

Christian Duncan David Eppstein Michael Goodrich Stephen Kobourov Maarten Löffler



GRAPH DRAWING 2011, EINDHOVEN

UTUNCAN • DA PLANAR AND POLY-ARC LOMBARDI DRAWINGS



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OMBARDI DRAWINGS

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OMBARDI DRAWINGS

Def: *Lombardi vertex* Perfect angular resolution.

PASY

SMBARDI DRAWINGS

Def: *Lombardi vertex* Perfect angular resolution.

S Z S Z C



MBARDI DRAWINGS

Def: Lombardi vertex Perfect angular resolution.

YYS>

3



TATIONCAN - DA. Def: Lombardi edge Single circular arc.

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SMBARDI DRAWINGS

Def: *Lombardi vertex* Perfect angular resolution.

YY'SY



Def: *Lombardi edge* Single circular arc.



MBARDI DRAWINGS

Def: Lombardi vertex Perfect angular resolution.

YSY



Def: Lombardi edge Single circular arc.



(Duncan *et al.*, 2010)

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J. MANDUNCAN - DA. PLANAR AND POLY-ARC LOMBARDI DRAWINGS







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There

Theorem: Not every embedding of every graph has a Lombardi drawing.

TAT DINCAN - DA **Theorem:** Not every planar graph has a planar Lombardi drawing.

There

Theorem: Not every embedding of every graph has a Lombardi drawing.

L I J) **Theorem:** Not every planar graph has a planar Lombardi drawing.

(Duncan *et al.*, 2010)

MBARDI DRAWINGS

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PLANAR AND POLY-ARC LOMBARDI DRAWINGS CHRISTIAN DUNCAN · DAVID EPPSTEIN · MICHAEL

How can we draw graphs without Lombardi drawings?

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OMBARDI DRAWINGS

How can we draw graphs without Lombardi drawings?

Relax single circular arc TATIONCAN - DA. requirement?

PRESE





OMBARDI DRAWINGS

How can we draw graphs without Lombardi drawings?

Relax single circular arc TATIONCAN - DA. requirement?

PRESE

How can we draw f without Lom^L

requirement?

- TUDINCAN - DA Relax perfect angular resolution requirement?





How can we draw f without Lom^L

requirement?

- TUDINCAN - DA Relax perfect angular resolution requirement?

How can we draw without Lom^L requirement? This talk!

. TO DINCAN - DA Relax perfect angular resolution requirement?

How can we draw f without Lom F requirement? This talk!

TTUTINCAN - DAT Relax perfect angular resolution requirement?

NIKUI DRAWING.

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Def: Lombardi edar Single circular





Def: Lombardi edor Single circulor

TAT DINCAN - DA **Def:** *k*-Lombardi edge Sequence of k circular arcs.






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RESULIS Theorem 1-Lor **Theorem:** Not every graph has a 1-Lombardi drawing.

Theorem 1-Lor **Theorem:** Not every graph has a 1-Lombardi drawing.

Theorem: Every graph has a TATIONCAN - DA. 2-Lombardi drawing.



TAT DUNCAN - DA.

r RESULIC Theorem 3-der r' **Theorem:** Not every planar 3-degenerate graph has a planar 1-Lombardi drawing.

TATIONCAN - DA. **Theorem:** Every planar 3-regular graph has a planar 2-Lombardi drawing.

Theorem 3-der r' **Theorem:** Not every planar 3-degenerate graph has a planar 1-Lombardi drawing.

aph has , drawing. **Theorem:** Every planar 3-regular graph has a planar 2-Lombardi drawing.

Theorem: Every planar graph has a planar 3-Lombardi drawing.

RESULIS Theorem 3-der r'

Theorem: Not every planar 3-degenerate graph has a planar 1-Lombardi drawing.

aph has , drawing. **Theorem:** Every planar 3-regular graph has a planar 2-Lombardi drawing.

Theorem: Every planar graph has a planar 3-Lombardi drawing.

VIIVE RESULT

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VITVE RESULI























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POSITIVE RESULT













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OPEN PROBLEMS

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PEN PROBLEMS FU10 A D D D D Do all planar graphs have planar 2-Lombardi drawings?

Do all plan 2-Lom Do all planar graphs have planar How much area do Lombardi drawings need? TATIONCAN - DA.

Do all plan 2-Lom Do all planar graphs have planar How much area do Lombardi drawings need?

TAT DINCAN - DA What can be done by relaxing the angular resolution requirement?

PEN PROBLEMS Do all planar graphs have planar 2-Lombardi drawings?

How much area do Lombardi drawings need?

What can be done by relaxing the angular resolution requirement?

Do outerplanar graphs have planar Lombardi drawings?



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