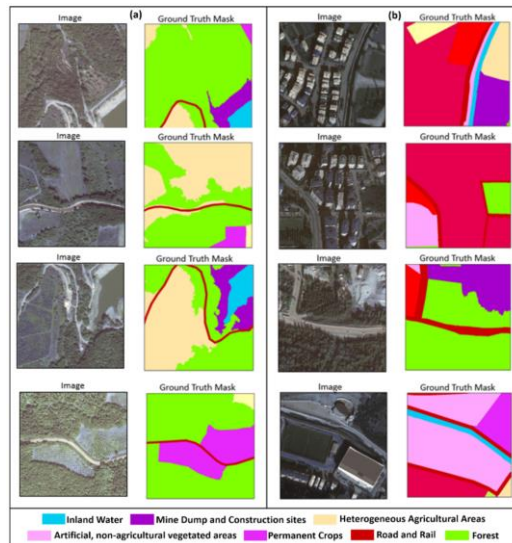

Land Use Maps



Sample image patches and their corresponding ground truth land use masks in Turkey using Worldview-3 images (0.3m) (Source: Sertel, E., Ekim, B., Ettehadi Osgouei, P. and Kabadayi, M.E., 2022. Land use and land cover mapping using deep learning based segmentation approaches and vhr worldview-3 images. Remote Sensing, 14(18), p.4558.)

Product Category

- Land Use
 Natural Disaster
 Coast Management
 Earth's Surface Motion
 Land Cover
 Climate Change
 Marine

Financial Domain(s)

- Investment management
 Risk analysis
 Insurance management
 Green finance

User requirements

- UN10: Need to understand population density when making investment decisions.
 UN11: Realistic assessment of accessibility to assets.
 UN13: Need to geo-map clients.
 UN27: Need to assess historical trends and baseline of natural assets.
 UN43: Need to monitor changing precipitation patterns and flood risk in the vicinity of vulnerable assets.
 UN47: Need up-to-date geospatial data on residential and industrial infrastructures' locations.
 UN56: Need to detect changes in land use (at the level of individual buildings).

Description

Land use maps provide information not only about the physical attributes of the Earth's surface, such as land cover but also detail the human activities and utilization of the land. These maps distinguish primary land cover categories, like urban areas, into various subcategories representing specific anthropogenic uses, such as residential zones, industrial areas, transportation networks, structures, and agricultural lands. By providing crucial insights into the spatial distribution of land cover types and anthropogenic activities, these maps enable informed decision-making in real estate development, market analysis, and infrastructure planning. New technologies like deep learning based-image segmentation algorithms such as Convolutional Neural Network (CNN) have shown impressive accuracy in segmenting complex images with intricate boundaries. Using such techniques gives promising results in land use classification even for complex areas with multiple land use classes.

Land use change maps: From time series land use maps, it is possible to provide land use change maps which are important for many applications.

Spatial Coverage Target

Asset level

Data Throughput

Rapid tasking High Low



Data availability High Low

Product specifications	
Main processing steps	It can ingest high-resolution EO data, such as satellite imagery or aerial photographs. Then, pre-preprocess the data by performing the atmospheric correction, radiometric calibration, and geometric alignment, as necessary. Split the data into training, validation, and testing sets. Manually label the training data to create a ground-truth dataset. This involves identifying and marking different land cover classes in the images. Land cover data can be used to segment land covers which makes it easier to classify the land use classes based on corresponding land cover. The labelled data will be used to train the deep learning model. To enhance the training process and improve model generalization, data augmentation techniques can be applied, followed by choosing an appropriate deep learning model like U-Net.
Input data sources	Optical: VHR based on the availability like Pleiades 1A/1B & NEO, WorldView2&3, and SPOT6/7 Radar: N.A Satellite-based products: N.A Supporting data: Land cover data such as ESA CCI Land cover (20m resolution)
Accessibility	Optical VHR imagery: commercially available on demand from EO service providers.
Spatial resolution	Optical VHR: ≤ 1 m
Frequency (Temporal resolution)	Optical VHR: Sub-daily to Daily
Latency	< 1 Day
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster File format: GeoTIFF
Accuracies	Thematic accuracy: 80-90% Spatial accuracy: 1.5-2 pixels of input data
Constraints and limitations	<ul style="list-style-type: none"> ■ Cloud presence ■ Creating high-quality and diverse labelled data for land use mapping can be challenging for specific land cover classes.
User's level of knowledge and skills to extract information and perform further analysis on the EO products.	Skills: Essential Knowledge: Essential