Real-Time Volume Graphics

[10] Transfer Functions Reloaded
Transfer Function

Slice image

- Background
- Enamel
- Dentin

Histogram

Real-Time Volume Graphics
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Eurographics 2006
2D Transfer Function
2D Transfer Function

2D Histogram

Gradient Magnitude

Scalar Value

Background

Dentin

Enamel
2D Transfer Functions

T2

PD
2D Transfer Functions
Multidimensional Transfer Functions
Multidimensional Transfer Functions
2D Curvature Transfer Functions

- 2D lookup table in domain of principal curvatures

ridges and valleys, plus contours:
Transfer Function Design

![Transfer Function Design](image)
Editors for 2D Transfer Function Design:
Editor based on geometric primitives:
reduce the number of DOFs

- Trapezoids (Kniss et al. 2001)
- Paraboloids (Vega et al. 2004)
- Quadrilaterals
Guidance

User points here

Opacity set automatically
Transfer Function Design

Automatic/Semiautomatic Approaches:

- Image-Drive Techniques
  - Interactive Evolution (Genetic Algorithms)
  - Design Galleries
  - Inverse Design
  - Search for Optimal Setting using Quality Metrics

- Data Driven Techniques
  - Image Processing [Fang et al.]
  - Neural Networks [Tzeng et al]
  - Position Function [Kindlmann and Durkin]
Conclusion

Multidimensional Transfer Functions

- Scalar Value and Gradient Magnitude
- Coregistered Volume Data/Multivariate Data
- Higher Flexibility and less artifacts
- Assignment becomes difficult!

Transfer Function Design:

- Manual Editing
- Galleries/Thumbnail Selection
- Automatic Techniques