Local accumulation for geometric tubular analysis
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Objective Segment wood knots from X-Ray CT images
Needs Automatic process for precise measurements

Context
Step 1 Initial knot area detection process
Step 2 Individual segmentation of each knot area

Comparisons Power Watersheds

Bibliography

Z-Motion accumulation for tree knot detection
Step 1: Accumulation map generation
Step 2: Knot area detection
1. Binarization + connected components
2. Pixel sorting by accumulation value
3. Process of connected component aggregation

Results
Space
Details
Trunk slice
Detected knot areas
3D visualization

Normal accumulation for centerline detection
Step 1: Normal scanning
Scan process → Accumulation image
+ Director vector image from covariance matrix
Step 2: Centerline tracking
From the global maximum of accumulation, proceed to a bi-directional tracking. From a 2D patch orthogonal to $\vec{d}_k$:
1. Localize the $C_{k+1}$ point at a step distance of $\vec{d}_k$
2. Build the patch $P_{k+1}$ orthogonal to $\vec{d}_k$ containing $C_{k+1}$
3. Correct the $C_{k+1}$ location as the local maximum of $P_{k+1}$

Results
(1) Data / centerline
(2) Rebuild shape
(3) Error (1)-(2)

Context
A company produces machines for the cold bending of metallic tubes.
Need integrate a quality control process

Bibliography

Try online demonstrations!
http://ipol-geometry.loria.fr/~kerautre/ ipol-demo/KnotDetectIPOLDemo/