Michishirube: AI Assist Cane for Visually Impaired

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Accidents involving visually impaired people while walking are one of the serious social issues (e.g., falling off station platforms and crossing crosswalks without acoustic signals). The risk of these accidents is particularly high in rural cities, where measures such as the installation of platform doors and acoustic signals are often insufficient. To address this issue, this research aims to develop a white cane device equipped with image recognition and acoustic messages supported by advanced AI technologies to prevent such accidents. To accomplish this, we collected a training data-set of images taken from the "white cane perspective" at crosswalks and station platforms. This enabled the image recognition to detect crosswalks and railroad tracks, which has been difficult to achieve in previous studies. The device is also capable of detecting pedestrians, cars, and bicycles. Furthermore, we implemented functions tailored to the needs of visually impaired individuals, such as a function that guides the user back to the direction of the crosswalks when they are about to step out of line while crossing a crosswalk. User tests with visually impaired people on station platforms and crosswalks have been conducted and the validity of the system were confirmed. That is, the developed device has the potential to significantly improve the safety of visually impaired individuals, as it can be equipped with the normal canes they use to determine the direction they are going and can help them avoid dangerous situations by providing audio messages from the device.

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