Métriques extrinsèques pour l'évaluation de la compression 3D

Existing Extrinsic Metrics

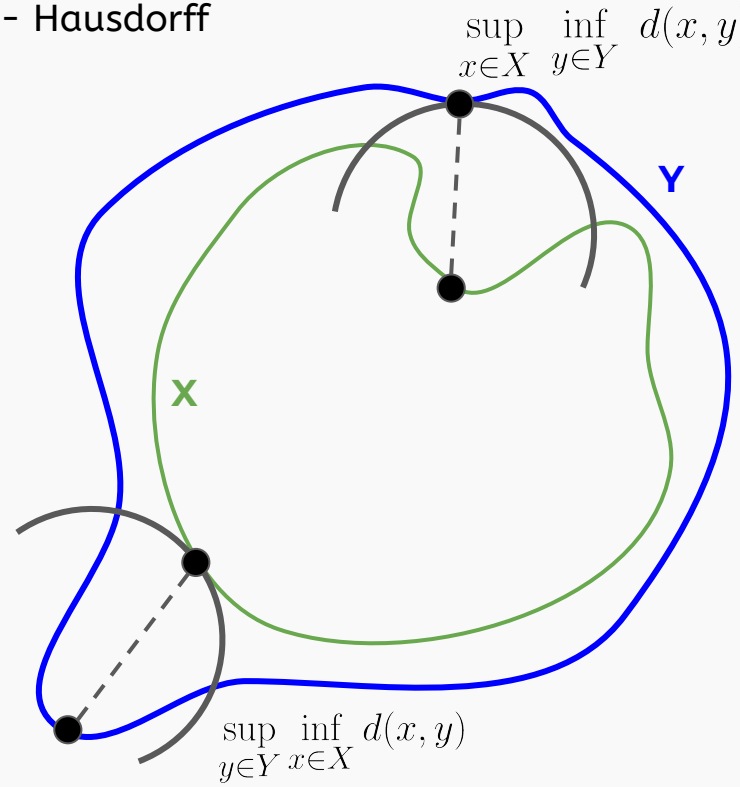
Metrics	Hausdorff [Cignoni 1998]	Completeness [Seitz 2006]	Accuracy [Seitz 2006]	DAME[1] [Váša 2012]	MSDM[2] [Lavoué 2006]	MSDM2[2] [Lavoué 2011]
Computation method(s)	Euclidean distance			Dihedral Angles	Contrast, Structure, Curvature	
Type	Geometric	Geometric and Global for 3D Reconstruction		Perceptual		Perceptual Multiscale

[1]DAME : *Dihedral Angle Mesh Error*
[2]MSDM : *Multi-Scale Distortion Measure*

Existing Extrinsic Metrics

Geometric Metrics - Hausdorff

[Hausdorff 1962]

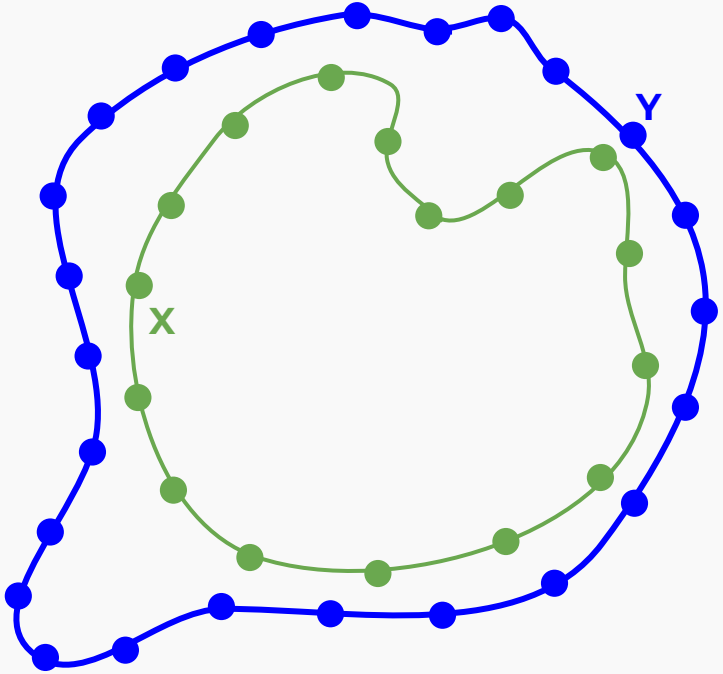


X - Reference 3D Model

Y - Reconstructed 3D Model

Existing Extrinsic Metrics

Geometric Metrics



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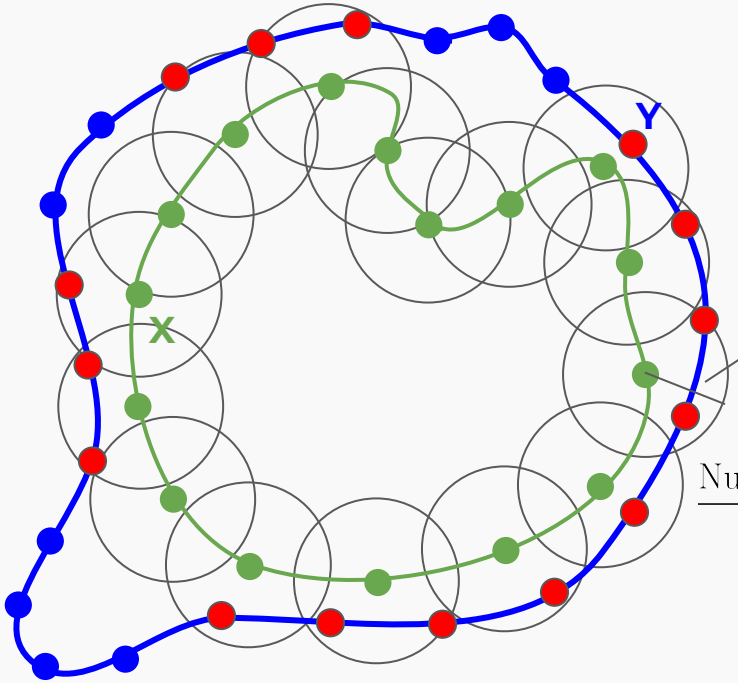
Existing Extrinsic Metrics

Geometric Metrics - Completeness

[Seitz 2006]



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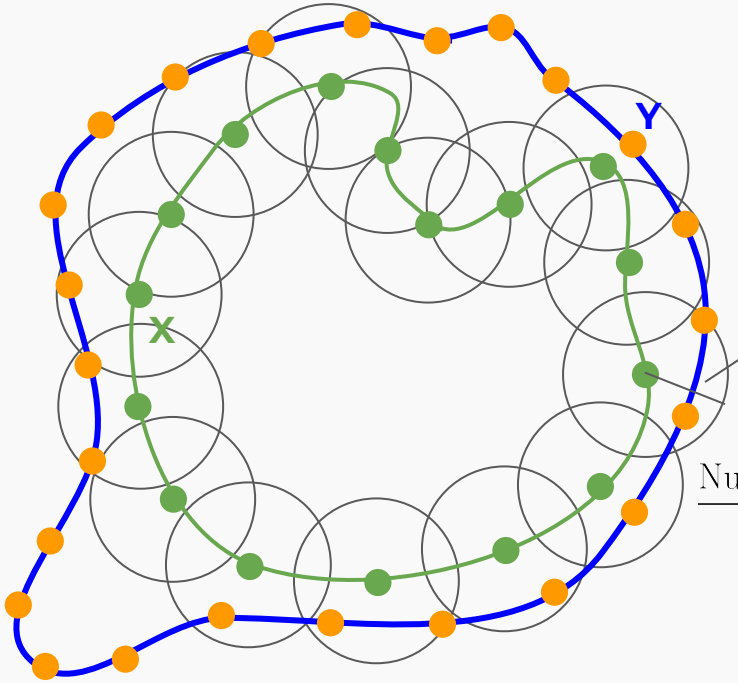
d_c

$$\frac{\text{Number of vertices at a distance} < d_c}{\text{Total number of vertices}}$$

Existing Extrinsic Metrics

Geometric Metrics - Completeness

[Seitz 2006]



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d_c

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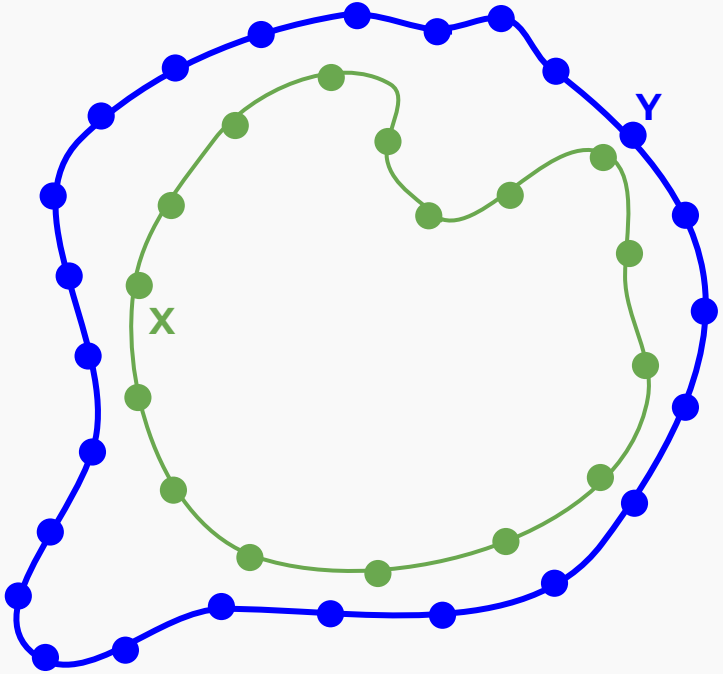
Existing Extrinsic Metrics

Geometric Metrics - Accuracy

[Seitz 2006]



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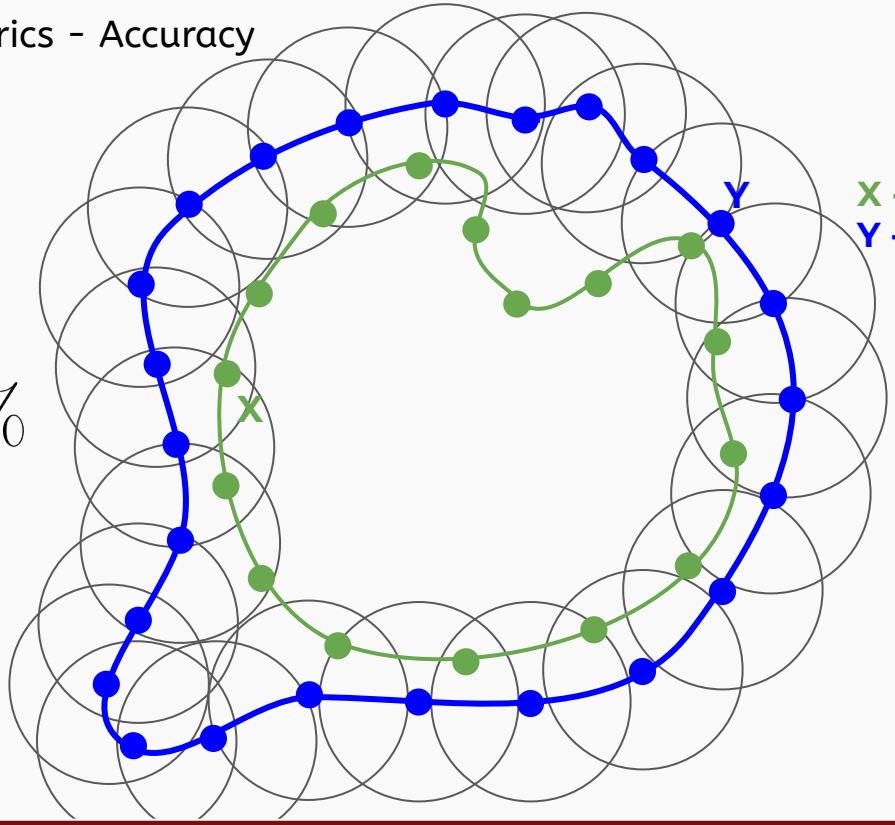
Existing Extrinsic Metrics

Geometric Metrics - Accuracy

[Seitz 2006]

$$T_a = 75\%$$



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Existing Extrinsic Metrics

Geometric Metrics - Accuracy

[Seitz 2006]

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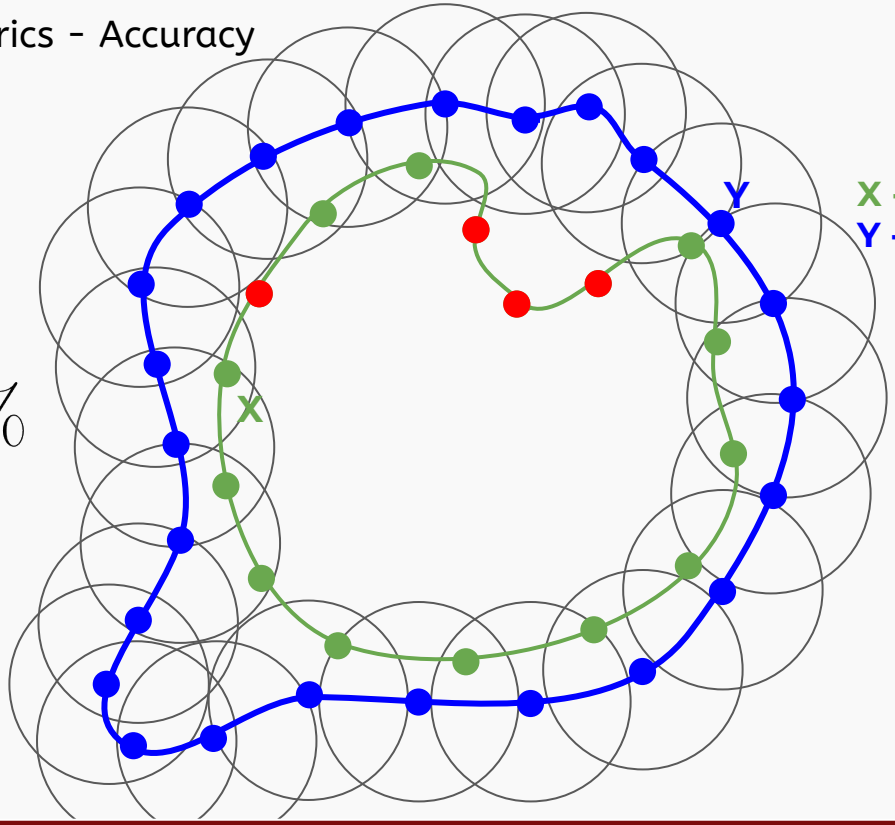

X - Reference 3D Model

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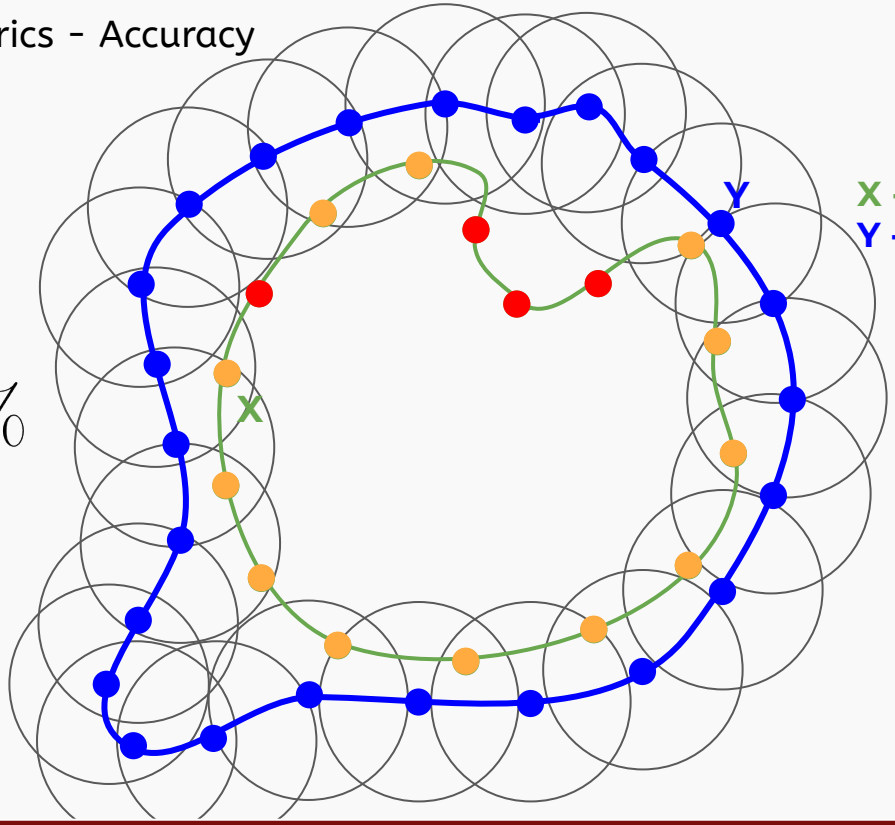
Existing Extrinsic Metrics

Geometric Metrics - Accuracy

[Seitz 2006]

$$T_a = 75\%$$



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Existing Extrinsic Metrics

Metrics	Hausdorff [Cignoni 1998]	Completeness [Seitz 2006]	Accuracy [Seitz 2006]	DAME[1] [Váša 2012]	MSDM[2] [Lavoué 2006]	MSDM2[2] [Lavoué 2011]
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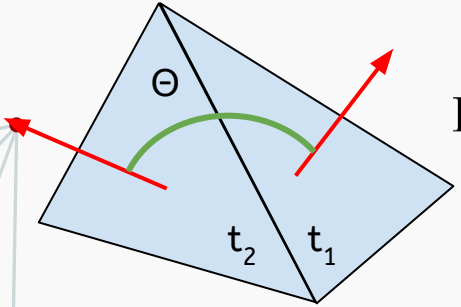
Existing Extrinsic Metrics

Perceptual Metrics - DAME

[Váša 2012]

Dihedral Angle Mesh Error



$$\mathrm{DAME} = \frac{1}{||\Omega||} \sum_{\{t_1,t_2\}\in\Omega} ||\theta_{t_1,t_2} - \overline{\theta_{t_1,t_2}}|| \cdot m_{t_1,t_2} \cdot (w_{t_1} + w_{t_2})$$

Set of Triangle Pairs

Dihedral angle difference between t_1 and t_2

Masking effect

Visibility

Existing Extrinsic Metrics

Perceptual Metrics - MSDM

[Lavoué 2006]

Mesh Structural Distortion Measure

$$C(\tilde{x}_{ref}, \tilde{x}_r) = \frac{||\sigma_{\tilde{x}_{ref}} - \sigma_{\tilde{x}_r}||}{\max(\sigma_{\tilde{x}_{ref}}, \sigma_{\tilde{x}_r})}$$

Contrast

$$L(\tilde{x}_{ref}, \tilde{x}_r) = \frac{||\mu_{\tilde{x}_{ref}} - \mu_{\tilde{x}_r}||}{\max(\mu_{\tilde{x}_{ref}}, \mu_{\tilde{x}_r})}$$

Curvature

$$S(\tilde{x}_{ref}, \tilde{x}_r) = \frac{||\sigma_{\tilde{x}_{ref}}\sigma_{\tilde{x}_r} - \sigma_{\tilde{x}_{ref}\tilde{x}_r}||}{\sigma_{\tilde{x}_{ref}}\sigma_{\tilde{x}_r}}$$

Structure

μ : mean of curvature on a given neighborhood
σ : standard deviation of curvature on a given neighborhood

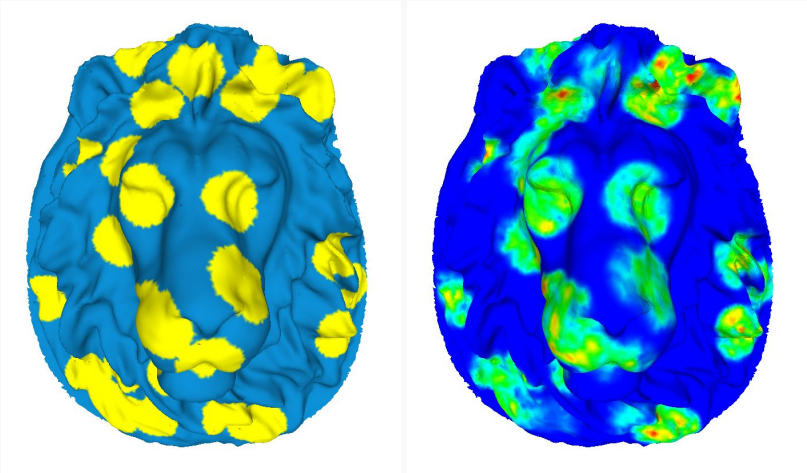
Existing Extrinsic Metrics

Perceptual Metrics - MSDM2

[Lavoué 2011]

Mesh Structural Distortion Measure 2

Perceptual Contrast, Structure, Curvature **Multiscale**



MSDM2 response on local noise