

Road segmentation

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Definition

In this project we aim to create two models, which will take a satellite image as input and return a mask of pixels, which correspond to roads in the image. One of the models will consider all RGB channels of an image (input = H,W, 3) and the other one will accept grayscale images with only one channel (input = H,W,1). We will then evaluate the models and compare them with each other to determine how important color channels are in this task.

The project will consist of data preprocessing and augmentation, creation of the two models and experiments with model parameters to find the best performing combination.

Data

We intend to use part of a dataset named "DeepGlobe Road Extraction Dataset" (available at <https://www.kaggle.com/datasets/balraj98/deepglobe-road-extraction-dataset>). The dataset contains 6226 satellite images with their corresponding ground truth masks. These images have the resolution of 1024x1024 pixels and will be divided into smaller sections, augmented and separated into training, testing and validation sets. These data augmentations will be implemented using the **OpenCV** library for Python.

Model

The model will be coded in a **Python Notebook** hosted on **Google Colab**, using the **PyTorch** library. The model will be a **CNN** using a **U-Net** architecture: <https://link.springer.com/article/10.1007/s11227-022-04379-6>.

Training and testing

Both models will be trained and tested on **Google Colab Pro**. We will evaluate the effectiveness of these models using the **IoU** (Intersection over Union) metric.

The work of the team will be likely split into aforementioned 3 parts, one for each of the members:

- **data preprocessing**
- **model design**
- **training and evaluation.**

The exact division of labor has not yet been determined.