Optical Oracle: Automatic Object Identification

Rapidly creating labelled machine learning data sets to train sensors whose inputs are not sensed by humans

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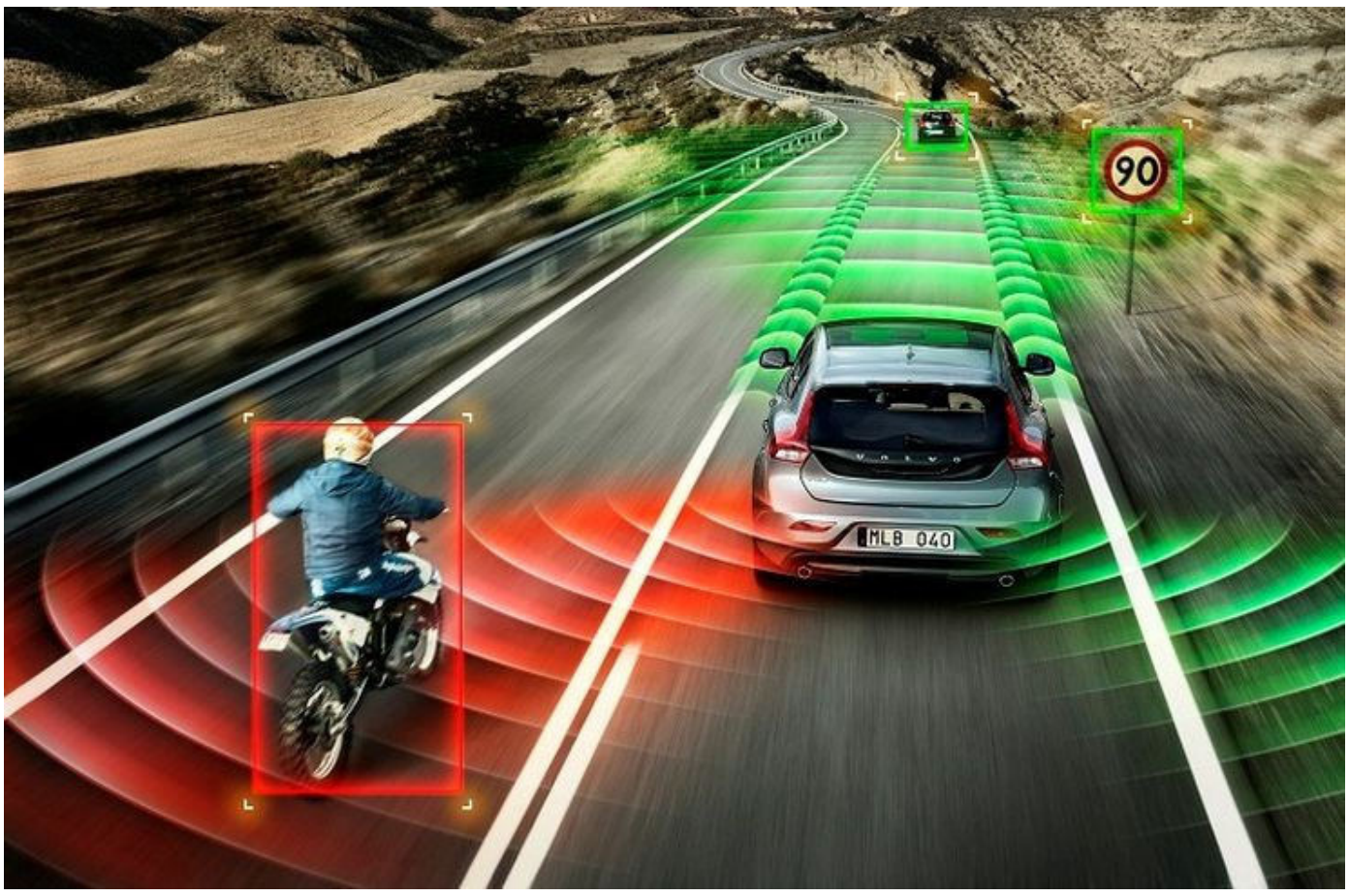

Please note, header image is purely illustrative. Source: Frank Derks, Flickr, CC BY 2.0

Background

A large volume of image data are available that have been “tagged” because of the relative ease for people to label their images on various (social media) platforms. This provides an excellent training set for machine learning and a range of technologies exist that can interpret images (or audio clips) and quickly classify them for example, images of “Taj Mahal”, “tiger”, “motor car” and even multiple different objects within a single image.

Sometimes, however, image data cannot be relied upon in isolation due to external factors, e.g. weather, lighting conditions, etc. which would lead to poor visibility and limit the usefulness of image data from a video sensor. In such implementations data from other sensors, such as radar or sonar, is often used in place of or in conjunction with image data.

At present, though, the identification and detection of objects present in the data from these alternative data sources (radar, sonar, etc.) remains limited due to the general unavailability and high cost of creating labelled data sets as the basis for machine learning. Optical Oracle bridges this gap by using sensors trained on human labelled sensory data to train the systems whose inputs cannot be perceived by humans.

Technology Overview

Optical Oracle is an automatic object identification system that can be based on a range of sensor technologies for which large labelled datasets are not available for training.

In training mode, the system receives primary input data from a scene that are generated by a sensor that is human perceptible (e.g. video, audio), as well as secondary data from a secondary sensor(s) simultaneously recording the same scene. This secondary sensor is one that is not human perceptible (e.g. radar, sonar, lidar).

The system processes the primary data to identify and label objects present in the scene and it associates the object signatures with signatures in the secondary data, effectively labelling the inputs from the secondary non human perceptible inputs. This can rapidly develop a training dataset for these secondary sensors.

Ultimately once sufficiently trained, the secondary sensor system can be relied on during adverse conditions where the primary sensor is unable to operate effectively (e.g. adverse weather) or it may be able to be used independently.

Benefits

The benefits of the technology include:

- Improve and enhance the object detection and identification ability of a system such as autonomous vehicle by being able to deploy sophisticated sensing technology in concert with less sophisticated systems
- Potential reduction in system complexity and cost by reducing the amount of sensing inputs through using the appropriate sensing system in the corresponding conditions (video in clear conditions and radar in rain/fog conditions)
- Widen the object identification capabilities of a system such as a autonomous car or UAV by using different sensing systems (e.g. video *vs.* radar) to extract different types of information or detail from the same scene

Applications

Optical Oracle has application in:

- vision systems in autonomous and semi-autonomous applications, such as vehicles and unmanned aerial vehicles (UAV's) or drones
- enhanced 'vision' for robotic and object identification systems
- security applications, such as perimeter monitoring

Opportunity

The University of Cape Town is seeking partners for:

- Commercial Licensing
- Technology Development and Field Trials

The inventor at UCT is able to work with partners to adapt the technology for partner specific requirements.

Patents

- A provisional application has been filed for the technology

IP Status

- Provisional patent

Seeking

- Development partner
- Commercial partner
- University spin out
- Licensing