

Sudoku 'saves' photographers from rights theft

- By [Chris Cheesman](#) Tuesday, 10 September 2013
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A digital watermarking system based on the numerical puzzle Sudoku has been developed by scientists in Malaysia to help combat copyright theft.



The method uses the permutation of rows and columns in Sudoku solutions to 'create and detect an invisible digital watermark that is overlaid on an image with a random distribution', reports [Inderscience Publishers](#), a distributor of scientific journals.

A valid Sudoku solution is needed to embed the watermark and to detect it, according to the paper, entitled *Anti-cropping digital image watermarking using Sudoku*.

It is hoped that the system, published in the *International Journal of Grid and Utility Computing*, will prevent attempts by copyright thieves to 'crop' a digital watermark in more than nine out of ten cases.

'Many digital image watermarking schemes have been developed to embed copyright information into an image,' explain the research team, based at Universiti Tun Hussein Onn Malaysia.

'However, an attacker may reuse parts of the watermarked image by cropping out unwanted parts.'

Designed to thwart 'severe cropping' of a watermark, the Sudoku solution is based on the permutation nature of the puzzle game that allows 'evenly distributed copies of watermark pieces in all parts of the cover image'.

Using 9x9 Sudoku, the team say their system worked in 94% of cropping attempts.

'If the image pirate crops part of the image, then the chances are that enough of the watermark will remain elsewhere in the image that the complete watermark might be retrievable - provided that the precise and correct Sudoku solution is given,' adds www.eurekalert.org.

'Based on the relationship between full and partially recovered watermarks, the Sudoku solution will be able to discern whether a pirated image has the copyright owner's watermark.'