

Mesh Normalization & Quantization Report

Generated: 20251108_173405

Mesh: branch

Input file: outputs\8samples\branch.obj

Vertices: 977

Min: [-0.851562, 0.0, -0.464844]

Max: [0.849609, 1.900391, 0.462891]

Mean: [0.06502485568065508, 1.0912832323439123, 0.11570215148413523]

Std: [0.3474391293373574, 0.46715492836599865, 0.20309079782449607]

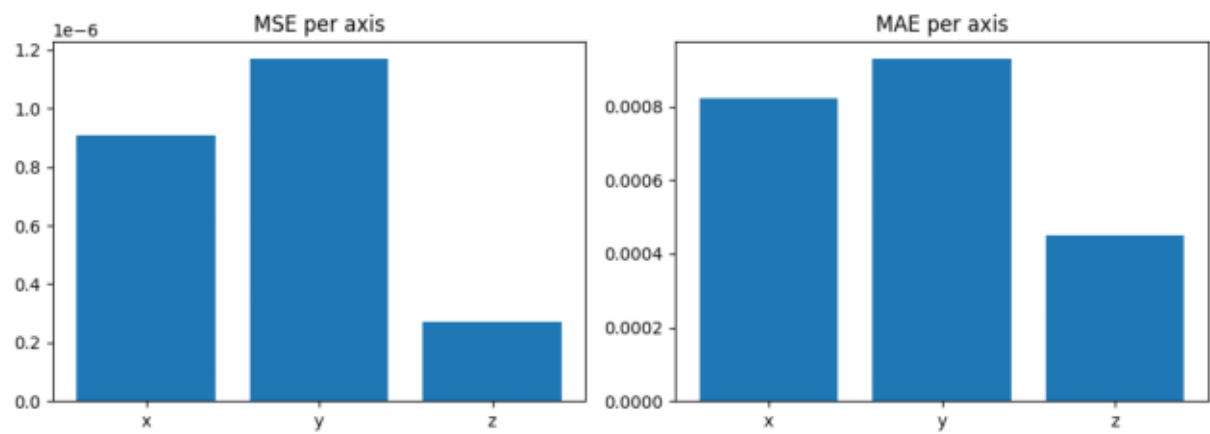
Min-Max MSE: 7.82560710e-07 MAE: 7.34188657e-04

Unit-Sphere MSE: 2.18500173e-06 MAE: 1.27254200e-03

Recommendation: Min-Max

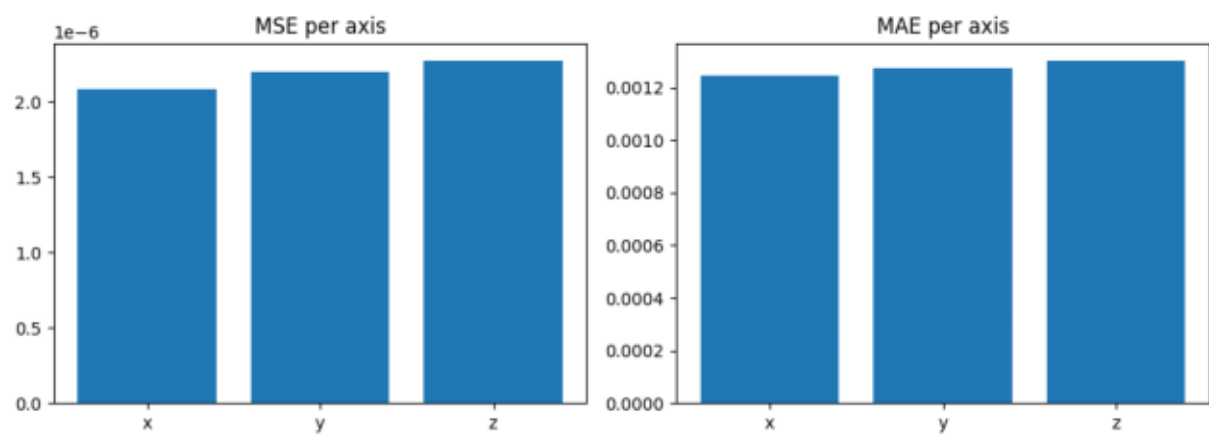
branch - MinMax Error Plot

branch - MinMax Errors



branch - UnitSphere Error Plot

branch - UnitSphere Errors



Mesh: cylinder

Input file: outputs\8samples\cylinder.obj

Vertices: 64

Min: [-1.0, -1.0, -1.0]

Max: [1.0, 1.0, 1.0]

Mean: [2.3418766925686896e-17, 0.0, -3.469446951953614e-17]

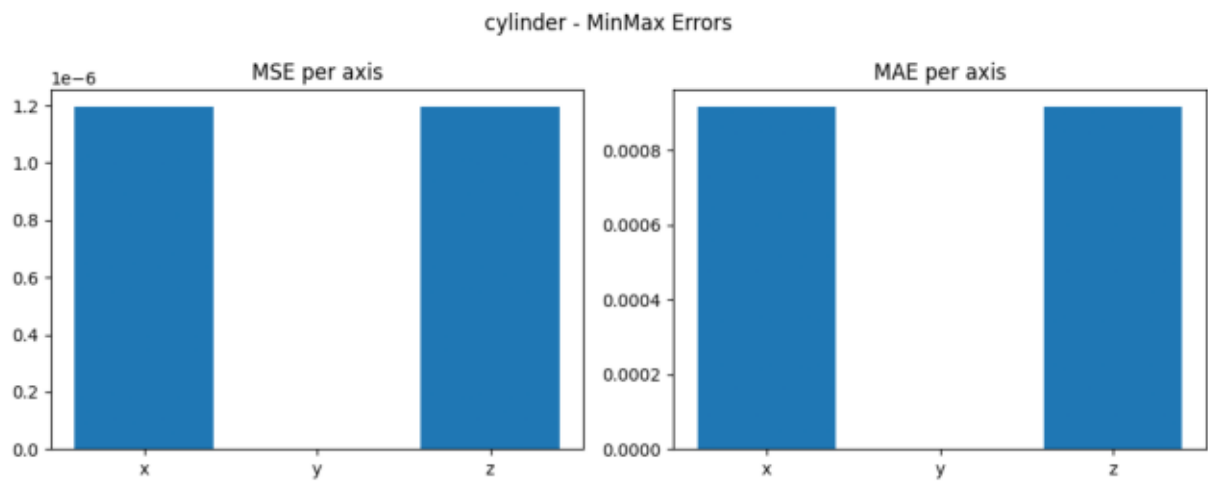
Std: [0.7071068300178377, 1.0, 0.7071068300178377]

Min-Max MSE: 7.96625842e-07 MAE: 6.10948192e-04

Unit-Sphere MSE: 2.57356360e-06 MAE: 1.38241816e-03

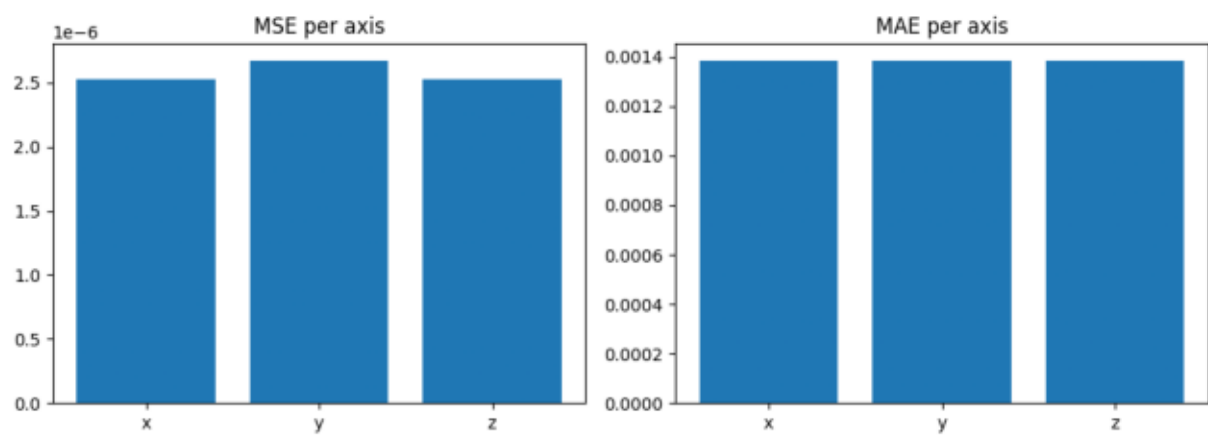
Recommendation: Min-Max

cylinder - MinMax Error Plot



cylinder - UnitSphere Error Plot

cylinder - UnitSphere Errors



Mesh: explosive

Input file: outputs\8samples\explosive.obj

Vertices: 1293

Min: [-0.199625, -0.0, -0.197126]

Max: [0.199625, 1.0, 0.197126]

Mean: [0.04264822273781913, 0.5208888917246713, -9.094354215003811e-06]

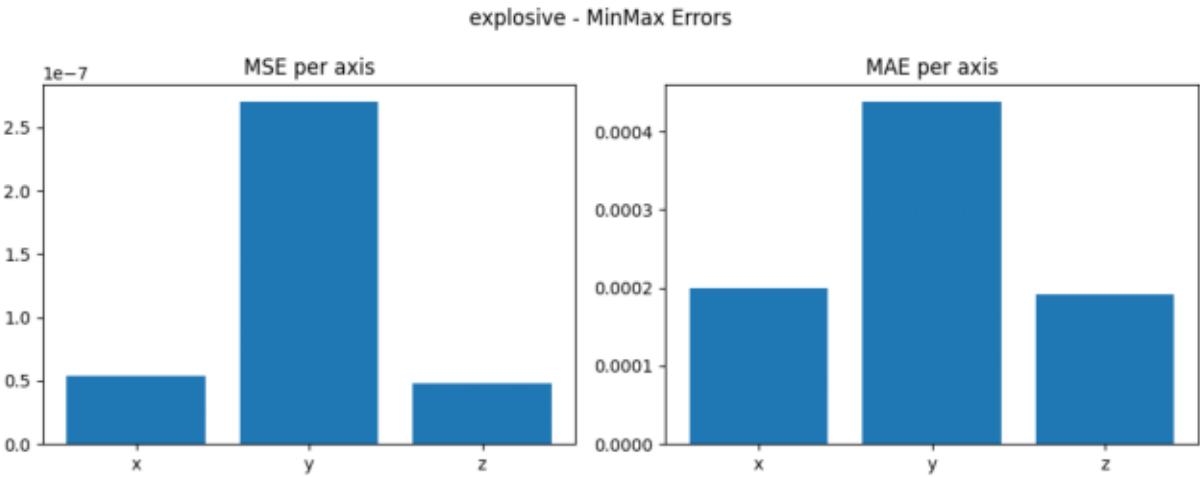
Std: [0.11742442416544392, 0.387970144780312, 0.0926960832965787]

Min-Max MSE: 1.23866910e-07 MAE: 2.76167077e-04

Unit-Sphere MSE: 3.68262143e-07 MAE: 5.23652774e-04

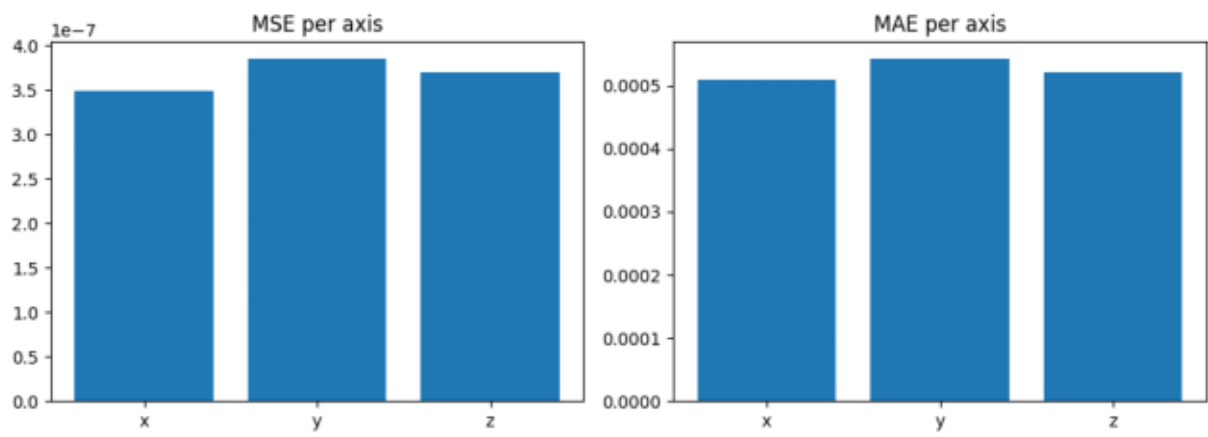
Recommendation: Min-Max

explosive - MinMax Error Plot



explosive - UnitSphere Error Plot

explosive - UnitSphere Errors



Mesh: fence

Input file: outputs\8samples\fence.obj

Vertices: 318

Min: [-0.5, 0.0, -0.0225]

Max: [0.5, 0.84317, 0.0225]

Mean: [-0.005803716981131987, 0.39659240880503194, 0.0]

Std: [0.3500769416289038, 0.2515873273125019, 0.010706196407194965]

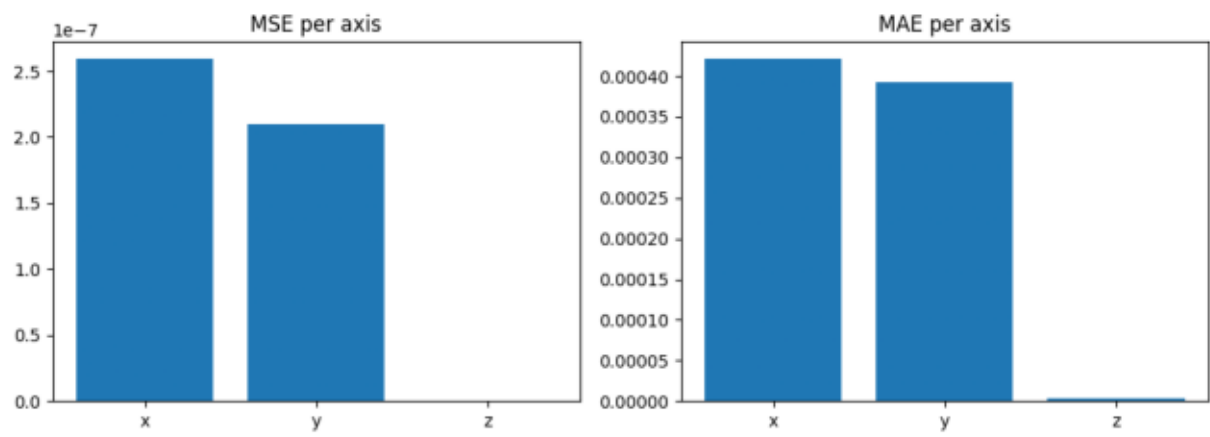
Min-Max MSE: 1.56312667e-07 MAE: 2.72302844e-04

Unit-Sphere MSE: 4.80320018e-07 MAE: 6.08273325e-04

Recommendation: Min-Max

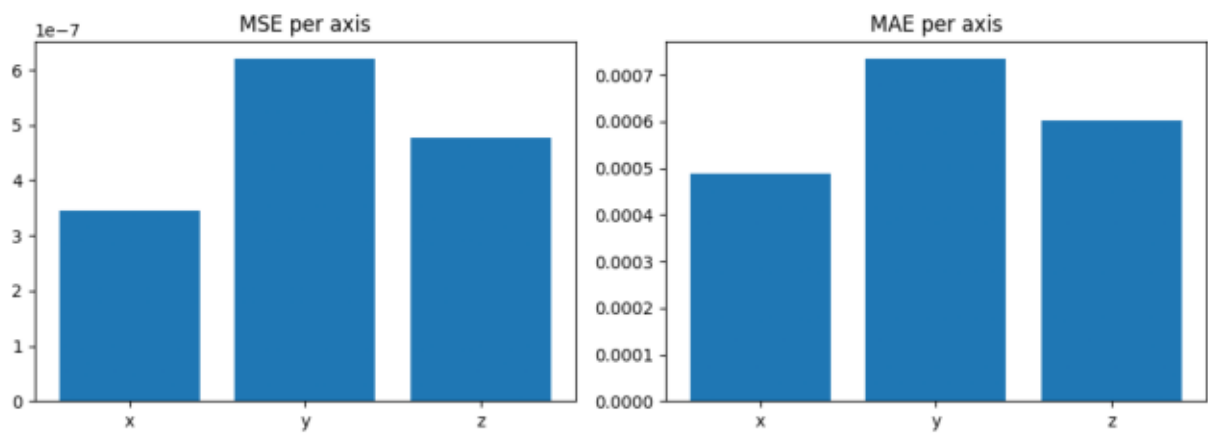
fence - MinMax Error Plot

fence - MinMax Errors



fence - UnitSphere Error Plot

fence - UnitSphere Errors



Mesh: girl

Input file: outputs\8samples\girl.obj

Vertices: 4488

Min: [-0.5, 0.0, -0.181411]

Max: [0.5, 0.904419, 0.181411]

Mean: [0.002644200311942898, 0.4294982283868098, 0.01746761029411767]

Std: [0.1671270845056467, 0.22321575530216234, 0.06566085646338478]

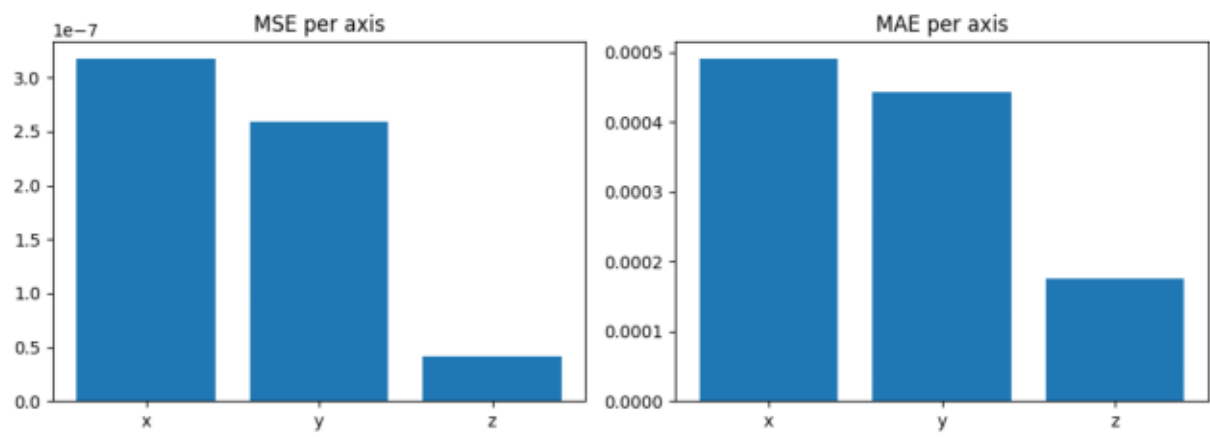
Min-Max MSE: 2.06130488e-07 MAE: 3.69743125e-04

Unit-Sphere MSE: 3.78331894e-07 MAE: 5.34058922e-04

Recommendation: Min-Max

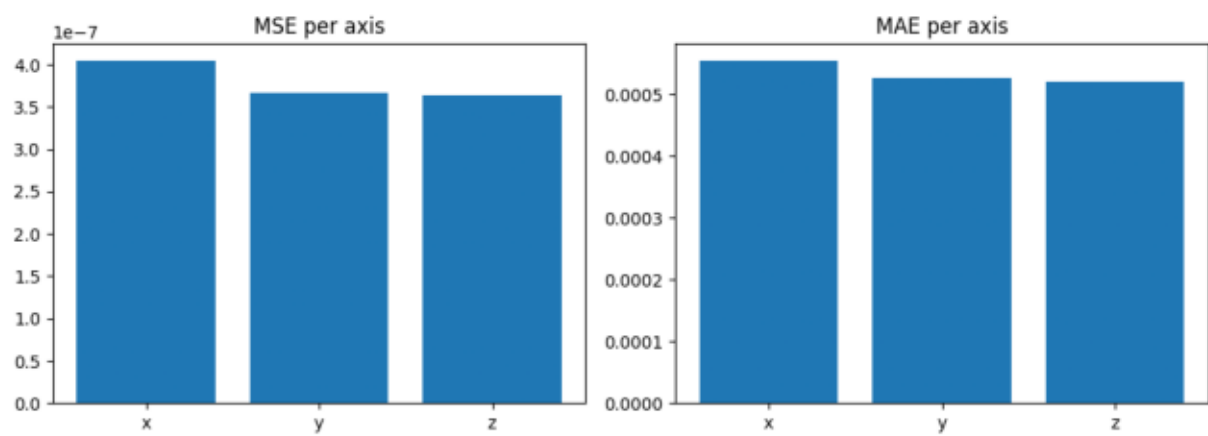
girl - MinMax Error Plot

girl - MinMax Errors



girl - UnitSphere Error Plot

girl - UnitSphere Errors



Mesh: person

Input file: outputs\8samples\person.obj

Vertices: 1142

Min: [-0.84375, -0.0, -0.212891]

Max: [0.841797, 1.900391, 0.210938]

Mean: [-0.0019838887915936917, 1.1684853887915918, -0.009341486865148869]

Std: [0.3809627517728304, 0.5266655782105262, 0.10060075514432687]

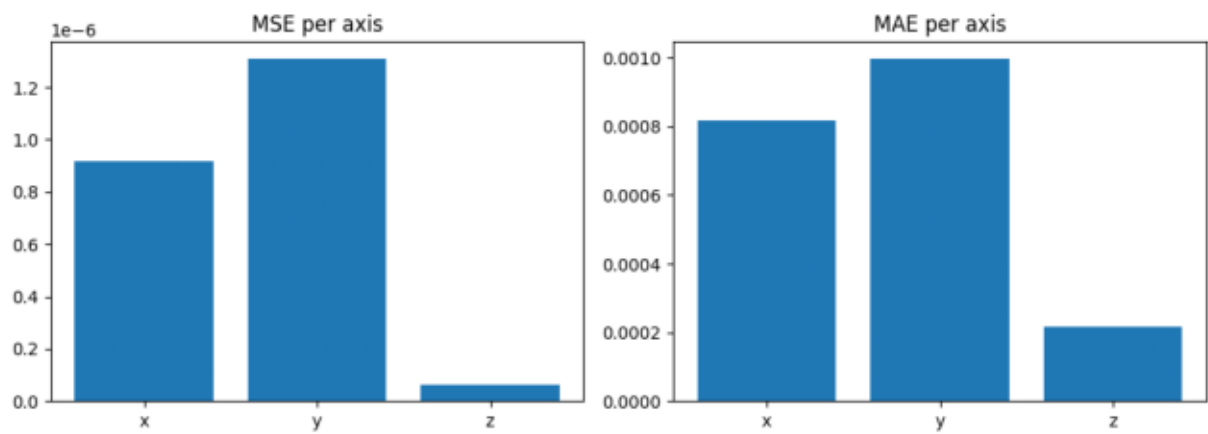
Min-Max MSE: 7.62764704e-07 MAE: 6.77791526e-04

Unit-Sphere MSE: 1.69367325e-06 MAE: 1.11785338e-03

Recommendation: Min-Max

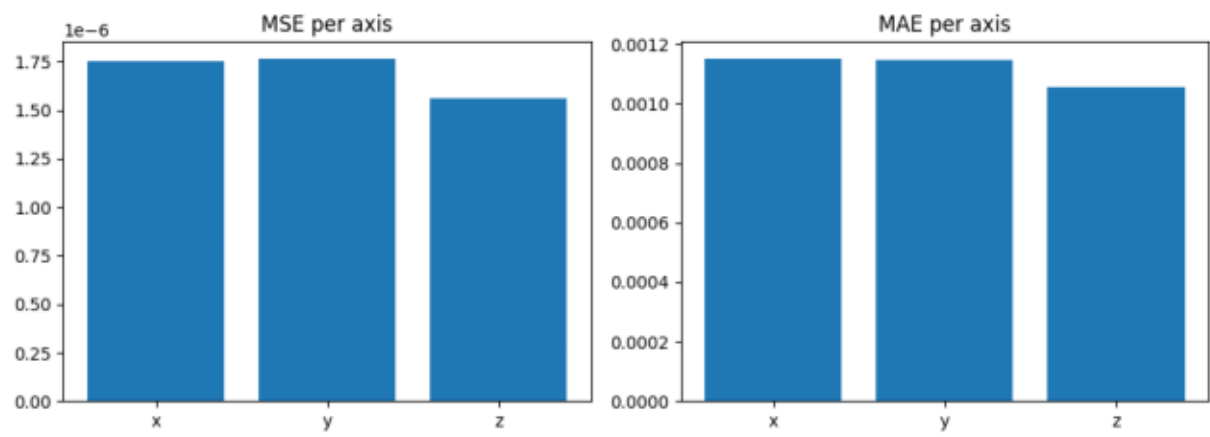
person - MinMax Error Plot

person - MinMax Errors



person - UnitSphere Error Plot

person - UnitSphere Errors



Mesh: table

Input file: outputs\8samples\table.obj

Vertices: 2341

Min: [-0.208906, 0.0, -0.5]

Max: [0.208906, 0.611761, 0.5]

Mean: [-0.0048377855617261455, 0.38833545664246283, -0.003936188381033726]

Std: [0.1479504357600781, 0.18426468792493758, 0.3313235700163484]

Min-Max MSE: 1.49989570e-07 MAE: 3.10445559e-04

Unit-Sphere MSE: 4.95644800e-07 MAE: 6.09635537e-04

Recommendation: Min-Max

table - MinMax Error Plot

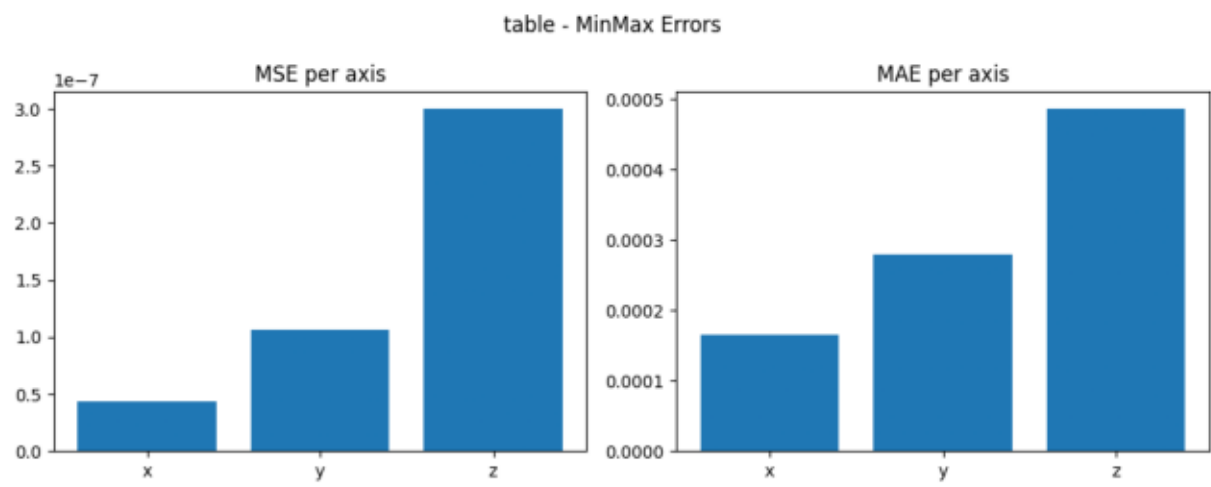
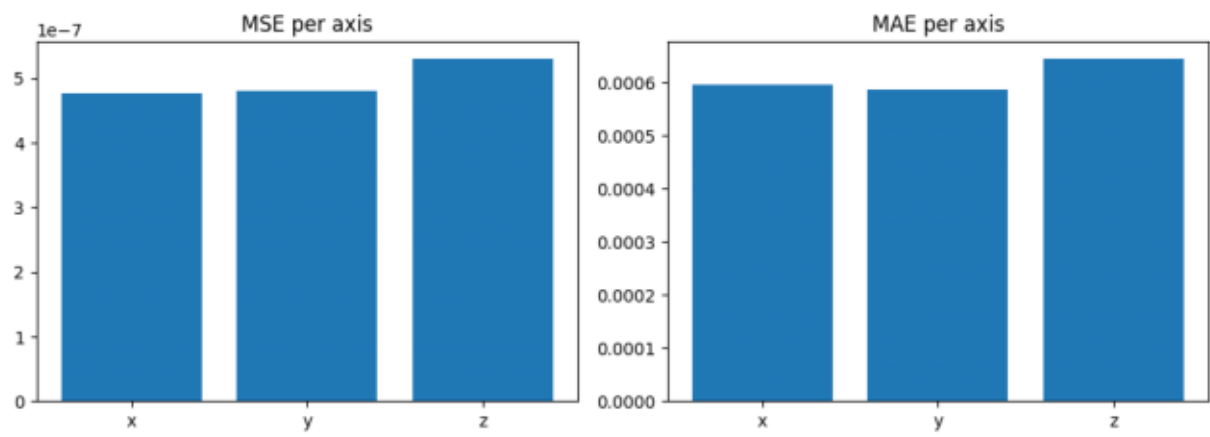


table - UnitSphere Error Plot

table - UnitSphere Errors



Mesh: talwar

Input file: outputs\8samples\talwar.obj

Vertices: 984

Min: [-0.031922, 0.0, -0.117146]

Max: [0.031922, 1.0, 0.117146]

Mean: [0.021873203252032486, 0.32418794918699106, -0.004872883130081303]

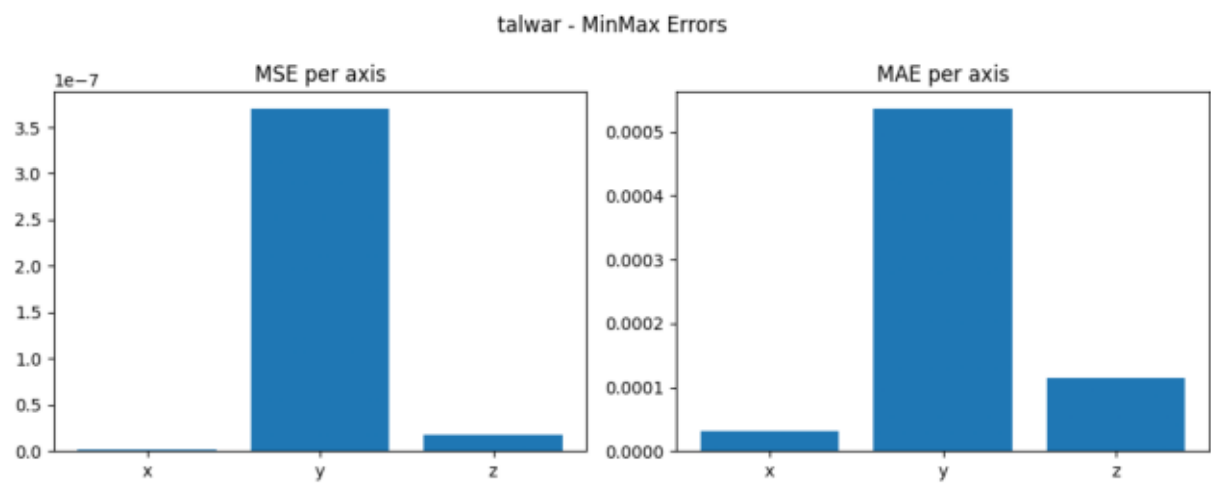
Std: [0.010548393747186339, 0.24173539940108701, 0.04776824955771874]

Min-Max MSE: 1.29474449e-07 MAE: 2.26889287e-04

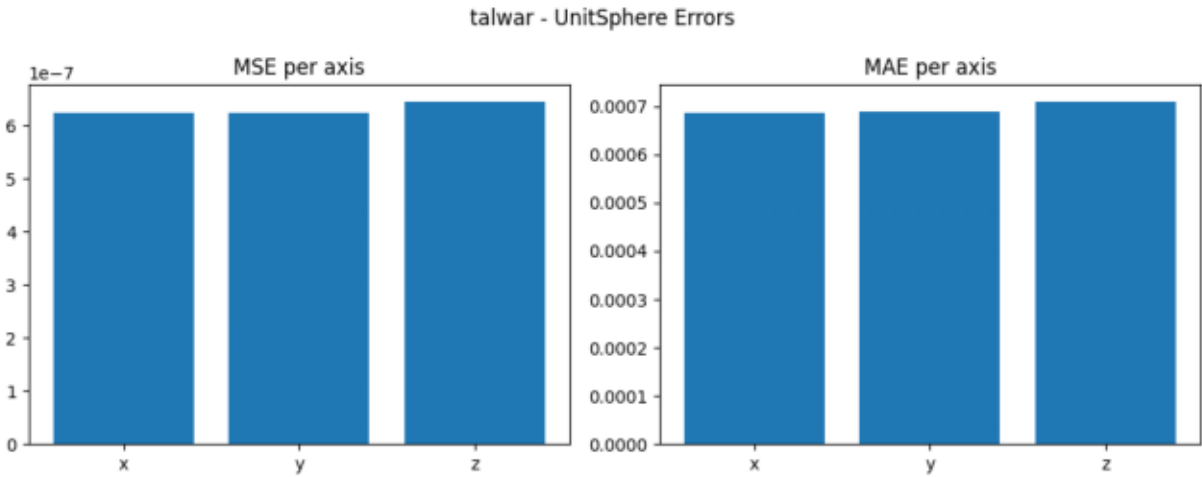
Unit-Sphere MSE: 6.30961439e-07 MAE: 6.95715421e-04

Recommendation: Min-Max

talwar - MinMax Error Plot



talwar - UnitSphere Error Plot



Mesh: ._branch

Input file: outputs__MACOSX\8samples_branch.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._cylinder

Input file: outputs__MACOSX\8samples_cylinder.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._explosive

Input file: outputs__MACOSX\8samples_explosive.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._fence

Input file: outputs__MACOSX\8samples_fence.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._girl

Input file: outputs__MACOSX\8samples_._girl.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._person

Input file: outputs__MACOSX\8samples\._person.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._table

Input file: outputs__MACOSX\8samples_table.obj

Vertices: N/A

No vertices found; file skipped

Mesh: ._talwar

Input file: outputs__MACOSX\8samples_._talwar.obj

Vertices: N/A

No vertices found; file skipped

Across 8 meshes processed: Min-Max better for 0 meshes; Unit-Sphere better for 0 meshes.

Observations:

- Quantization to 1024 bins introduced small reconstruction errors (often MSE $\sim 1e-6$ to $1e-4$).
- Min-Max tends to be slightly better when meshes are axis-aligned.
- Unit-Sphere helps for scale and rotation invariance.

Recommendation:

Use Min-Max for preserving original axis-aligned structures; use Unit-Sphere for rotation-invariant preprocessing.