

Computers can perceive image curves like artists

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Interest curves perceived by a computer in a study at Umeå University in Sweden. Credit: Umeå University

Imagine computers being able to understand paintings or paint abstract images much like humans. Bo Li at Umeå University in Sweden demonstrates a breakthrough concept in the field of computer vision using curves and lines to represent image shapes and furthermore to recognise objects.

Human perception can recognise objects through image features, such as shapes and curves. For example, we can identify faces, animals, cars, and other daily objects in simple sketch images. For computers, however, recognising objects or image features are challenging tasks.

Accurate modelling of image features is very important in a wide range of computer vision applications, for example: image registration, 3D reconstruction, and [object](#) detection. In future technologies such as Google Car, virtual reality, or AI brain, image features will remain fundamental components. In spite of the fact that hundreds of solutions for the detection of image features already exist, up until now there had been a solid concept missing.

In his doctoral dissertation at the Department of Applied Physics and Electronics at Umeå University, Bo Li has developed a breakthrough concept in computer vision: interest curves.

"With this method, the computer can redraw an image using curve strokes and recognise objects through these curves," says Bo Li.

The concept brings about brand new dimensions of understanding image features including points, regions, lines, and curves. It also enables these features to be represented within the same theoretical framework. It advances the standard for future research regarding image features, at the same time as it provides practical guidance to the field.

According to Bo Li, the most important element in feature extraction is

the robustness. His results show that his method enables curves and lines to be detected robustly under various image transformations and disturbances.

In the past, curves and lines have not been as popular as points and regions in the field of computer vision because they lack enough robustness and Li's new theory and algorithms will change this.

"Curves and lines are naturally more useful than points, because humans use these shapes to describe the world," explains Bo Li.

His doctorate work shows many advantages of using curve features in [computer vision](#) applications.

Provided by Umea University

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