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From Satellite Images to Vector Representations

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\textbf{Introduction}

One of the most popular challenges in the field of remote sensing is to generate vector representations from satellite images to be included into various Geographic Information System (GIS) applications. One way to generate the aforementioned vector representations is to split this task into two consecutive sub-tasks, where the first one consists in generating pixel-wise maps in raster format using advanced machine learning techniques, and the second one aims at vectorizing the obtained raster map by applying computational geometry methods. We propose novel methods for both sub-tasks.

\textbf{Overview}

- **Incremental Learning:** Learning new classes continually without forgetting the already learned classes.
- **Domain Adaptation:** Generating high quality maps even when there exists a large difference between the spectral bands of training and test images.
- **Mesh Approximation:** Vectorizing the raster map using a triangle mesh with edge flip, half edge collapse, and vertex relocation operators.

\textbf{Conclusions}

- **Incremental Learning:** To the best of our knowledge, we propose the first work on incremental learning for semantic segmentation.
- **Domain Adaptation:** The proposed approach is architecturally simple but powerful. We achieve a better performance than the existing approaches in a much shorter period of time.
- **Mesh Approximation:** The approach yields a better accuracy than the simplification algorithms in common GIS softwares, although our method generates significantly less number of vertices.

\textbf{References}