Appearance Shock Grammar for Fast Medial Axis Extraction from Real Images

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Medial Axis Transform (MAT)

MAT: Binary shapes
Blum, 1967

AMAT: Natural scenes
Tsogkas & Dickinson, 2017
AMAT limitations

- Invalid topologies;
- “Thick” structures;
- Disconnected branches;
- Slow (~6.5min for 400x400 image).
Shock graph theory

Application of shock grammar
Medial axis extraction begins with a seed...
Medial axis extraction begins with a seed...
...which is then grown into medial branches.
...which is then grown into medial branches.
...which is then grown into medial branches.
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...which is then grown into medial branches.
Results

Ground truth

AMAT (State-of-the-art)
F1 = 0.434
\( t = 393 \) s

ASG (this work)
F1 = 0.522
\( t = 35 \) s
~9% gains!
10x speed up!
Applications

Scene retrieval

Interactive segmentation

Constrained image editing

Painterly rendering
Code available at: github.com/CharloCamaro/ASG