THE HERD

AI-powered algorithms to prepare and analyse Earth Observation data

ABOUT **THE HERD**

The Herd is a set of **AI-powered algorithms designed to facilitate Earth Observation data analysis.** It comprises three elements – data pre-processing techniques, approaches to spatial resolution enhancement of image data, and data analysis algorithms. The Herd fully supports the EO processing chain – from optical data acquisition, through data preparation and manipulation, up to data classification, segmentation, unmixing, compression, and much more.

All key elements of The Herd were designed to be used both on Earth and on-board the satellite – they fit FPGA processors and are compatible with the Xilinx-based Data Processing Units.

The full power of The Herd can be unchained in high-dimensional data analysis – it handles hyperspectral, multispectral, and time-series data.

The Herd is part of the **Smart Mission Ecosystem** – hardware, software, and AI-powered algorithms designed to complete your mission.

THE HERD IS BUILT OUT OF **3 KEY ELEMENTS**

Data pre-processing
The algorithms designed for data preparation steps such as band misalignment correction, bad pixel masking, optical distortion correction, georeferencing, and sensor-level radiometric corrections.

Enhancement of spatial image resolution
The algorithms for single- and multiple-image super-resolution reconstruction utilise classical image processing, machine learning, and deep learning.

Data analysis
The algorithms, alongside rigorous validation pipelines, can unveil every single bit of information from your data through dimensionality reduction, feature extraction, classification, segmentation, hyperspectral unmixing, and time-series analysis using classical machine learning and deep learning.

ON-BOARD **PROCESSING**

Deploy The Herd on board your satellite to keep the brain just next to your hyperspectral eye. On-board dimensionality reduction and advanced data analysis make the final data transfer affordable by extracting the most important bits of information that you need. Use The Herd to design and execute robust deep learning techniques that perfectly fit your hardware and execution environment.

ON-THE-GROUND **PROCESSING**

The Herd allows us to build, validate, and deploy end-to-end machine learning processing pipelines, on the ground. We exploit cutting-edge deep learning for comprehensive analysis of multi- and hyperspectral data, including dimensionality reduction, classification, segmentation, unmixing, and much more. Unchain The Herd with your unlimited in-house GPU capabilities.

KEY ADVANTAGES

1 Mission Cost Reduction

- Send only insights to the ground instead of huge volumes of raw data.

- Run ready-to-use algorithms to support your mission instead of developing them from scratch.

2 Mission Customisation

- Release the potential of data-driven algorithms.

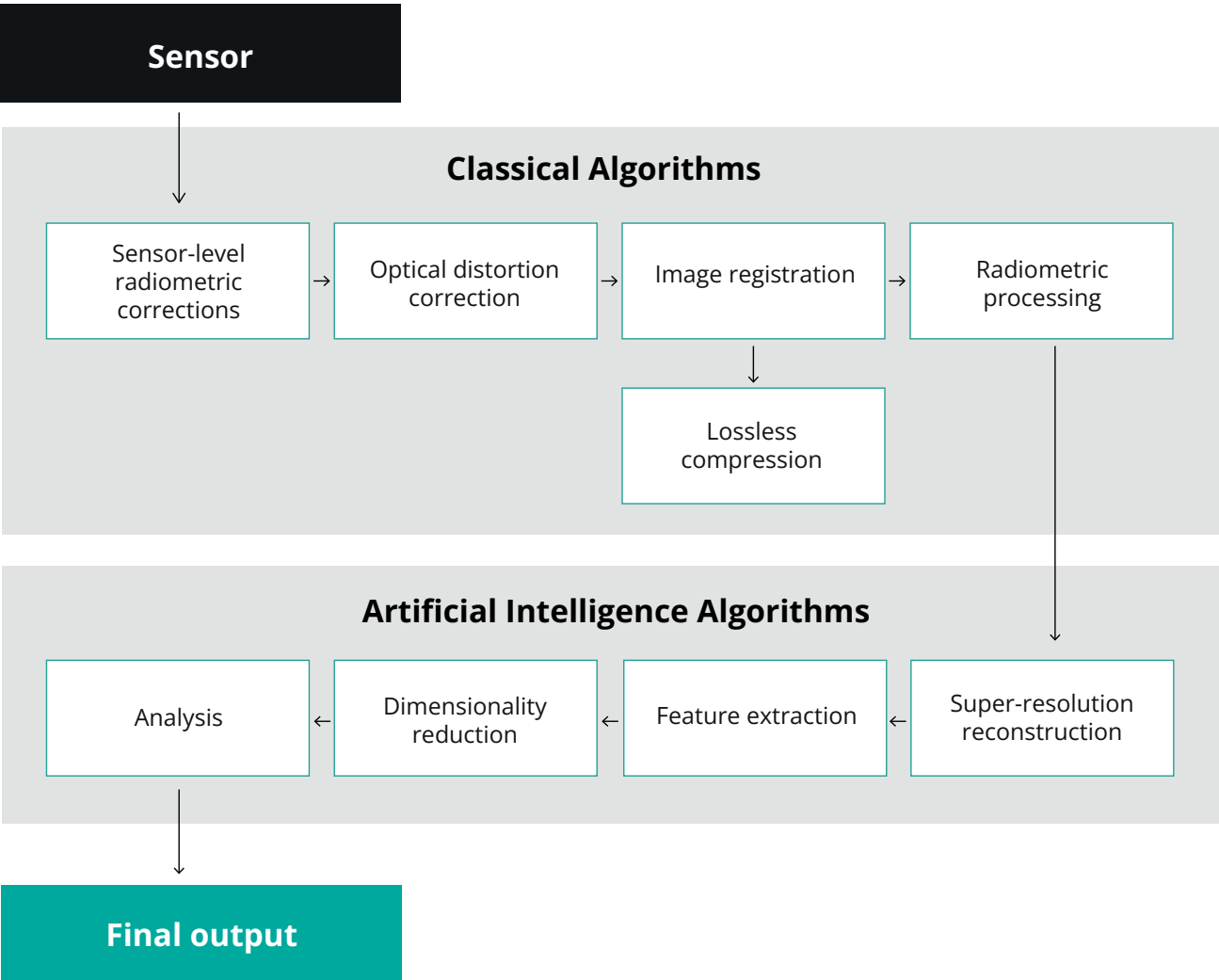- Make your mission multi-purpose or reconfigure it while in orbit.

3 Mission Simplicity

- Use The Herd as a mission building block and exploit only those algorithms which are really required for your task.

- Train the deep networks on the ground and uplink your fully functional and memory efficient models straight up to the satellite.

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PROCESSING **CHAIN**

The Herd fully automates the following steps of the processing chain:

Sensor

Classical Algorithms

Sensor-level radiometric corrections → Optical distortion correction → Image registration → Radiometric processing

Image registration → Lossless compression

Artificial Intelligence Algorithms

Analysis ← Dimensionality reduction ← Feature extraction ← Super-resolution reconstruction

Final output

INTUITION-1 **CASE STUDY**

The Herd will be used in the Intuition-1 mission, which is planned for launch at the turn of 2023/24 . Intuition-1 is a 6U-class satellite with a data processing unit – Leopard – enabling on-board data processing acquired via a hyperspectral instrument with spectral resolution in the range of visible and near infrared light.

ABOUT US

KP Labs is a NewSpace company based in Poland. We deliver **AI computers and software to bring autonomy into demanding space missions.** We are a team of more than 80 space enthusiasts who do not think that the sky is the limit.

SOUNDS GOOD?

Contact us at **sales@kplabs.pl** to attain the benefits your organisation deserves!

KP LABS | KP Labs Sp. z o.o. | Bojkowska 37J, 44-100 Gliwice, Poland | +48 32 461 22 99