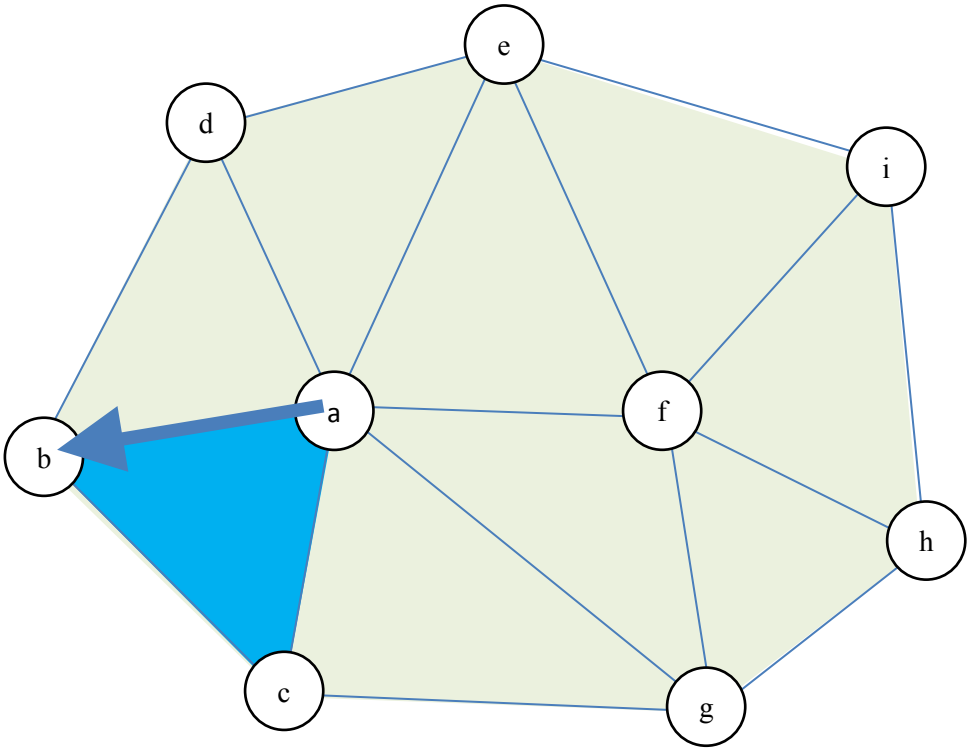
CS3242 Modelling Tutorial 1: The Trist Structure

Question 1



We start with triangle `abc`. We represent it with an arrow pointing from the starting vertex, namely the "`org`", to the second vertex, namely the "`dest`". Evaluate the terms below. The bolded part is the answer for some previous evaluations.

`enext(abc)`	bca
`fnext(abc)`	abd
`enext(enext(abc)`	cab
`fnext(`**`enext(enext(abc))`**`)`	cag
`fnext(enext(`**`fnext(enext(enext(abc)))`**`))`	agf
`org(`**`fnext(enext(fnext(enext(enext(abc)))))`**`)` origin	a
`dest(`**`fnext(enext(fnext(enext(enext(abc)))))`**`)` destination	g

From `abc`, how do we traverse to the triangle `fhi`?

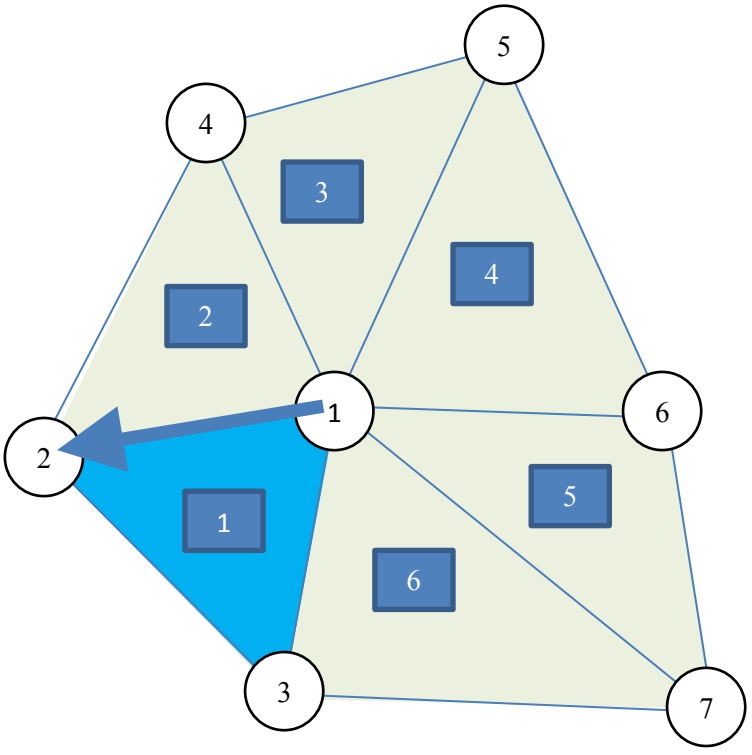
fnext(enext(fnext(enext(agf))))

If we want to “fan” around the vertex `a`, how should we do it? Namely, produce a sequence of triangles with `a` as the `org` vertex. For example, the sequence, `abc`, `adb`, `aed`, `afe`, `agf` and `acg`. Write some C++ or pseudo code for this.

fan(T) = enext(sym(fnext(T)))

fan(T) = enext(fnext(sym(T)))

Question 2



In this question, we assume we are still using the “book page” complete data structure for Trist. Namely, each triangle has six versions and we need all **six** entries for the `fnext` of each version of the triangle.

version 0

Let’s have a simpler triangulation and the circles and rectangles record the vertex and face indices respectively. Assuming the triangle “123” is the version 0 of triangle with index 1. For triangle with index 1, what is the `OrTri` representation for “231”?

version 1 1 x 8 + 0 = OrTri 8

1 x 8 + 1 = OrTri 9

version 3,

What are the OrTri (integer) representations for triangles 312, 213, 132 and 321?

132 = 8 + 5 = 13

What is the OrTri (the vertex sequence) for the OrTri with the integer representation as 44?

vertex sequence 5 44 % 8 = 4

Assuming 124 and 317 are the version 0 for triangles with indices 2 and 6. For the flist entry of triangle 123, what will be the following six entries for fnext? They should be all in OrTri representations

213

Idx	vi1	vi2	vi3	fn0	fn1	fn2	fn3	fn4	fn5
1	1	2	3		0	6 x 8 = 48			

213
2 x 8 + 3 = 19

Repeat and finish the above entries for triangle 124

Idx	vi1	vi2	vi3	fn0	fn1	fn2	fn3	fn4	fn5
2	1	2	4	2 x 8 + 0					

hgs

Finish the whole table. We assume the arrangement in the vertex indices is the arrangement for version 0 for each triangle.

Idx	vi1	vi2	vi3	fn0	fn1	fn2	fn3	fn4	fn5
1	1	2	3						
2	1	2	4						
3	1	4	5						
4	1	6	5						
5	1	7	6						
6	3	1	6 7						

For all the version 0 triangles, which are the ones with normal vectors facing you (out of the paper) and which are the ones facing “into” the paper? Assuming the right-hand rule is used as the lecture.