

AI classifies objects on the road only by radar measurements

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Whether future modern self-propelled cars can truly distinguish objects while in traffic, such as between cars, trucks and pedestrians based on radar data ? Absolutely, and all thanks to AI. In a new paper published on Arxiv.org last week with the title: 'Radar-based Road User Classification and Novelty Detection with Recurrent Neural Network Ensembles' (roughly translated: Classifying objects in actual participation New traffic and discovery based on recurrent neural networks, scientists from Daimler Automobile Corporation and Kassel University, Germany have described in detail a novel machine learning framework that can be clearly classified It is clear that individuals and vehicles are engaged in traffic only by data obtained through the vehicle's radar system. Without introduction, it can be seen that this model is particularly suitable for application in the automotive industry in particular and the transport sector in general, in which, self-propelled vehicles will probably be the aspect. benefit the most.



1. MIT strives to develop an AI model that can drive almost like a human

"The overall classification performance can be significantly improved when compared to current object identification methods and in addition, the number of identifiable objects will be more, along with the improvement. A clear good defense of accuracy, "the team said. In addition, as explained by scientists, radar is

one of the few types of sensors that can directly measure the velocity from many objects in sight and in particular it is much more powerful than many types. Other sensors when operating in adverse weather conditions such as fog, snow or heavy rain. However, few devices can be 100% perfect and radar sensors are no exception. It has a relatively low angle resolution compared to most other sensors, making it difficult to display dense and clear data on the screen.

The team's solution in this case is to use a set of classification tools including 80 short-term memory cells (LSTM) or special recurrent neural networks (here are mathematic functions that mimic biological neuron structures - a technology in deep learning technology that is capable of learning and remembering long-term dependencies. In particular, scientists only need to use a subset of 98 features - namely, statistical derivatives of scope, angle, amplitude, Doppler; geometry characteristics, and features related to Doppler value distribution - to determine the main differences between objects that need to be identified, and do not require computational power, processing too high in the process Model training and reasoning.

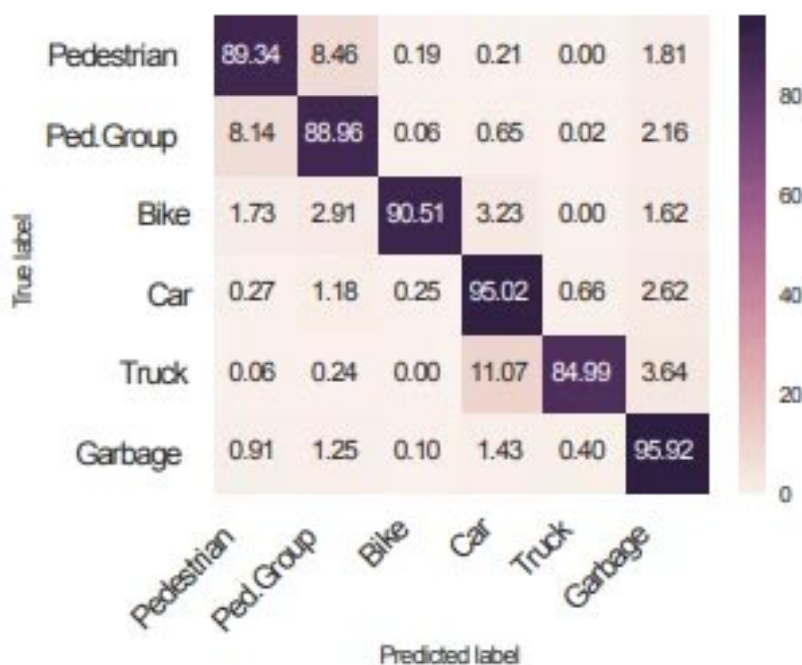


Fig. 5. Normalized confusion matrix. All values as percentages.

1. The difference between AI (Artificial Intelligence) and Cognitive Computing (Cognitive Computing)

To train these machine learning models, the team found a data set containing more than 3 million data points of more than 3,800 cases of traffic participants. These training models were acquired through four radar sensors mounted on the front half of the test vehicle (with an effective range of about 100 meters). After training, as a result, these machine-based classification models were able to arrange the objects it detected, including pedestrians, pedestrian groups, bicycles, and cars, trucks and garbage, into categories corresponding to relatively high accuracy.

Specifically, the 'pedestrian group' category will be assigned to pedestrian data in which the system cannot identify the clear separation between the image of each individual obtained through radar data. On the other hand, the 'garbage' and 'other' categories will include foreign objects and traffic vehicles that the system cannot

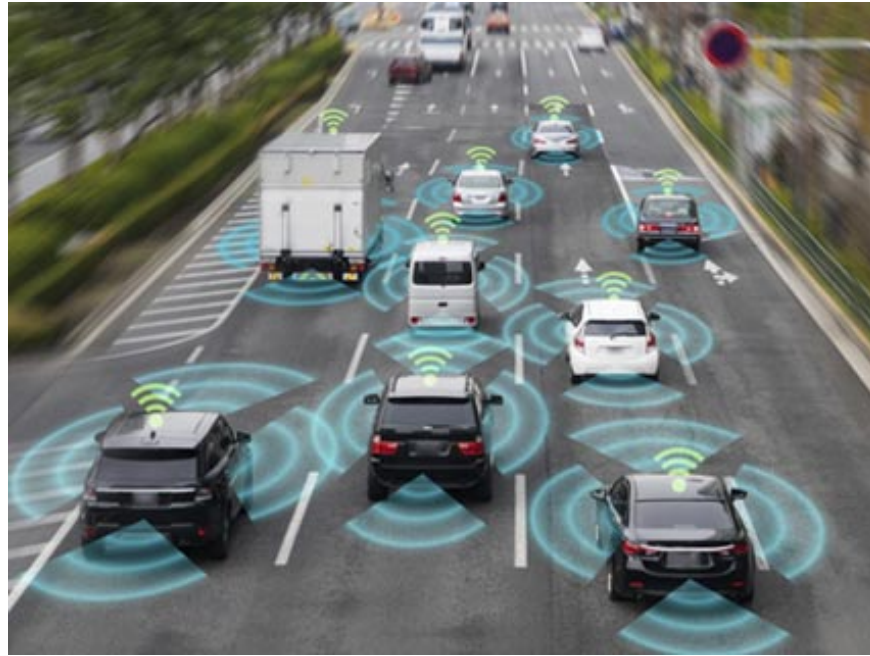
identify, or misidentify. In other words, objects classified into these two categories are rated as not suitable for any other classifications mentioned above (such as motorcyclists, scooters, wheelchairs, cables). hanging and cats and dogs).



1. Japan's artificial intelligence has created ultra-realistic virtual fashion models

So how accurate is this advanced classification system and can it be used in the near future? According to the researchers, they have an average accuracy of up to 91.46% in subjects classified and even more accurate when sharing the same set of characteristics. Clearly, most classification errors often occur between pedestrians and pedestrian groups due to complex similarities between the two categories. At the same time, there are some other cases of confusion related to the characteristics and shapes of objects. For example, the system may misidentify a person in a wheelchair and a small scooter driver.

Leaving aside those not so significant errors, the team believes that this proposed structure can allow new insights into the importance of characteristics for identifying between multiple categories. individually, it is very important for the development of new algorithms as well as requirements for sensor systems. In addition, the ability to identify objects flexibly from different categories with objects seen in training data also plays an important role in developing self-propelled vehicle technology.



1. AI uses WiFi data to estimate the number of people in a room

In the future, scientists plan to improve current results by adopting high-resolution signal processing techniques, which can help increase radar resolution in terms of impact range and angle. Impact and Doppler.

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