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Centre for Research Training

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Urban Mapping and Navigation Support Using Machine Learning

Used technologies: machine learning (deep learning) and computer vision

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Summary:

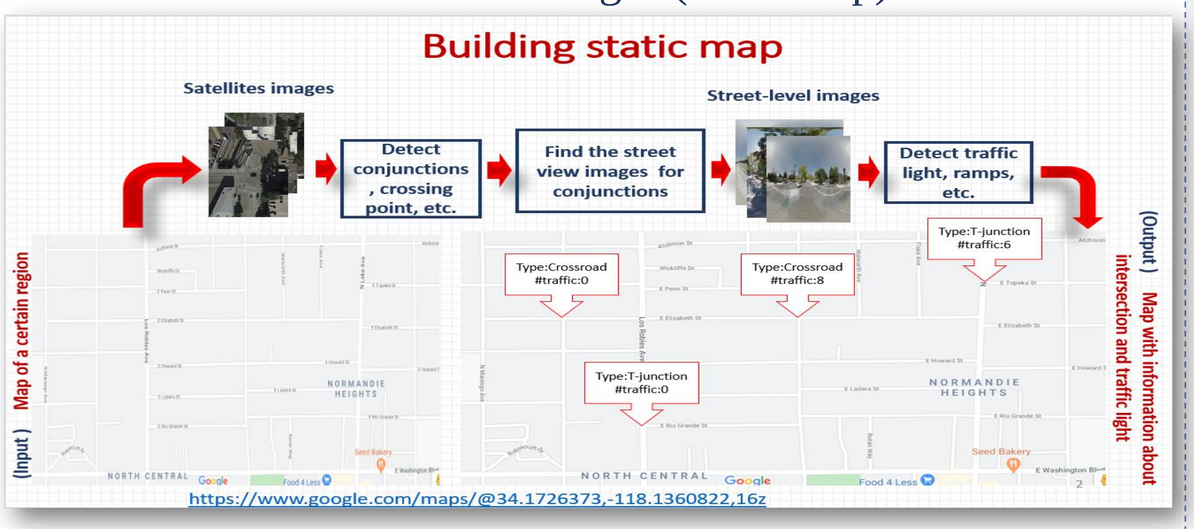
The main objective is assisting visually impaired people to navigate safely in an urban environment through computer vision and machine learning. We start by enhancing available maps by adding a new layer with street information such as street junctions, traffic lights, and other safety features for pedestrian users. This map will use for safe route planning. Finally, during navigation, real time tasks such as obstacles avoidance and traffic light status recognition will be activated.

Research Questions:

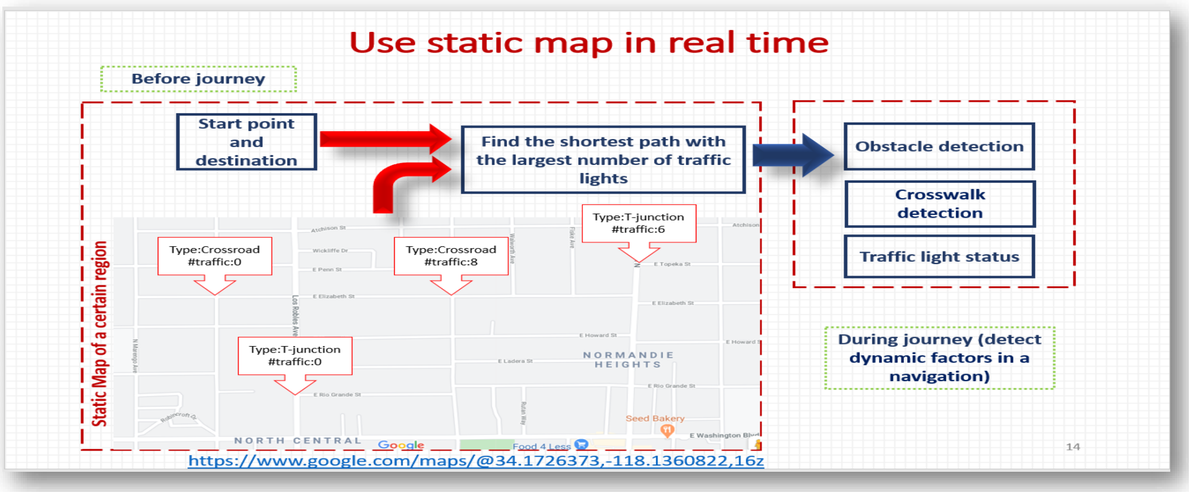
- Can we define the location and type of intersections in a certain region using machine learning?
- Can we detect the location and direction of traffic lights on a road intersection using machine learning?
- Is there a method to define the shortest path between two points that contains the largest number of traffic lights to guarantee safe navigation?
- Can we detect dynamic factors (traffic light status, obstacle location, etc.) in real-time?

Technology solution:

- We use machine learning to detect street objects from satellites and street-level images (static map).

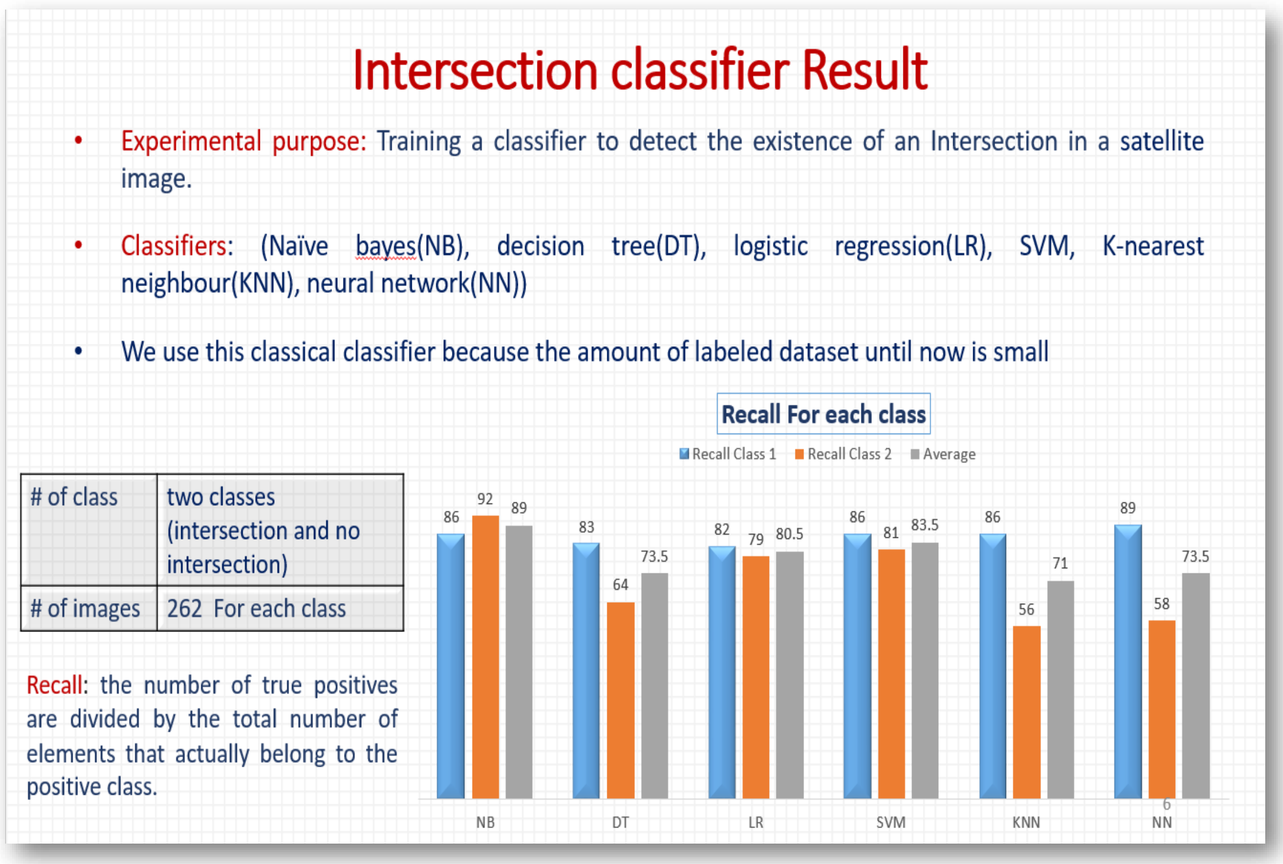


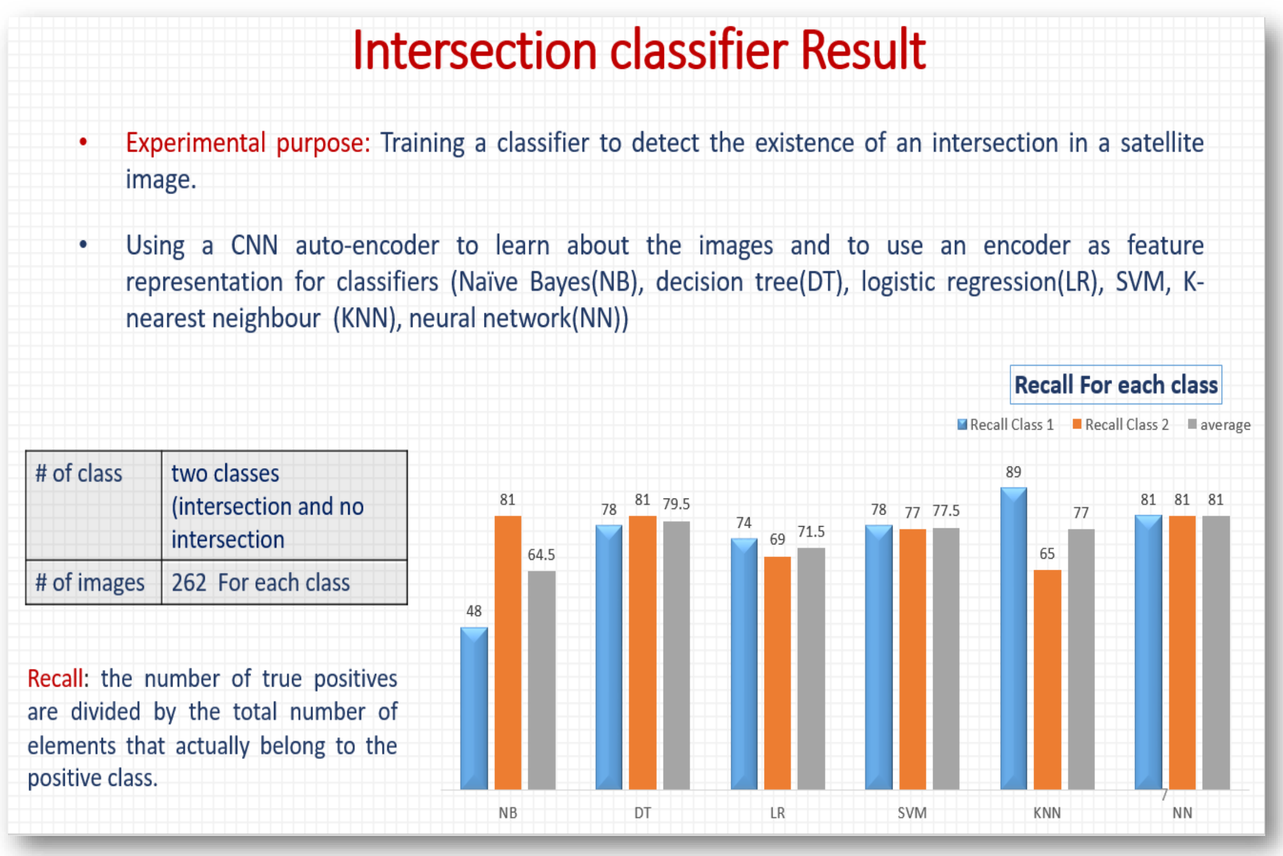
- A static map is utilized to define the best route according to the user.
- In real-time, dynamic factors need to be detected.



Work done so far:

- ✓ We reviewed the related literature and published a review paper.
- ✓ Currently, we are liaising with external organizations to get the user perspective on safe navigation issues.
- ✓ We explored available datasets and the capability of detecting road network components from satellite images using machine learning and CNN.





Next steps :

1. Develop generalized models to identify useful urban markers for maps using wide coverage datasets .
2. Find approaches to minimize reliance on data labelling.

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