

Computer vision for improved cycling safety analyses

Enhancing cycling safety analyses from naturalistic data by combining automated fine-grained classification and expert-based traffic conflict assessment

Our society needs more citizens who choose cycling as preferred way to move, in order to make our living environment more sustainable. However, the use of bicycle is often hindered by the choice of more convenient modes of transportation, like passenger cars, and by the risk of being involved in a crash. With respect to the latter, the number of seriously injured and killed cyclists is not decreasing as expected, despite the efforts made in improving the cycling infrastructure. Additional efforts are therefore required to understand why crashes involving cyclists occur and how we can avoid them in the future.

Naturalistic data (ND) — data collected through cameras and other sensors while road users ride their bikes, walk or drive — is a unique source of data to understand why cyclists are involved in crashes. The main advantage of ND is the possibility to study the behavior of cyclists and other road users, including travelled trajectories and speeds, and distraction associated to phone use. The analysis of ND is nevertheless time-consuming because it requires manual annotations of the video data: these annotations allow researchers to extract relevant features about human behavior, which are needed for the analyses. To facilitate the extraction of these features, this project aims to partially automate the annotation process of ND using Artificial Intelligence (AI) image analysis techniques. The project uses ND collected from cameras installed on road infrastructure and on drones. The features to be extracted include trajectories of road users and cyclist equipment (for example, helmet, yellow vest, and phone). The trajectories extracted through computer vision techniques are used to identify traffic conflicts between cyclists and other road users.

The project starts in January 2024, and it is expected to be completed by the end of the year. The project benefits from an interdisciplinary team of researchers employed in industry and academia: a traffic planning expert (Jonas Hammershøj Olesen, COWI), a computer vision researcher (Andreas Møgelmoose, Department of Architecture, Design and Media Technology at AAU) and a human factors researcher (Giulio Bianchi Piccinini, Build Environment department at AAU).

The results of the project will be disseminated to reach academics, companies, governmental bodies, and the general public. By the end of the project, a workshop will be held at COWI to describe the main result of the project. The results will also be presented in national and international conferences or peer-reviewed journals.