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Flowity – Artificial Intelligence for traffic analysis

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Abstract

Flowity is a product developed by ÅF. It brings cutting edge artificial intelligence technology to a wide range of markets. By utilizing *Deep Neural Nets* (DNN), Flowity is able to detect and track objects such as pedestrians and vehicles in streaming video. The product is highly versatile and can run on any type of camera or CCTV setup, with the ability to output the AI sensor data in real time. Flowity can be run as a real time system, where the sensor data is immediately available to act on by customized integrations; or as a sole analysis tool, where data is collected over time and made available for automatic report generation. This can form the basis for advanced business intelligence or be used as a foundation for other types of decision making.

Introduction

We have now reached a technological paradigm where it has become feasible to use artificial intelligence to solve problems that simply are too difficult with traditional deterministic and statistical models. Today, we can use neural networks to process vast amounts of video data, not just for detection of simple objects but also for analyzing sequences of events. Something that was considered as impossible just a few years ago.

The number of sensors being in use for traffic analysis is growing fast and more and more information has become available to us. We have information from public transits, reporting of traffic crashes and incidents, road camera feeds, onboard diagnostics information from individual vehicles, navigation data, localized weather data, booking data from online booking apps such as taxi bookings, hotels, and other types of accommodation, and parking space occupation. To put it shortly, the monitoring capabilities of traffic have merely become better and better.

The challenge we are facing is how to aggregate these vast amounts of data into powerful models that can lead to a smarter regulation of traffic that is more adaptive to different traffic situations. With good models we can get more efficient traffic reallocation in regard to construction sites, different kinds of events such as concerts, sport events, weather conditions or high traffic due to paycheck week.

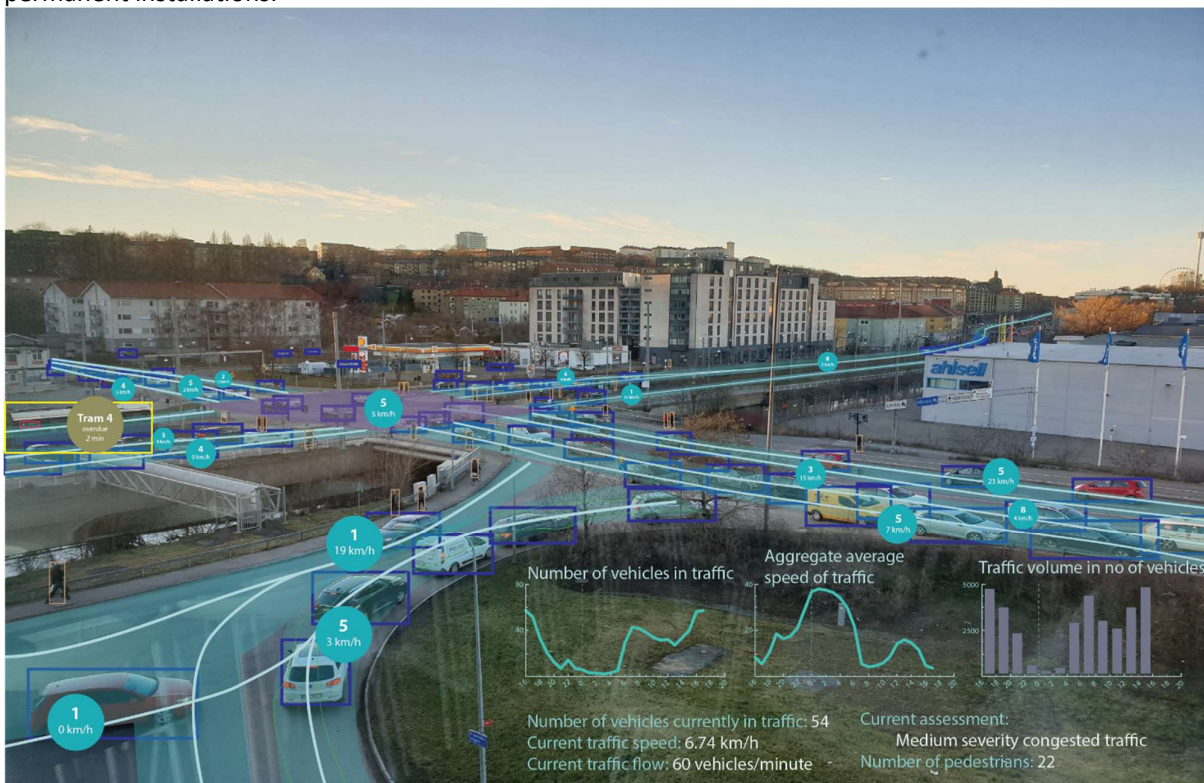
The success stories are already showing up. The Nevada Highway Patrol managed to reduce the number of car crashes by 17% along a stretch of Las Vegas' busiest highway, thanks to a yearlong effort into an AI based crash prevention pilot program.

Our vision is to make the roads and the streets around us smarter and more aware of what is happening in terms of such events.

Artificial Intelligence and User Experience in coalescence

State-of-the-art computer vision technology allows Flowity to detect objects, such as pedestrians, fast-moving vehicles or any type of inert objects. Whereas previous computer vision technology has been inherently dependent on movement, Flowity utilizes *Deep Neural Nets* which has been trained specifically to detect the object in question. This method ensures high confidence when detecting, as well being extremely hardened to deal with image noise, such as transient changes in lighting.

Flowity offers an intuitive user interface for easy configuration of parameters, allowing a non-technical end user to configure the setup from start to finish. Functions can be defined by drawing lines and polygons directly on the camera's image, for example when defining regions of interest and for counting the number of vehicles or pedestrians that crosses a certain path. This permits a dynamic approach when installing and configuring the installation in the field, which is especially useful for time-limited surveys in non-permanent installations.



Analysis of Elisedal intersection in Gothenburg

Applications in traffic analysis

Flowity detects and tracks pedestrians, cyclists, cars, and other types of vehicles. The platform enables counting of passages, accumulated wait times and average speed, per object type, which means that pedestrians and cyclists can be counted separately for the same passage detection. The algorithm is able to process the data in real time, allowing the system to run continuously in permanent installations, giving near-instantaneous feedback on the current traffic situation. This enables easy integration to other systems, which can utilize the Flowity output for controlling e.g. lighting or to display the information on an info screen.

Artificial intelligence brings more advanced possibilities than contemporary non-AI technology in regards of detecting objects and events, in particular:

- Queue lengths in congested traffic
- Detection of flooded or caved in roads
- Detection of obstacles on the road such as fallen down trees, dropped cargo, or road debris.
- Detection and tracking of animal wild-life on roads.

Other applications

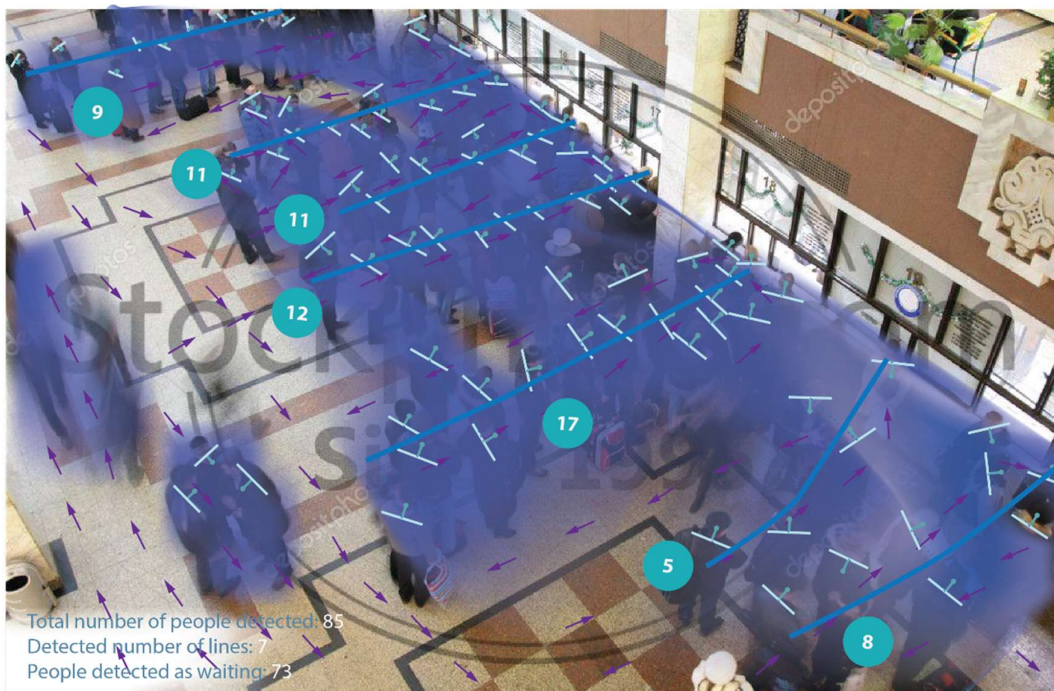
The strength of Flowity is its ability to detect objects in noisy environments with high confidence, and the capability to track these objects over time. Naturally, these features are applicable to many fields when it comes to analyzing movements, securing objects or tracking objects, making Flowity a truly universal and cross-segment product.

Other utilizations include, but are not limited to:

- Retail analytics
- Space Management in real estate
- Security
- Healthcare
- Passenger analytics in public transport
- Crowd-management in public events

The inherent nature of using cameras impose restrictions as to how the information is stored and if the objects detected could be identified at a later point in time. Flowity anonymize all collected data by default, at the moment of the initial processing, making re-identification of persons or vehicles impossible from the analytical data. However, in circumstances where identification of persons or vehicles is desirable, the AI-technology used by Flowity allows for identification methods such as *Optical Character Recognition* (license plates) and facial recognition.

For more information and use cases, see www.flowity.io.



Facts about the system

- It respects GDPR regulations
- There are not specific requirement to the type of camera to be used, or the angle of view
- Based on machine learning which can detect objects also in low quality videos, poor light conditions and with reflections
- Can function in real time as well as on recorded videos
- Can register up to 20 times per second
- The data can be stored in a ÅF server or on a server chosen by the client.
- The client can access data and statistics through a web interface.