

Dular Mestes

Feb 25

Nomes:

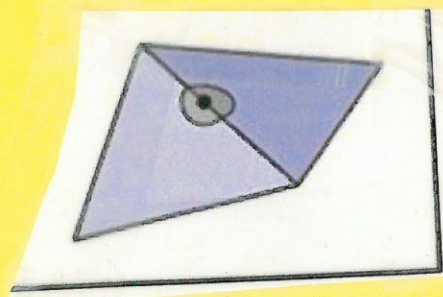
- triangular meshes
- triangle meshes
- triangulated irregular networks (TINs)

meshes are (discrete reps) of continuous surfaces

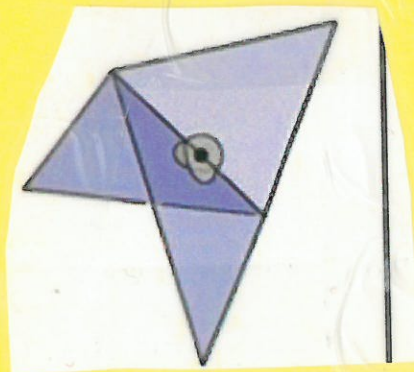
\Rightarrow make more efficient algs and Data structures

mesh topology: how Δ s are connected together
w/o vertex positions

manifold! the neighborhood around any point
(2-manifold) can be "smoothed out" to a flat surface



manifold



non-manifold

Water Molecules

Feb 22

- Triangular meshes
- Hexagonal meshes

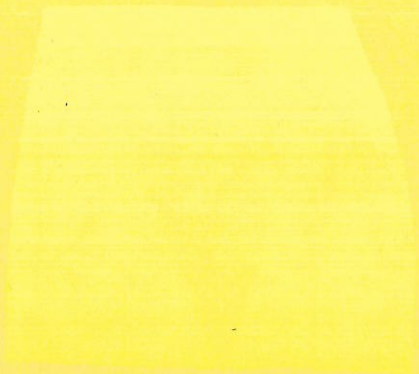
- Triangulated irregular networks (TINs)

meshes are (discrete sets) of continuous surfaces

\Rightarrow mesh is not a point and only the vertices

mesh together: how are they connected together
into vertex positions

can fold the neighborhood around any point
(2-manifold) can be flattened out to a flat surface



non-manifold

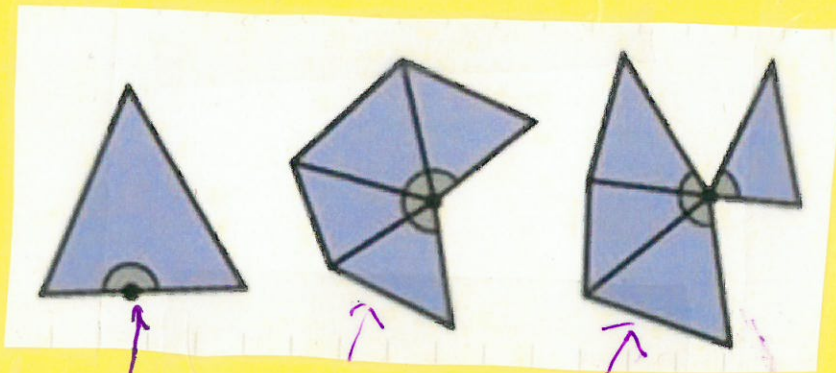


manifold

manifold w/ boundary

1) every edge used by 1 or 2 Δ_s

2) every vert connects to single edge connect set of Δ_s

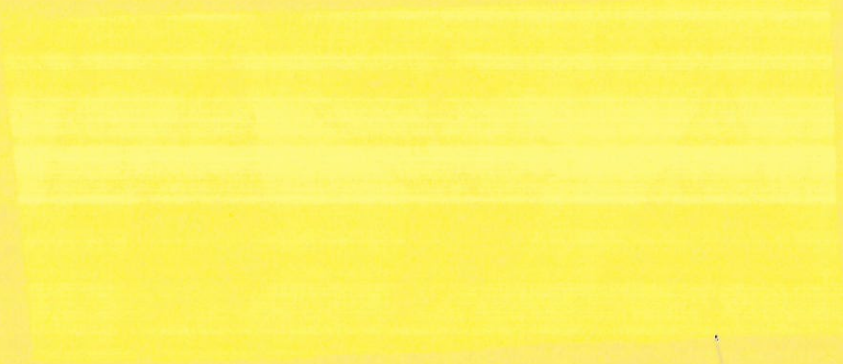


manifold
w/
bnd

non-manifold
w/o bnd

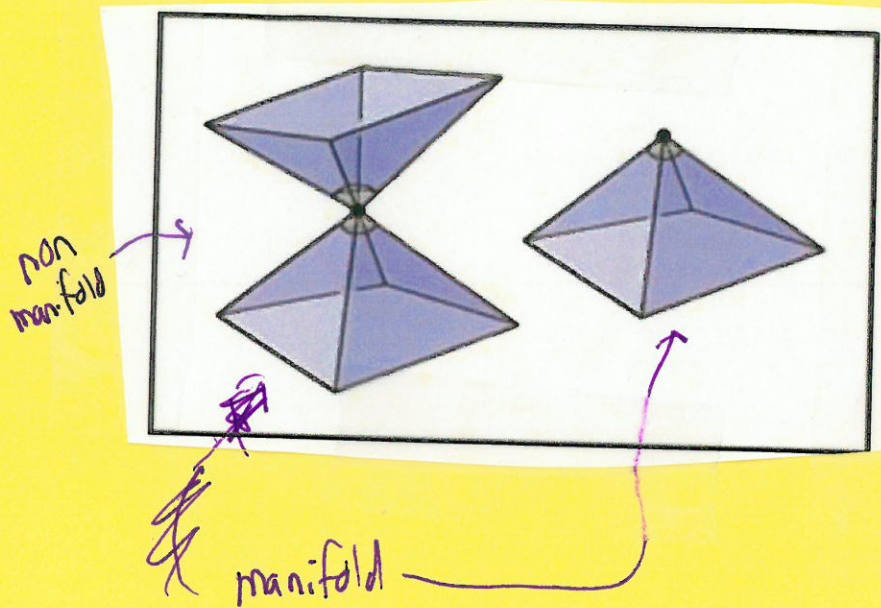
produced by bl/son
24 2 -ol po low right page (1)

2) cut out contents to single of - connect
24 9c toe



Wetman - non
66d w

Wetman
w
66d



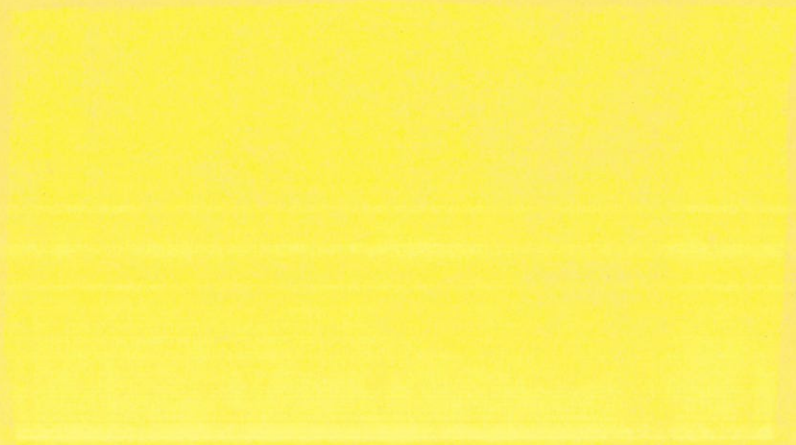
Check if object is a manifold!

1) check if every edge is shared by 2 Δ s

2) check if every vertex

1 loop of Δ s around it





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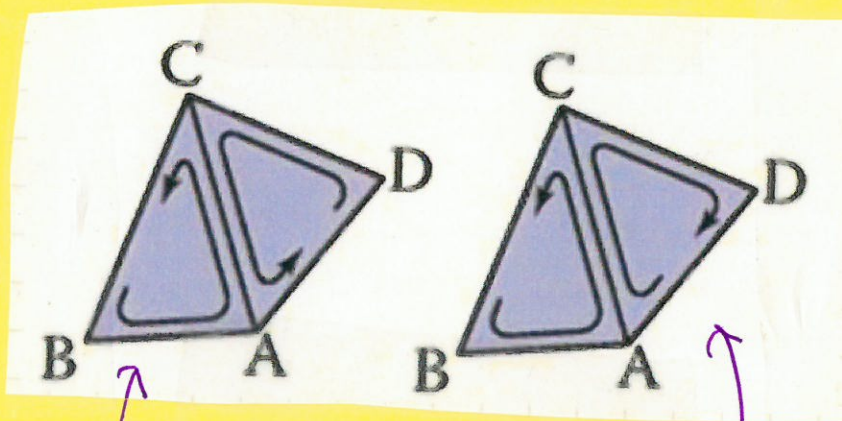
Orientation: distinguish between
inside/outside or front/back

- defined by order of verts
- front side is Δ w/ verts ordered CCW



$$t = \{a < b\}$$

$$t' = \{a < b < c\}$$



consistently
oriented!

inconsistent

all Δ s agree on the side that is front
e.g. every adj Δ ~~is~~ has some orientation

Orientation: distinguish between
inside/outside or front/back

Given to subject by hand -
front side is up with subject could

$\{d \rightarrow a\} \rightarrow b$

$\{c \rightarrow b\} \rightarrow a$



interior

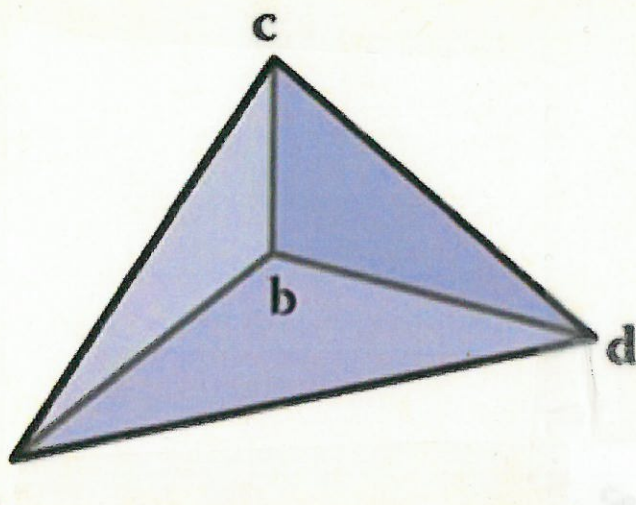
consistently
behaved

It is argued on the side that is front
e.g. front and it is the same orientation

Triangle {

vector3 vertexPositions[3];

}



a: 2x

b: 3x

c: 2x

d: 2x

Separate triangles:

#	Vertex 0	Vertex 1	Vertex 2
0	(a _x , a _y , a _z)	(b _x , b _y , b _z)	(c _x , c _y , c _z)
1	(b _x , b _y , b _z)	(d _x , d _y , d _z)	(c _x , c _y , c _z)
2	(a _x , a _y , a _z)	(d _x , d _y , d _z)	(b _x , b _y , b _z)

Alt:

Triangle {
Vertex v[3]

}

Vertex {
vector3 pos.tions

}

Indexed Mesh {
int tInd[nt][3]
vector3 verts[nv]

}

Shared vertices:

Triangles		Vertices	
#	Vertices	#	Position
0	(0, 1, 2)	0	(a _x , a _y , a _z)
1	(1, 3, 2)	1	(b _x , b _y , b _z)
2	(0, 3, 1)	2	(c _x , c _y , c _z)
		3	(d _x , d _y , d _z)

Which rep uses less spaces

n_t # of triangles

n_v # of verts

Δ list: 3 verts per Δ
3 floats per vert

$9n_t$: total space

Indexed mesh:

1 vec3 per vertex

3 floats per vec3

3 ints per Δ

total space:

$3n_v$

+

$3n_t$

each Δ has 3 verts

each vertex is connected to ~ 6 Δ s (on average)

$$\Rightarrow n_t \approx 2n_v$$

to compare

• Δ struct: $18n_v$

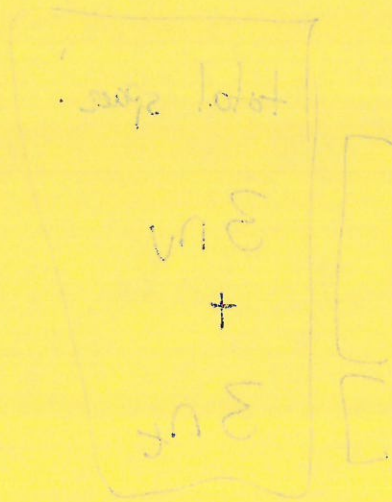
• indexed mesh: $9n_v$

which ref uses less space

of triangles
of vertices

Δ list: 3 out for Δ
3 traps for out

Δ ref: total space



Indexed mesh:
3 v for Δ
3 traps for vcc
1 vcc for index

each Δ has 3 vcc
each vertex is connected to 3 Δs (on average)
⇒ $3v$

to compare
- Indexed mesh
- Δ ref