TECHNOLOGY TRANSFER

DOOLITTLEINSTITUTE
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Improved Hexagonal Array Set Addressing for Better Image Processing

An efficient and simple method to improve sampled image data by up to 33%

Modern image sensors, such as typical charge-coupled device (CCD) and complementary metal-oxide semiconductor (CMOS) sensors found in cameras, use arrays of rectangular pixels. It has been known since the early 1960's that rectangular sampling produces less-than-optimal image data. Hexagonal sampling is the optimal sampling approach providing a 13.4% improvement over rectangular sampling. Despite this and other advantages of hexagonal sampling, the lack of an efficient coordinate system for hexagonal grids has prevented its utilization in the imaging market.Researchers at AFRL developed a new method for addressing hexagonally arranged image sensors, producing an output which can be efficiently manipulated in digital systems. The patented coordinate system utilizes Array Set Addressing (ASA), a novel method for capturing data from a hexagonal grid of image sensor pixels for image processing. The primary concept behind ASA is that a hexagonal grid of sensors can be represented as a set of two rectangular arrays distinguished by a single binary coordinate. This technology can be used for any hexagonal grid of senor data to enable more efficient computational manipulation and sampling data processing.The new addressing method can be straightforwardly implemented in conventional electronic hardware and digital processing systems. ASA supports efficient linear algebra and other image processing manipulation. This results in improved image processing efficiency and reduced computational power. Utilizing the hexagonal sensor grid enables greater angular resolution, equidistant spacing, and a higher degree of symmetry than rectangular grids. Finally, since all neighboring pixels in a hexagonal grid share a side, there is no connectivity ambiguity as in rectangular grids, leading to more efficient algorithms dealing with connectivity.

BENEFITS

Less Computational Burden: Faster computational operations for hexagonal samples images

33% improvement in 3D spaces

13.4% improvement in 2D spaces

Elegant Solution: ASA significantly outperforms other hexagonal addressing approaches

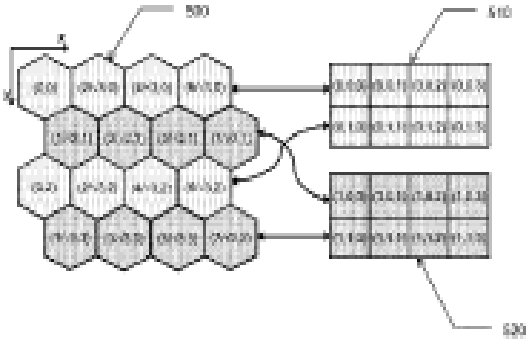
Higher fidelity to source than current methods

OPPORTUNITIES

US patent 8,797,436 available for license

Collaboration with Air Force researchers

Potential for:
Medical imaging
Smartphone displays
Camera sensors
3D mapping



A schematic view of an example showing the addressing of a hexagonal grid by separating it into two separate rectangular arrays.

READY TO COLLABORATE?

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