

BETTER ROAD MAINTENANCE WITH ARTIFICIAL INTELLIGENCE

The technology of image recognition is so mature *it can be used to recognize the relevant types of road damages and classify the road network condition out of images that are simply taken from a smartphone.* Therefore, saving money and CO₂.

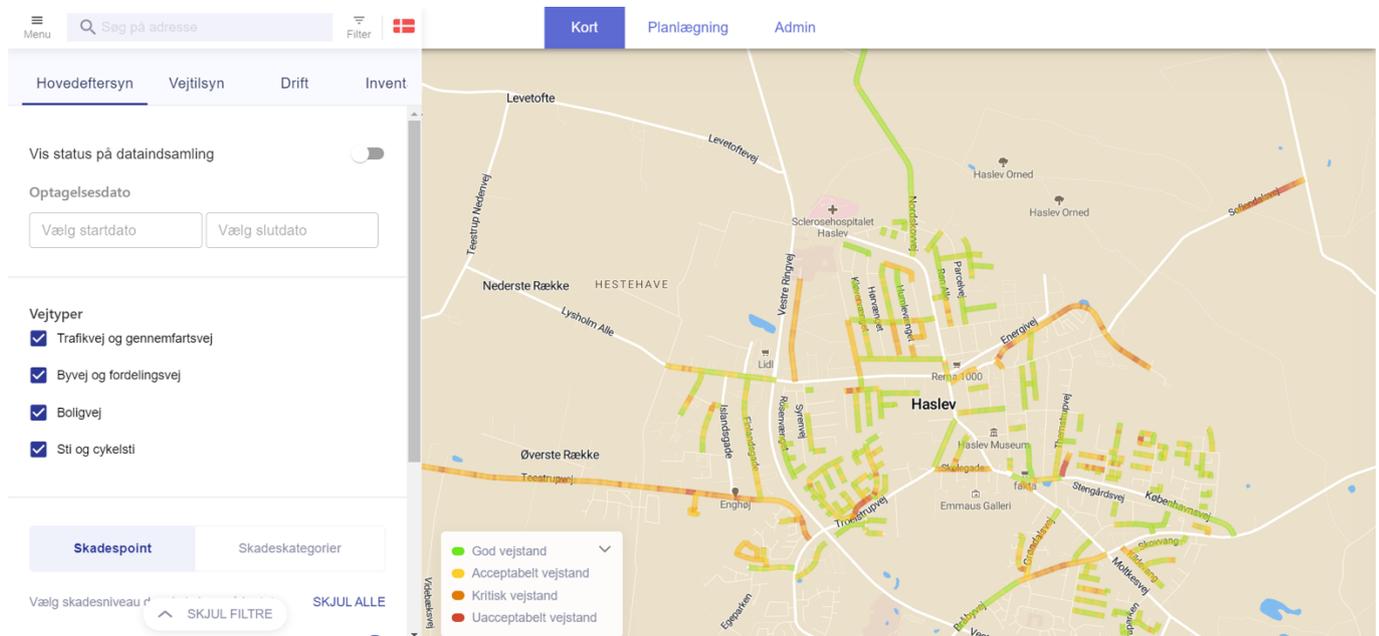
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Since the Romans, well-maintained infrastructure has been essential for a connected society. To ensure an optimal lifespan of roads, they needed a systematic approach to assess their condition of their road network. Nowadays, are visual inspections still in use but this method has its limitations as it is very manual and therefore cost prohibitive.

A national inquiry assessed the total backlog on road maintenance in the Danish municipalities to a total of 4.9 billion DKK in 2016 (source KTC). Therefore, a relevant question is; How can the municipalities utilize their resources better? In this case artificial intelligence is useful as it can help provide an overview of the otherwise uncountable. With just a smartphone can the road damages records be collected in a digital overview. Pluto Technologies is a Danish company aiming at revolutionizing road maintenance. The technology is used today to detect the relevant road damages and classify the road network condition from images taken from a smartphone. All damages can be viewed from high resolution images with geolocation and timestamp.

The main challenges that municipalities face today can be described as the following:

- Finite resources for road maintenance
- Requirements for documentation of continuous road overview
- Consultancy expenses associated with road data
- Increasing number of citizen inquiries



This is how you get started!



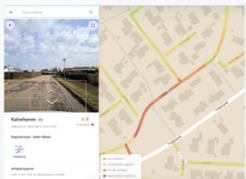
1

Place the smartphone



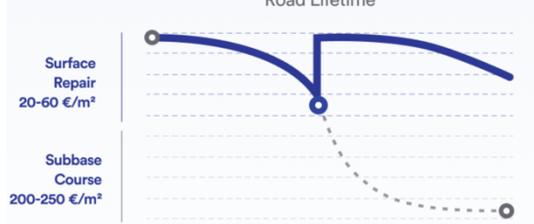
2

Drive and collect



3

Receive the results



Their sweepers drive through their whole network (trails and roads) around four times per year.

THE SYSTEM KEEPS IMPROVING

One of the key properties of artificial intelligence is that the system improves as the amount of data is increased. In February 2020 Pluto Technologies and the Danish Road Directory thus tested the solution on a trail network. The system's algorithm was at that point accustomed to municipal roads and made some distinct errors. The system thereafter was retrained to have a better understanding of the conditions of trail networks, and in April 2020, the results had already improved significantly.

The Danish Road Directory decided to take part in a pilot with the aim on major inquiries of trail systems. – “The Danish Road Directory has worked towards objective damage assessments for state roads in some years, but we lacked a good objective method for damage analysis on our trails. Pluto's solution seems interesting, as it is fast and effective, gives a consistent assessment, and all the damages are documented with an image thus it is possible to inspect it from the office,” explains Niels Skov Dujardin, engineer at Danish Road Directory ■

This allows for more inspection to be conducted from the office and shared with colleagues before a decision is made. All data is visualized on a webapp – similar to Google Maps – that provides a better overview of where to focus.

Based on this data, municipalities will be able to better prioritize their resources and ultimately save money on their data collection and reduce the CO₂ emission from transport. In short, the technology opens up for new and more effective solutions from which maintenance can be planned, managed, and inspected.

UPGRADING ROAD SWEEPERS

The system is in use in Aabenraa, Albertslund, and 7 other Danish municipalities. In Albertslund they have installed the system on the windshield of their sweepers, which allows for continuous data collection when the roads are swept. With this setup, Allan Sibbern from Albertslund municipality expects to upgrade and evaluate the road overview as well as save on resources.

THE MUNICIPALITY AS ASSOCIATE

” We have joined for several years development partnership with Pluto Technologies. We do this, as we believe in the coming potential of artificial intelligence. The goal is to increase our business information, reduce costs as well as automation within many parts of the organization. The new AI-technologies observes already the same asphalt damages as we do while being objective with a faster pace and precision.”

Jakob Scholdan – Engineer at the construction unit - Aabenraa Municipality



Gert (VD), Johan Bender (Pluto) and Jesper Henriksen (Pluto).