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Title	A Compact Encoding of Plane Triangulations with Efficient Query Supports
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Description	ERATO湊離散構造処理系プロジェクトシンポジウム(第2回) : 第73回情報処理学会全国大会イベント企画. 2011年3月2日(水). 東京工業大学 大岡山キャンパス.
Relation	2010年度科学技術振興機構ERATO湊離散構造処理系プロジェクト講究録. p.504.
Issue Date	2011-06
Doc URL	https://hdl.handle.net/2115/48327
Type	conference presentation
File Information	03.yamanaka.pdf

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A Compact Encoding of Plane Triangulations with Efficient Query Supports

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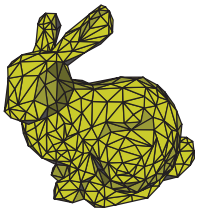
Motivation

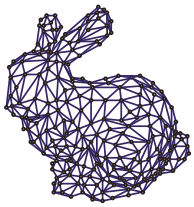
A *fine* 3D object is represented as *large* plane triangulation

A *compact* representation



3D object

Representation as plane triangulation

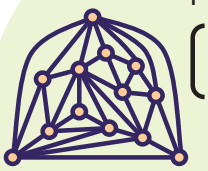


Encoding Ideas

n : # vertices
m : # edges

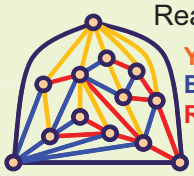
Plane triangulation

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



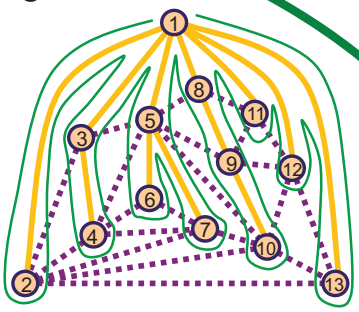
Realizer

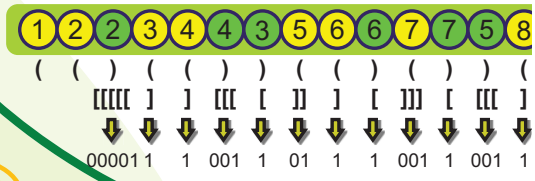
Yellow tree
Blue tree
Red tree



Keypoint
Depth first search
（drawn by *green line*）

For each vertex …

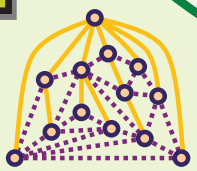




Decode

O(n) time

Encode



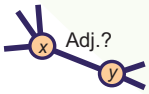
- Spanning-tree（Yellow lines）
- Non-spanning-tree edges（Purple lines）

Compact representation of plane triangul.

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



- Degree query

- Clockwise neighbour query

k-th clockwise neighbour query

Binary string（6*n* bits）

11011001101001110001010100
00001110011011100110011100101011011001100 1

Known results

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