# Fusing Satellite Images and OpenStreetMap to Detect Public Green Spaces

## *IDP for CIT Students at TUM*

Many real estate databases use OpenStreetMap (OSM) to show the availability of public green spaces. However, a recent study has found significant differences between the actual and through OSM suggested availability of public green spaces.

To decrease the degree of mismatching information, Sentinel-2 satellite images, normalized difference vegetation index (NDVI), and OSM data can be combined using so-called believe functions to map actual public green spaces.

**Task**

In this project, you will use code based on Ludwig et al (2021) to combine OSM and satellite images to detect green spaces in urban areas. You will then visually and empirically assess the difference between OSM-only and OSM-Sentinel-2-fused green space availability. Empiric assessment is based on walkability scoring.

- Study the approach of Ludwig et al (2021) with respect to feasibility and adaptability. Describe advantages and disadvantages and compare them to other methods.
- Fuse satellite images and OSM information based on Ludwig et al (2021) methodology for a given territory. Hereby, critically assess and potentially improve code performance.
- Assess potential mismatching information between OSM and satellite images and provide appropriate visualization / descriptive statistics.
- Implementation of web service/API: The goal is to implement a service where a third party can supply a given location (longitude and latitude). The service then performs the satellite/OSM layering and returns certain to-be-defined parameters (e.g., the density of green space in a given surrounding area, shortest walking distance to the next green space, etc.).

**Requirements**

- Independent and thorough operation
- Programming experience with Python (methodology from Ludwig et al (2021) is given as Python script)
- Interest / first experience in building a web service.

**Accompanying Lectures**

Generally, the accompanying lecture can be selected in consultation with the supervisor from the entire list of courses offered by the Professorship for Real Estate Development. For this IDP, attendance to one of the following lectures is recommended:

- Applied Research Methods in Real Estate

- Sustainable Real Estate Development
- Seminar Real Estate Investment


Please visit the below-mentioned website to check if you can apply for this project:

**https://www.cit.tum.de/cit/studium/studiengaenge/master-informatik/interdisziplinaeres-projekt/**


**Contact**

Please do not hesitate to contact us if you have any questions regarding this project

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**Literature**

Ludwig, C. et al. (2021). Mapping Public Urban Green Spaces Based on OpenStreetMap and Sentinel-2 Imagery Using Belief Functions. *International Journal of Geo-Information*, 20, 251

Ludwig, C. et al. (2021). Mapping Public Urban Green Spaces based on OpenStreetMap and Sentinel-2 imagery using Belief Functions: Data and Source Code. Available at: https://doi.org/10.11588/data/UYSAA5

Vale. D., Saraiva, M., Pereira, M. (2016) Active accessibility: A review of operational measures of walking and cycling accessibility, *Journal of Transport and Land Use*.