

PEDESTRIAN SHORTCUT FORMATION ON A UNIVERSITY CAMPUS BASED ON THE ACTIVE WALKER MODEL

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Abstract

In this study, we investigate pedestrian behavior on the campus of Kochi University of Technology by simulating shortcut formation using the Active Walker Model proposed by D. Helbing.

In public spaces such as university campuses and parks, shortcuts that were not included in the original design often emerge as pedestrians repeatedly walk along the same routes. However, these shortcuts do not necessarily follow the shortest paths between two points. This may result from two competing tendencies in pedestrian behavior: the desire to minimize walking effort and the reluctance to create new paths.

A typical example can be found in front of Building B at the Kami Campus of Kochi University of Technology. A shortcut has formed across the lawn near Central Pond, connecting the entrance of Building B to the Symbol Tower. Interestingly, this shortcut does not coincide with the geometrically shortest path between the two locations. To investigate its formation process, we performed numerical simulations using the Active Walker Model, which incorporates these competing behavioral tendencies. We treated the perceptual range and perceptual angle as model parameters and searched for values that reproduce the observed shortcut, aiming to characterize the walking behavior of students on campus.

Our simulations show that a larger perceptual range combined with a narrower perceptual angle leads pedestrians to move more directly toward their destinations, even when this involves walking across grass and forming shortcuts. In contrast, a smaller perceptual range combined with a wider perceptual angle encourages pedestrians to take detours and avoid damaging the grass.

By fitting the simulated shortcut to the observed one, we estimated the effective perceptual range and angle of pedestrians on the campus to be 4.6 m and 30°, respectively.