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A Compact Encoding of Plane Triangulations with Efficient Query Supports

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Motivation

A *fine* 3D object is represented as *large* plane triangulation

A *compact* representation

3D object

Representation as plane triangulation

Encoding Ideas

n : # vertices
 m : # edges

Plane triangulation

(A plane graph in which every face is a *triangle*)

Realizer

Yellow tree
Blue tree
Red tree

Encode

Spanning-tree (Yellow lines)

Non-spanning-tree edges (Purple lines)

Binary string ($6n$ bits)

11011001101001110001010100
000011100110111001100111001010110110011001

Known results

Authors	Size (bits)	Published in
Chuang, Garg, et. al.	$7n + o(n)$	Proc. ICALP (1998)
Aleardi, Devillers, et. al.	$4.35n + o(n)$	Proc. WADS (2005)
Aleardi, Devillers, et. al.	$3.24n + o(n)$	Theoretical Computer Science (2008)
Ours	$6n + o(n)$	Information Processing Letters (2010)

Query supports

With a help of *auxiliary table* of $o(n)$ bits, we can support a variety of queries in $O(1)$ time

- Adjacency query Adj.?
- Degree query Deg.?
- Clockwise neighbour query k -th clockwise neighbour query
Next?

Compact representation of plane triangulation