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## A CONSTANT PASSES ALGORITHM FOR QUADTREE CONSTRUCTION

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## Abstract

Quadtrees are known hierarchical data structures to represent image if sizes  $2r^*2r$ . Quadtree construction is one of the biggest operation for many algorithms that manipulate data structures. Determining the level(depth) of each image pixels (quadtree construction) takes almost O(r) computational times, where r is the height of a given quadtree. The traditional algorithms have an execution time that is proportional to the size of the image. Thus, the passes number of each pixel is proportional to the number of pixels in the image. In this paper, a new algorithm to built the quadtree in constant passes. Each pixel is visited 4 times for the worst case. The first time when are scanning, the second and third time if this pixel is representative quadrant, the fourth time is for pixels labeling.

The Principle is that each homogeneous quadrant has a representative pixel and treating this quadrant is treating only the representative pixel, since the quadrant components have the same characteristics exactly like quadrant representative pixel.

The new algorithm runs very fast and reduces the computational complexities of almost all algorithms based on quadtrees.

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Key Words : Image processing, Quadtree, Representative quadrant.

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