

# SEMANTICS OF EARTH OBSERVATION DATA: AN APPROACH TOWARDS PRODUCING TRANSFERABLE KNOWLEDGE

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In the last years, remotely sensed data has tremendously developed in terms of accuracy, spatial, temporal and spectral resolution and resulting volume. To extract information from satellite imagery, analysts have to translate domain *a priori* knowledge into classification rules. Existing methods have been proven effective in acquiring appropriate information. However, the developed classifications cannot be imported as “prototypes” for performing analysis on other images. The lack of transferability is caused by the absence of explicit links between contextual expert knowledge (high level semantics) and the lower level image data (such as color or shape). In our approach we are using domain ontology as basis for semantic object categorization, transportability of resulted classification and image interpretation. The ontology structures domain concepts, their characteristics and the relations that hold them together in a formal way. The overall goal is to assess the versatility and transportability of object categorization developed on ontological bases. Therefore, we focus on formalizing domain knowledge and on associating higher level semantics with data-level observables.

EO data is a field representation of geographic reality, making the process of image understanding more difficult. Recent advances in satellite images analysis enable us to discretize images into „homogeneous“ objects through segmentation and classification. Thus, the field representation of the reality (the image) is transformed into homogeneous, detachable objects using available image segmentation algorithms. The resulted homogeneous objects have specific spectral and spatial characteristics (spectral signatures, geometrical and topological relations) that can be used in the object categorization task.

Next issue challenging the image understanding process is the context, i.e. spectral resolution, scale, sensing conditions or entities states (phenology). Intrinsic properties of the sensors together with sensing settings must be used as generic input information that will guide the process of image analysis and understanding. To enable transferability object categorizations are structured on three generic levels: superordinate level, basic level and subordinate level.

The approach starts with acquiring domain knowledge and its formalization into a consistent ontology. The ontological structure is extended with visual information (e.g. spectral signatures) and the characteristics of ontology classes will be translated into classification rules. The developed rules are applied to satellite imagery in order to give meaning to the objects resulting from segmentation. In the end, we assess the transferability of the resulted classification by applying it to other geographic regions (but using the same type of satellite image).