AI algorithms in photogrammetry and remote sensing (GeoAI).

Leader:

Sławomir Mikrut, PhD, DSc, Eng, Prof. of AGH, MBA

Abstract:

In the past decade, the Polish market for image analysis has seen the emergence of highly specialized hyperspectral cameras capable of capturing spectral information across hundreds of channels simultaneously. This innovation significantly enhances the interpretive potential of obtained results by increasing the density of sampling for spectral curves, thereby improving their accuracy.

Develop a unique Big Data database leveraging artificial intelligence (AI) algorithms to create proprietary algorithms for processing photogrammetry and remote sensing data, including hyperspectral data.

Currently, many analyses in photogrammetry and remote sensing are performed manually.
The use of our AI will enable the automation of processes such as:

- Environmental monitoring (examining soil, water, and air pollution)

- Precision agriculture (accurate fertilization forecasting, predicting crop yield and quality)

- Crop type identification (projects for the Agency for Restructuring and Modernization of Agriculture, verifying crops in programs related to direct subsidies for farmers)

- Detection of hazardous materials (e.g., roofs containing asbestos) and identification of illegal discharges (e.g., detecting unauthorized sewage disposal from small and large facilities)

- Automatic determining the volume of earth masses using a drone and AI

Related founding:

"Automated precision volumetric measurement system – VolumeMonit" – NCBiR POIR.04.01.04 – S.Mikrut /Project Leader of AGH/; 2020 – 2023

"Proprietary algorithms for processing remote sensing and hyperspectral data" – NCBiR - BRIdge Alpha - – S.Mikrut /Project Leader/; 2018 – 2023 – foundation of the startup - HyperLab Solution Ltd.

"The development of impact of shape, size and reflective properties of railway infrastructure elements in relation to density and direction of mobile laser scanning on the ability of automatic identification of infrastructure objects" – project implmented upon the order of the National Railway Company – S.Mikrut /Project Leader/, 2012–2013

"An assessment of the effectiveness of neural network implementation in the processes of automated correlation of aviation photographs" - NCBiR - No. 1634/T12/2004/27 – S.Mikrut /Project Leader/

Related publications:

Reliable crops classification using limited number of Sentinel-2 and Sentinel-1 images / Beata HEJMANOWSKA, Piotr KRAMARCZYK, Ewa GŁOWIENKA, **Sławomir MIKRUT** // Remote

Sensing [Dokument elektroniczny]. — Czasopismo elektroniczne ; ISSN 2072-4292. — 2021 — vol. 13 iss. 16 art. no. 3176, s. 1–23

The use of artificial intelligence methods for analyzing images obtained through low-altitude photogrammetry technology to calculate the volume of mass in open-pit mines / **Sławomir MIKRUT** // Geomatics, Landmanagement and Landscape ; ISSN 2300-1496. — 2024 — no. 2, s. 21–30.

Mobile laser scanning systems for measuring the clearance gauge of railways: state of play, testing and outlook / **Sławomir MIKRUT,** Piotr KOHUT, Krystian PYKA, Regina TOKARCZYK, Tomasz BARSZCZ, Tadeusz UHL // Sensors [Dokument elektroniczny]. — Czasopismo elektroniczne ; ISSN 1424-8220. — 2016 — vol. 16 iss. 5 art. no. 683, s. 1-19 (numeracja całości nieciągła). — Bibliogr. s. 18–19,

GIS i teledetekcja w monitoringu środowiska [Dokument elektroniczny] — [GIS and remote sensing in environmental monitoring] / aut.: Andrzej Borkowski, Ewa Głowienka, Beata HEJMANOWSKA, Jolanta Kwaitkowska-Malina, Mateusz Kwolek, Krystyna Michałowska, **Sławomir MIKRUT**, Agnieszka Pękala, Tomasz PIROWSKI, Barbara Zabrzeska-Gąsiorek ; pod red. Ewy Głowienki. — Wersja do Windows. — Dane tekstowe. — Rzeszów : Wyższa Szkoła Inżynieryjno-Ekonomiczna, 2015. — 160 s

Sieci neuronowe w procesach dopasowania zdjęć lotniczych - Redakcja naukowa dr inż. Sławomir **Mikrut, 2010**. Autorzy: Czechowicz A., , Gryboś P., Jachimski J., **Mikrut S.**, Mikrut Z. , Pawlik P., Tadeusiewicz R. Wydawnictwa AGH. Kraków. (Punktacja MNiSW (2010) – 12.000 pkt.)