neural Networks and Their Applications 1	Session 5 (Oral, Room: Tatry)	Session 10 (Room: Rysy)	
	Session 2 (Room: Rysy)	10:30-12:00 Various Problems of Artificial Intelligence	11:20-12:30 Bioinformatics, Biometrics and Medical App.	
	11:50 - 13:00 Neural Networks and Their Applications 2	Session 6 (Room: Rysy)		
		11:50 - 13:00 Fuzzy Systems and Their Applications		
	13:00 - 14:30 Lunch, Room: Zakopane	13:00 - 14:30 Lunch, Room: Zakopane	13:00 - 14:30 Lunch, Room: Zakopane	
	Invited Talk, Chair: Jacek Zurada	Invited Talk, Chair: Norbert Jankowski, Room: Tatry	Sightseeing trip	
	14:45 - 15:30 Adel S. Elmaghraby	14:45 - 15:30 Ujjwal Maulik		
	Invited Talks	Invited Talk		
	15:30 - 16:15 Włodzisław Duch	15:30 - 16:15 Wojciech Szpankowski		
	Session 3 (Room: Rysy)	Session 7 (Room: Rysy)		
	16:30-17:40 Pattern Classification, Robotics and Control	16:30-17:40 Various Problems of Artificial Intelligence		
18:00	18:15 Social event, barbecue Venue: terrace (Lobby level)	18:30 Social event (Banquet), Room: Tatry	18:00 Farewell Dinner, Room: Zakopane	
18:00 Welcome dinner, Room: Zakopane				

Detailed Program

Sunday, June 16

18:00

Welcome party

Room: Zakopane

Monday, June 17

07:30 - 8:30

Breakfast, Room: Zakopane

8:30 - 8:40

Opening Ceremony, Room: Tatry

Invited Talks, Chair: Leszek Rutkowski, Room: Tatry

8:45 - 9:25

Dacheng Tao

9:25 - 10:10

Witold Pedrycz

Session 1: Neural Networks and Their Applications 1 (poster session)

Date/Time: 10:30-11:40, Mon., June 17, 2019

Room: Rysy

SpikeletFCN: Counting Spikelets from Infield Wheat Crop Images Using Fully Convolutional Networks

Tahani Alkhudaydi, Ji Zhou, and Beatriz De La Iglesia

Modifications of the Givens Training Algorithm for Artificial Neural Networks

Jarosław Bilski, Bartosz Kowalczyk, and Andrzej Cader

Deep Neural Networks Applied to the Dynamic Helper System in a GPGPU

João Pedro Augusto Costa, Omar Andres Carmona Cortes, Valério Breno Santos Nunes de Oliveira, and Ada Cristina França da Silva

Combining Neural and Knowledge-Based Approaches to Named Entity Recognition in Polish

Slawomir Dadas

Sensitivity Analysis of the Neural Networks Randomized Learning

Grzegorz Dudek

Smart Well Data Generation via Boundary-Seeking Deep Convolutional Generative Adversarial Networks

Allan Gurwicz, Smith Arauco Canchumuni, and Marco Aurélio Cavalcanti Pacheco

Resilient Environmental Monitoring Utilizing a Machine Learning Approach

Dan Häberlein, Lars Kafurke, Sebastian Höfer, Bogdan Franczyk, Bernhard Jung, and Erik Berger

Study of Learning Ability in Profit Sharing Using Convolutional Neural Network

Kazuki Hashiba and Yuko Osana

Neural Net Model Predictive Controller for Adaptive Active Vibration Suppression of an Unknown System

Mateusz Heesch and Ziemowit Dworakowski

Robust Training of Radial Basis Function Neural Networks

Jan Kalina and Petra Vidnerová

Session 2: Neural Networks and Their Applications 2 (poster session)

Date/Time: 11:50-13:00, Mon., June 17, 2019

Room: Rysy

On Learning and Convergence of RBF Networks in Regression Estimation and Classification

Adam Krzyżak and Marian Partyka

Application of Deep Neural Networks to Music Composition Based on MIDI Datasets and Graphical Representation

Mateusz Modrzejewski, Mateusz Dorobek, and Przemysław Rokita

Application of Spiking Neural Networks to Fashion Classification

Piotr Opielka, Janusz T Starczewski, Michał Wróbel, Katarzyna Nieszporek, and Alina Marchlewska

Text Language Identification Using Attention-Based Recurrent Neural Networks

Michał Perelkiewicz and Rafał Poświata

Filter Pruning for Efficient Transfer Learning in Deep Convolutional Neural Networks

Caique Reinhold and Mauro Roisenberg

Regularized Learning of Neural Network with Application to Sparse PCA

Jan Rodziewicz-Bielewicz, Jacek Klimaszewski, and Marcin Korzeń

Trimmed Robust Loss Function for Training Deep Neural Networks with Label Noise

Andrzej Rusiecki

On Proper Designing of Deep Structures for Image Classification

Piotr Woldan, Paweł Staszewski, Leszek Rutkowski, and Konrad Grzanek

Constructive Cascade Learning Algorithm for Fully Connected Networks

Xing Wu, Paweł Rozycki, Janusz Kolbusz, and Bogdan M Wilamowski

Generative Adversarial Networks: Recent Developments

Maciej Zamorski, Adrian Zdobyłak, Maciej Zięba, and Jerzy Świątek

13:00 - 14:30

Lunch, Room: Zakopane

Invited Talks, Chair: Jacek Zurada, Room Tatry

14:45 - 15:30

Adel S. Elmaghraby

15:30 - 16:15

Włodzisław Duch

Session 3: Pattern Classification, Robotics and Control (poster session)

Date/Time: 16:30-17:40, Mon., June 17, 2019

Room: Rysy

Application of Elastic Principal Component Analysis to Person Recognition Based on Screen Gestures

Mateusz Baran, Leszek Siwik, and Krzysztof Rzecki

Sentiment Analysis of YouTube Video Comments Using Deep Neural Networks

Alexandre Ashade Lassance Cunha, Melissa Carvalho Costa, and Marco Aurélio C Pacheco

Layered Geometric Learning

Hamideh Hajiabadi, Reza Godaz, Morteza Ghasemi, and Reza Monsefi

Fast Algorithm for Prototypes Selection—Trust-Margin Prototypes

Norbert Jankowski and Marek Orliński

Classifying Image Sequences with the Markov Chain Structure and Matrix Normal Distributions

Ewaryst Rafajłowicz

The Elastic k-Nearest Neighbours Classifier for Touch Screen Gestures

Krzysztof Rzecki, Leszek Siwik, and Mateusz Baran

Whole Image and Modular Image Face Classification – What is Really Classified?

Ewa Skubalska-Rafajłowicz

Classifier Selection for Highly Imbalanced Data Streams with Minority Driven Ensemble

Paweł Zyblewski, Paweł Ksieniewicz, and Michał Woźniak

Tasks Allocation for Rescue Robotics: A Replicator Dynamics Approach

Sindy Amaya and Armando Mateus

Enhancing Cognitive Virtual Maps for Domestic Service Robots by Adapting the User's Perception on Uncertain Information Based on the Robot Experience: A Neural Network Approach

H.M. Ravindu T. Bandara, B.M.S.S. Basnayake, A.G. Buddhika P. Jayasekara, and D.P. Chandima

Enhancing Human-Robot Interaction by Amalgamating Spatial and Attribute Based Cognitive Maps of Assistive Robot

H.M. Ravindu T. Bandara, K.S. Priyanayana, A.G. Buddhika P. Jayasekara, and D.P. Chandima

Proactive Middleware for Fault Detection and Advanced Conflict Handling in Sensor Fusion

Gilles Neyens and Denis Zampunieris

Indoor Robot Navigation Using Graph Models Based on BIM/IFC

Wojciech Palacz, Grażyna Ślusarczyk, Barbara Strug, and Ewa Grabska

An Algorithm for Swarm Robot to Avoid Multiple Dynamic Obstacles and to Catch the Moving Target

Quoc Bao Diep, Ivan Zelinka, and Roman Senkerik

Emergence of Collective Behavior in Large Cellular Automata-Based Multi-agent Systems

Franciszek Seredyński and Jakub Gąsior

Prototypes of Arcade Games Enabling Affective Interaction

Paweł Jemioło, Barbara Giżycka, and Grzegorz J. Nalepa

A Multi-filtering Algorithm for Applying ICA in a Low-Channel EEG

Izabela Rejer and Paweł Górski

18:15

Social event, barbecue Venue: terrace (Lobby level)

Tuesday, June 18

07:30 - 8:30

Breakfast, Room: Zakopane

Invited Talks, Chair: Ivan Zelinka, Room Tatry

8:30 - 9:15

Jacek Koronacki

9:15 - 10:15

Zbigniew Michalewicz

Session 4: Evolutionary Algorithms and their Applications (poster session)

Date/Time: 10:30-11:40, Tue., June 18, 2019

Room: Rysy

Solving the Software Project Scheduling Problem with Hyper-heuristics

Joaquim de Andrade, Leila Silva, André Britto, and Rodrigo Amaral

Influence of Social Coefficient on Swarm Motion

Bożena Borowska

An Evaluative Study of Adaptive Control of Population Size in Differential Evolution

Petr Bujok

A New Hybrid Particle Swarm Optimization and Evolutionary Algorithm

Piotr Dziwiński, Lukasz Bartczuk, and Piotr Goetzen

Evolutionary Algorithms Applied to a Shielding Enclosure Design

Tomas Kadavy, Stanislav Kovar, Michal Pluhacek, Adam Viktorin, and Roman Senkerik

Hybrid Multi-population Based Approach for Controllers Structure and Parameters Selection

Krzysztof Łapa, Krzysztof Cpałka, and Józef Paszkowski

Improving Population Diversity Through Gene Methylation Simulation

Michael Cilliers and Duncan A Coulter

Strategizing Game Playing Using Evolutionary Approach

Abhinav Nagpal and Goldie Gabrani

Using the Evolutionary Computation Approach in the Initial Phase of Protocol Discovering

Dariusz Palka, Marcin Piekarczyk, and Krzysztof Wójcik

Population Diversity Analysis in Adaptive Differential Evolution Variants with Unconventional Randomization Schemes
Roman Senkerik, Adam Viktorin, Tomas Kadavy, Michal Pluhacek, Anezka Kazikova, Quoc Bao Diep, and Ivan Zelinka

Analyzing Control Parameters in DISH

Adam Viktorin, Roman Senkerik, Michal Pluhacek, and Tomas Kadavy

Iterative Design and Implementation of Rapid Gradient Descent Method

Wei Wei, Bin Zhou, Rytis Maskeliūnas, Robertas Damaševičius, Dawid Połap, and Marcin Woźniak

The Method of Predicting Changes of a Dynamic Signature Using Possibilities of Population-Based Algorithms

Marcin Zalasinski, Krystian Łapa, Krzysztof Cpalka, and Alina Marchlewska

Session 5: Various Problems of Artificial Intelligence (oral session)

Date/Time: 10:30-11:40, Tue., June 18, 2019

Room: Tatry

Raw G-Band Chromosome Image Segmentation Using U-Net Based Neural Network

Emre Can Altınsoy, Can Yilmaz, Juan Wen, Lingqian Wu, Jie Yang, and Yuemin Zhu

Dense Multi-focus Fusion Net: A Deep Unsupervised Convolutional Network for Multi-focus Image Fusion

Hafiz Tayyab Mustafa, Fanghui Liu, Jie Yang, Zubair Khan, and Qiao Huang

On Approximating Metric Nearness Through Deep Learning

Magzhan Gabidolla, Alisher Iskakov, M. Fatih Demirci, and Adnan Yazici

Improving Population Diversity Through Gene Methylation Simulation

Michael Cilliers and Duncan A. Coulter

A Fuzzy-Dynamic Bayesian Network Approach for Inference Filtering

Munyque Mittelman, Jerusa Marchi, and Aldo von Wangenheim

Experimental Study of Totally Optimal Decision Rules

Mohammad Azad and Mikhail Moshkov

Session 6: Fuzzy Systems and Their Applications (poster session)

Date/Time: 11:50-13:00, Tue., June 18, 2019

Room: Rysy

Fuzzy Modeling in the Task of Control Cartographic Visualization

Stanislav Belyakov, Alexander Bozhenyuk, Janusz Kacprzyk, and Margarita Knyazeva

Method for Generalization of Fuzzy Sets

Dmitry Frolov, Boris Mirkin, Susana Nascimento, and Trevor Fenner

The 2-additive Choquet integral of bi-capacities

Jabbar Ghafil

A New Class of Uninorm Aggregation Operations for Fuzzy Theory

Sándor Jenei

Different Forms of Generalized Hypothetical Syllogism with Regard to R-implications

Katarzyna Miś and Michał Baczyński

The Estimation of Uncertain Gates: an Application to Educational Indicators

Guillaume Petiot

Fuzzy reasoning in control and diagnostics of a turbine engine - a case study

Wojciech Rafajłowicz, Wojciech Dowski, Andrzej Jabłoński, Adam Ratajczak, Wojciech Tarnawski, and Zbigniew Zajda

Application of type-2 fuzzy sets for analyzing production processes

Anton Romanov, Aleksey Filippov, and Nadezhda Yarushkina

On Explainable Recommender Systems Based on Fuzzy Rule Generation Techniques

Tomasz Rutkowski, Krystian Lapa, Robert Nowicki, Radosław Nielek, and Konrad Grzanek

Different Aggregation Modes Applications within the Framework of Weights Uncertainty

Anna Tikhonenko-Kędziak and Mirosław Kurkowski

Fuzzy Clustering High-Dimensional Data Using Information Weighting

Oleksii Tyshchenko, Sergii Mashtalir, and Yevgeniy Bodyanskiy

A Multi-demand Negotiation Model with Fuzzy Concession Strategies

Yufeng Yang and Xudong Luo

13:00 - 14:30

Lunch, Room: Zakopane

Invited Talk, Chair: Norbert Jankowski, Room Tatry

14:45 - 15:30

Ujjwal Maulik

15:30 - 16:15

Wojciech Szpankowski

Session 6: Various Problems of Artificial Intelligence (poster session)

Date/Time: 16:30-17:40, Tue., June 18, 2019

Room: Rysy

AQuA: Automatic Quality Analysis of Conversational Scripts in Real-time

Kumar Abhinav, Alpana Dubey, Sakshi Jain, Veenu Arora, Asha Puttaveerana, and Susan Miller

A Conceptual Model to Improve Understanding of Distance Related Uncertain Information

H.M. Ravindu T. Bandara, H.P. Chapa Sirithunge, A.G. Buddhika P. Jayasekara, and D.P. Chandima

Hybrid Genetic Algorithm for CSOP to Find the Lowest Hamiltonian Circuit in a Superimposed Graph

Khaoula Bouazzi, Moez Hammami, and Sadok Bouamama

Allowing Users to Create Similarity Relations for Their Flexible Searches over Databases

Mohammad Halim Deedar and Susana Muñoz-Hernández

Automatic Recognition of Melody Similarity

Tomasz Grębski, Krzysztof Pancierz, and Piotr Kulicki

SMT-Based Encoding of Argumentation Dialogue Games

Magdalena Kacprzak, Anna Sawicka, and Andrzej Zbrzezny

Affective Context-Aware Systems: Architecture of a Dynamic Framework

Mateusz Z. Łepicki and Szymon Bobek

RDFM: Resilient Distributed Factorization Machines

André Rodrigo da Silva, Leonardo M Rodrigues, Luciana de Oliveira Rech, and Aldelir Fernando Luiz

How Implicit Negative Evidence Improve Weighted Context-Free Grammar Induction

Olgierd Unold and Mateusz Gabor

On Sympathy and Symphony: Network-Oriented Modeling of the Adaptive Dynamics of Sympathy States

Ilze A. Auzina, Suzanne Bardelmeijer, and Jan Treur

Analysis of Large Scale Power Systems via LASSO Learning Algorithms

Mirosław Pawlak and Jiaqing Lv

Pattern-Based Forecasting Monthly Electricity Demand Using Multilayer Perceptron

Pawel Pelka and Grzegorz Dudek

Squirrel-Cage Induction Motor Malfunction Detection Using Computational Intelligence Methods
Krzysztof Rzecki, Bartosz Wójcik, Mateusz Baran, and Maciej Sulowicz

18:30

Social event (Banquet), Room: Tatry

Wednesday, June 19**07:30-8:30**

Breakfast, Room: Zakopane

Session 8: Data Mining (poster session)
 Date/Time: 8:40-9:50, Wed., June 19, 2019
 Room: Rysy

Activity Learning from Lifelogging Images
Kader Belli, Emre Akbaş, and Adnan Yazici

Where's @Waldo?: Finding Users on Twitter
Kyle Clarkson, Gautam Srivastava, Fatma Meawad, and Ashutosh Dhar Dwivedi

The Dynamically Modified BoW Algorithm Used in Assessing Clicks in Online Ads
Marcin Gabryel and Krzysztof Przybyszewski

Associative Pattern Matching and Inference Using Associative Graph Data Structures
Adrian Horzyk and Agata Czajkowska

Resource-Aware Data Stream Mining Using the Restricted Boltzmann Machine
Maciej Jaworski, Leszek Rutkowski, Piotr Duda, and Andrzej Cader

Fuzzy Approach for Detection of Anomalies in Time Series
Adam Kiersztyn and Pawel Karczmarek

A Scalable Segmented Dynamic Time Warping for Time Series Classification
Ruizhe Ma, Azim Ahmadzadeh, Soukaïna Filali Boubrahimi, and Rafal A. Angryk

Speed Limits Can Be Determined from Geospatial Data with Machine Learning Methods
Piotr Szwed

Appropriate Data Density Models in Probabilistic Machine Learning Approaches for Data Analysis
Thomas Villmann, Marika Kaden, Mehrdad Mohannazadeh Bakhtiari, and Andrea Villmann

Open Set Subject Classification of Text Documents in Polish by Doc-to-Vec and Local Outlier Factor
Tomasz Walkowiak, Szymon Datko, and Henryk Maciejewski

A Greedy Algorithm for Extraction of Handwritten Strokes
Michał Wróbel, Janusz T Starczewski, Katarzyna Nieszporek, Piotr Opielka, and Andrzej Kaźmierczak

The Method for Improving the Quality of Information Retrieval Based on Linguistic Analysis of Search Query
Nadezhda Yarushkina, Aleksey Filippov, Maria Grigorieva, and Vadim Moshkin

Session 9: Computer Vision, Image and Speech Analysis (poster session)

Date/Time: 10:00-11:10, Wed., June 19, 2019

Room: Rysy

Indoor Localization Using Cluster Analysis

Ramy Aboul Naga, Rimon Elias, and Amal El Nahas

From Synthetic Images Towards Detectors of Real Objects: A Case Study on Road Sign Detection

Przemysław Klęsk

Enhanced Local Binary Patterns for Automatic Face Recognition

Pavel Král, Antonín Vrba, and Ladislav Lenc

Novel Texture Descriptor Family for Face Recognition

Pavel Král and Ladislav Lenc

Video Sequence Analysis Using Local Binary Patterns for the Detection of Driver Fatigue Symptoms

Andrzej Majkowski, Marcin Kołodziej, Dariusz Sawicki, Paweł Tarnowski, Remigiusz J. Rak, and Adam Kukielka

Randomness of Shares Versus Quality of Secret Reconstruction in Black-and-White Visual Cryptography

Arkadiusz Orłowski and Leszek J. Chmielewski

Control of Dissolving Cytostatics Using Computer Image Analysis

Paweł Rotter and Wiktor Muron

Brassica Napus Florescence Modeling Based on Modified Vegetation Index Using Sentinel-2 Imagery

Michał Słapek, Krzysztof Smykała, and Bogdan Ruszczak

Ensemble of Classifiers Using CNN and Hand-Crafted Features for Depth-Based Action Recognition

Jacek Trelinski and Bogdan Kwolek

Gamification of Eye Exercises for Evaluating Eye Fatigue

Mindaugas Vasiljevas, Robertas Damaševičius, Dawid Połap, and Marcin Woźniak

Session 10: Bioinformatics, Biometrics and Medical Applications (poster session)

Date/Time: 11:20 - 12:30, Wed., June 19, 2019

Hybrid Ant Fuzzy Algorithm for MRI Images Segmentation

Alexander Bozhenyuk, Samer El-Khatib, Janusz Kacprzyk, Margarita Knyazeva, and Sergey Rodzin

Narrow Band-Based Detection of Basal Ganglia Subterritories

Konrad A Ciecierski

Realizations of the Statistical Reconstruction Method Based on the Continuous-to-Continuous Data Model

Robert Cierniak, Jaroslaw Bilski, Piotr Pluta, and Zbigniew Filutowicz

Classification of Transposable Elements by Convolutional Neural Networks

Murilo H.P. da Cruz, Priscila T.M. Saito, Alexandre R. Paschoal, and Pedro H. Bugatti

Human Cognitive State Classification Through Ambulatory EEG Signal Analysis

Sumanto Dutta, Sumit Hazra, and Anup Nandy

Generalizations of Aggregation Functions for Face Recognition

Pawel Karczmarek, Adam Kiersztyn, and Witold Pedrycz

Epileptic Seizure Detection Based on ECoG Signal

Marcin Kołodziej, Andrzej Majkowski, Remigiusz Jan Rak, Pawel Tarnowski, and Andrzej Rysz

A Computational Model of Myelin Excess for Patients with Post-Traumatic Stress Disorder

Jelmer Langbroek, Jan Treur, and S. Sahand Mohammadi Ziabari

On Machine Learning Approach for the Design of Pharmaceutical Technology of Tablets: Acetyl Salicylic Acid with Atorvastatin

Vasyl Martsenyuk, Taras Hroshoyi, Oksana Trygubchak, and Aleksandra Klos-Witkowska

On an Approach of the Solution of Machine Learning Problems Integrated with Data from the Open-Source System of Electronic Medical Records: Application for Fractures Prediction

Vasyl Martsenyuk, Vladyslav Povoroznyuk, Andriy Semenets, and Larysa Martynyuk

Energy Consumption Analysis of the Nussinov RNA Folding Implementations

Marek Palkowski

Behavior-Based Emotion Recognition Using Kinect and Hidden Markov Models

Aleksandra Postawka

Case-Based Reasoning for Context-Aware Solutions Supporting Personalised Asthma Management

Mario Quinde, Nawaz Khan, and Juan Carlos Augusto

Deep Learning for Detection and Localization of Thoracic Diseases Using Chest X-Ray Imagery

Somnath Rakshit, Indrajit Saha, Michal Wlasnowolski, Ujjwal Maulik, and Dariusz Plewczynski

Naive Bayes Learning of Dermoscopy Images

Grzegorz Surówka and Maciej Ogorzalek

Multi-class Classification of EEG Spectral Data for Artifact Detection

Mikhail Tokovarov, Małgorzata Plechawska-Wójcik, and Monika Kaczorowska

13:00 - 14:30

Lunch, Room: Zakopane

Sightseeing trip

18:00 -

Farewell Dinner, Room: Zakopane

Thursday, June 20

07:30-8:30

Breakfast, Room: Zakopane

Conference site

The ICAISC Conference is held in:

Mercure Kasprowy Hotel
ul. Szymaszkowa
34-500 Zakopane, POLAND
tel(+48) 18 202 40 00

Useful phone numbers:

taxi in Zakopane: +48 18 196 25, Radio Taxi Giewont +48 18 196 26

Radio Taxi 919: +48 18 20 12 560

INTER Radio Taxi: +48 18 201 42 32

Zakopane tourist information: +48 18 20-122-11

Ambulance: 999, Police: 997 (or 112 from your mobile phone)

Mountain Rescue Team TOPR : 985, (+48) 601 100 300 or (+48) 18 206 34 44

Krakow tourist information: +48 12 422 60 91, +48 12 421 77 06, +48 12 433 73 10

taxi in Krakow: (+48 12) 19919, 19191, 19621, 19623, 19625