Detecting roads in aerial images

Aradhya Neeraj Mathur, Priyabrata Mallick, Viraj Parimi

Problem Statement

The goal is to produce a road network graph where vertices are annotated with spatial coordinates and edges correspond to straight-line road segments.

Introduction

It is very difficult to maintain accurate and updated maps, as it is very tedious to create and expensive to maintain. Multiple companies have invested large amounts, still there is a gap in accuracy. It is very difficult to extract roads from aerial images due to the occlusion by trees, buildings and shadows. Our project aims at exploring this domain through different techniques.

Literature Survey

1. **Road Segmentation**: Segment the image to first identify roads. Threshold the output to obtain a binary mask. Perform a morphological thinning procedure to obtain roads as one pixel wide lines. Generate a graph from this image and apply the Douglas Peucker procedure.

2. **Road Tracer**: Define a search algorithm governed by a decision function which is guided by a set of actions such as walk/stop and set of angles uniformly distributed between [0, 2pi). Use this algorithm to generate a graph representing the road network. Decision function is implemented using a CNN.

Dataset

Covers a region of 24 sq km around the city center. Satellite imagery from Google at 60 cm/pixel resolution, and the road network from Openstreetmap will be used.

Project Tasks and Timeline

The project can be primarily be divided into the following subtasks -

- Generating the dataset - Week 1
- Testing naive approaches for road detection - Week 2 and 3
- CNN based approach for road segmentation - Week 3 - 5
- Testing advance roadtracer method for road detection - If time permits