Traverse a Mesh with the half-edge structure

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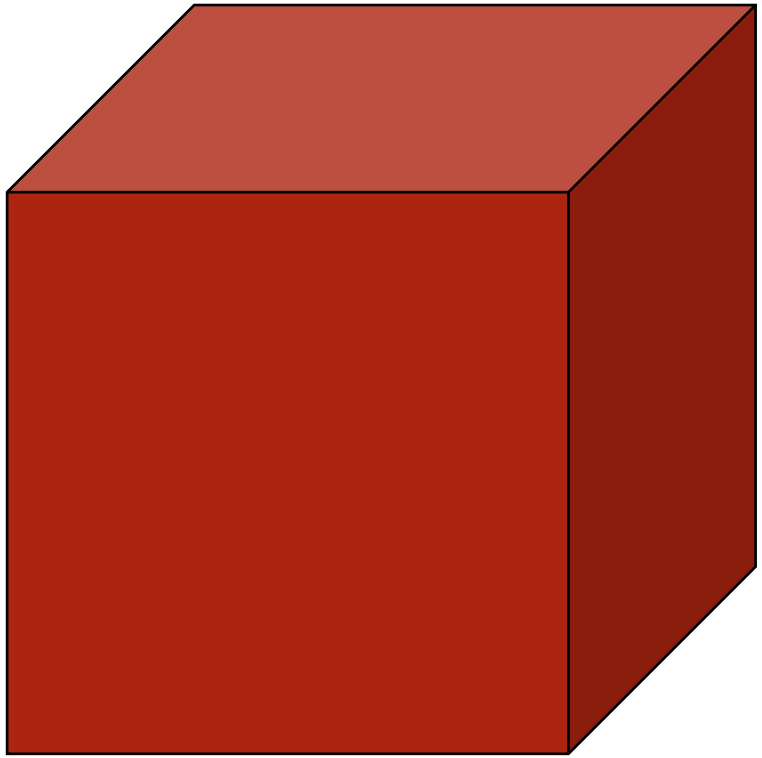
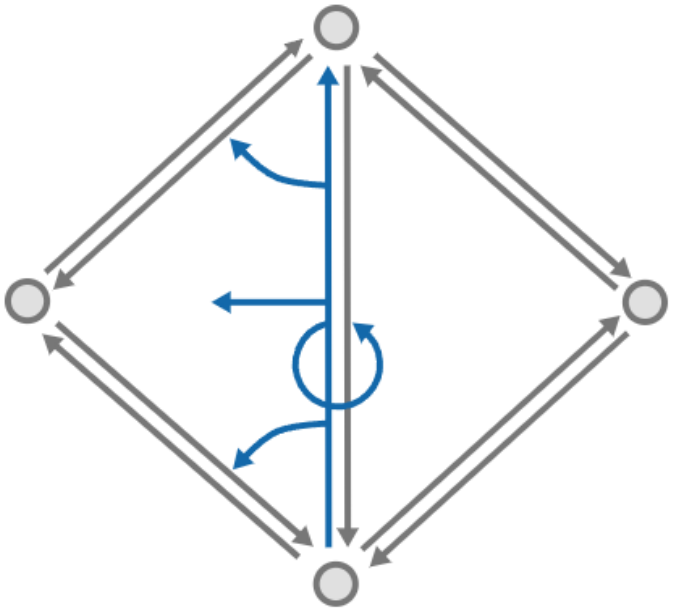
박영진

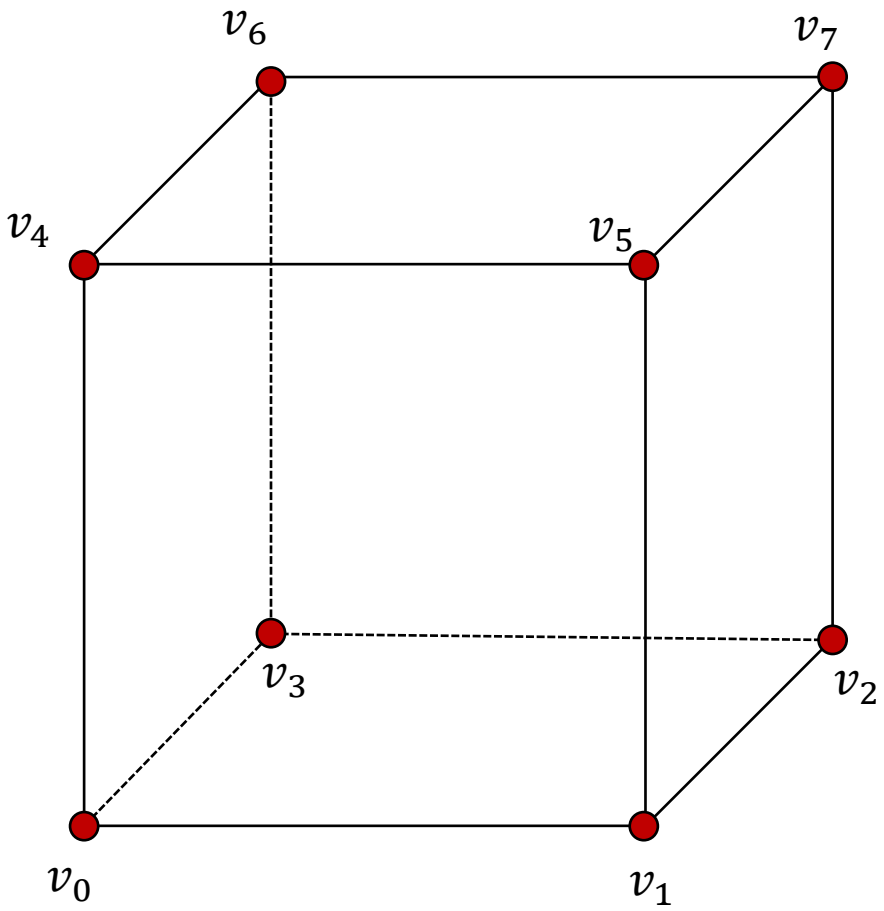
Add Face under the half-edge structure





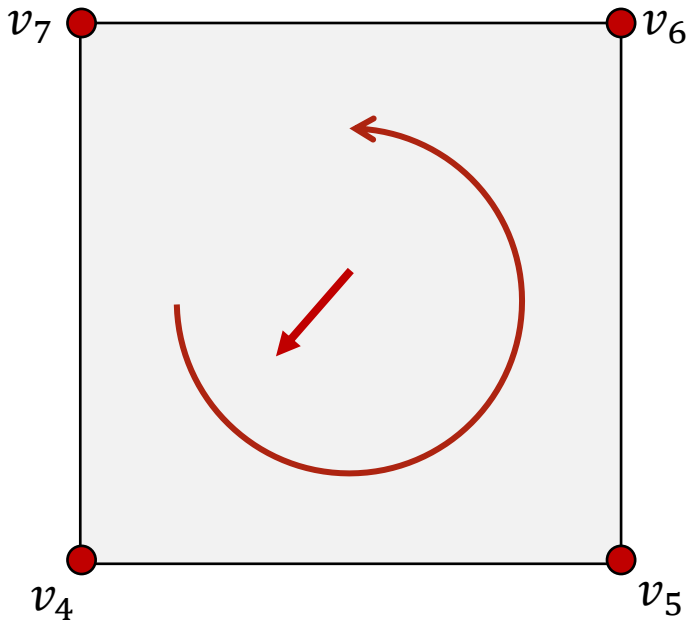
Halfedge connectivity.

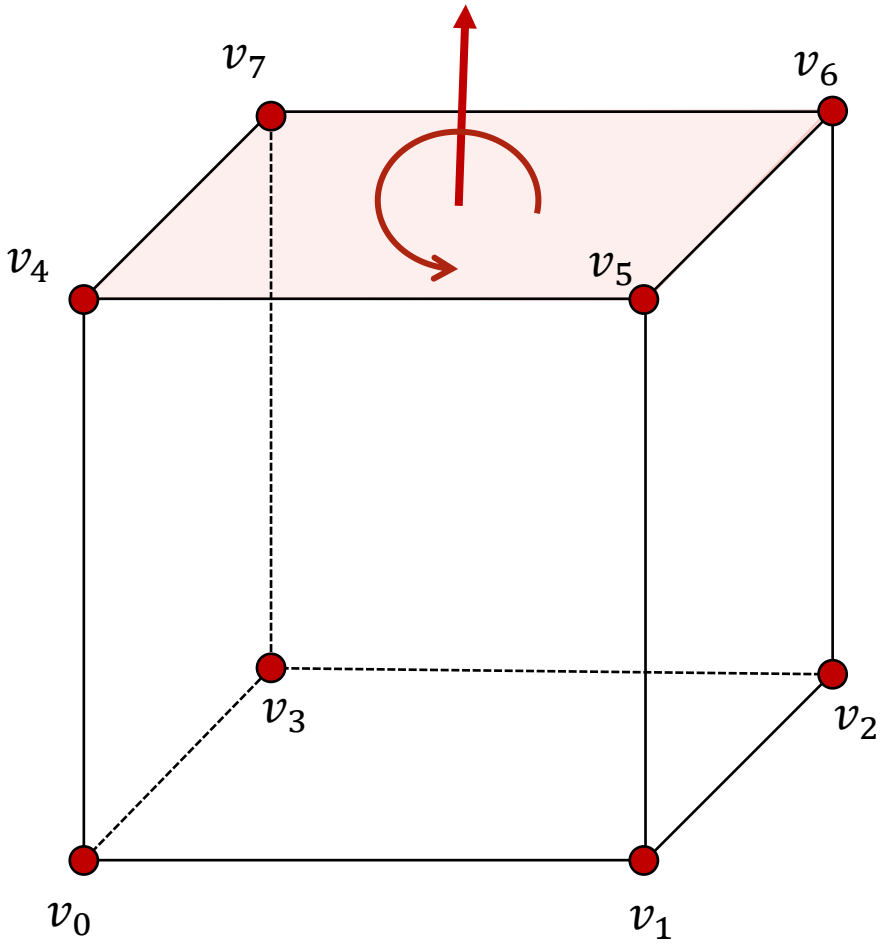
Add Face under the half-edge structure



Add Face under the half-edge structure

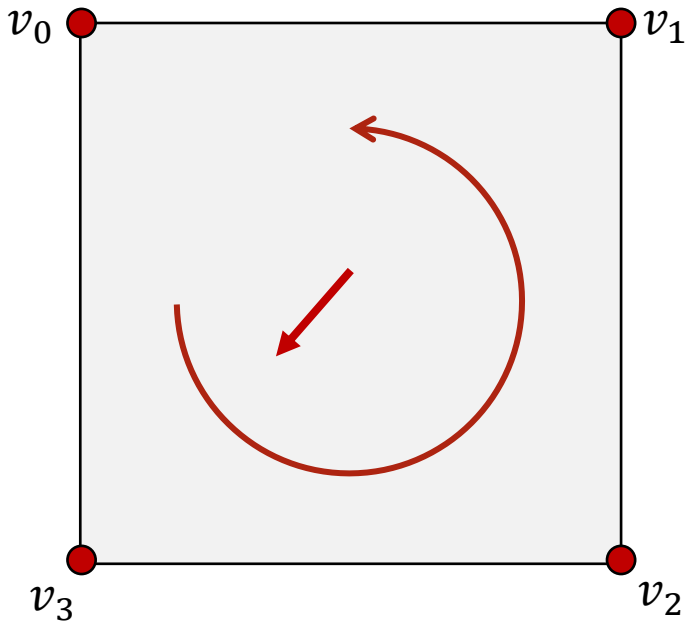
- $v_4 \rightarrow v_5 \rightarrow v_6 \rightarrow v_7$

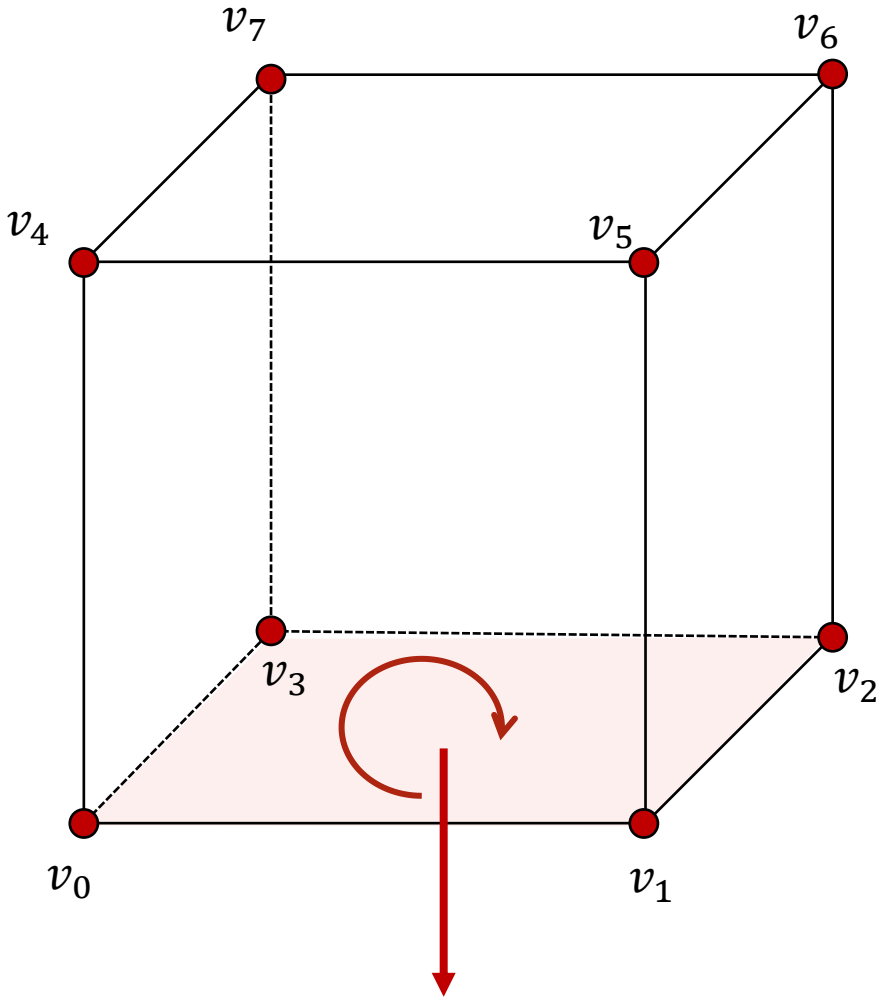




Add Face under the half-edge structure

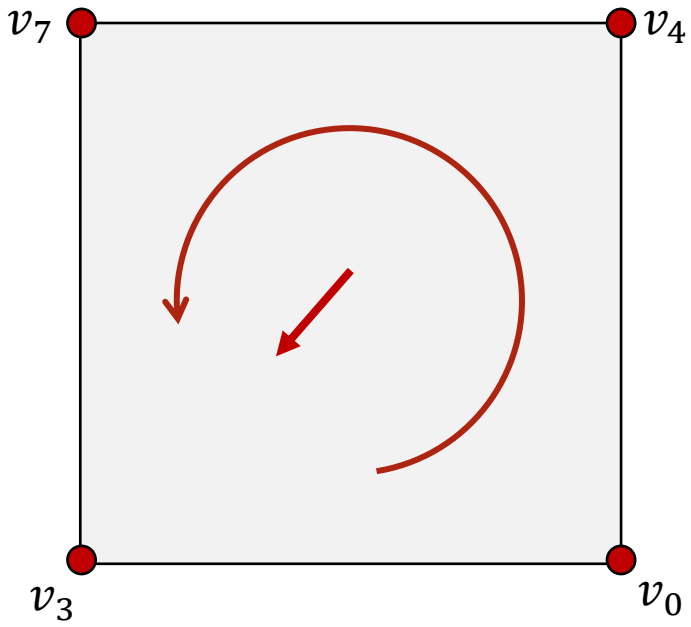
- $v_0 \rightarrow v_3 \rightarrow v_2 \rightarrow v_1$

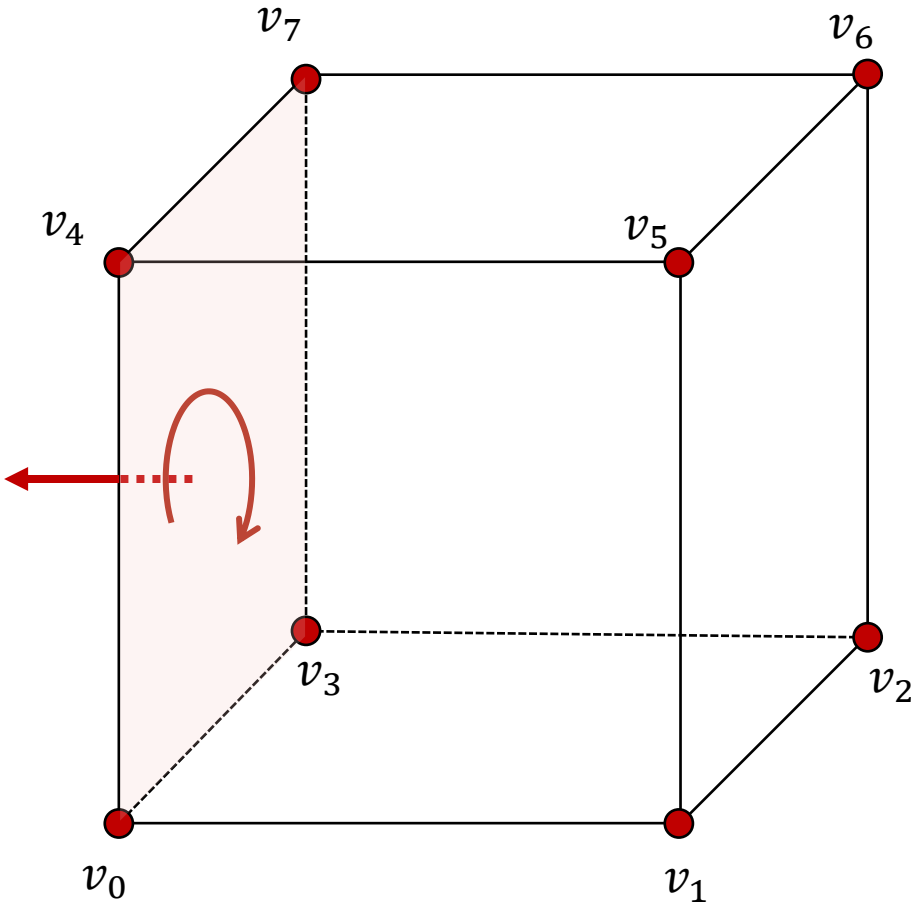




Add Face under the half-edge structure

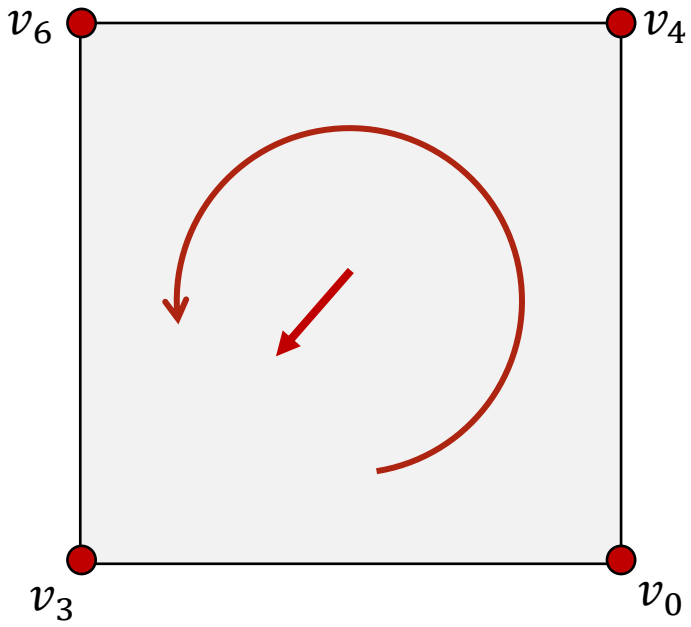
- $v_0 \rightarrow v_4 \rightarrow v_7 \rightarrow v_3$

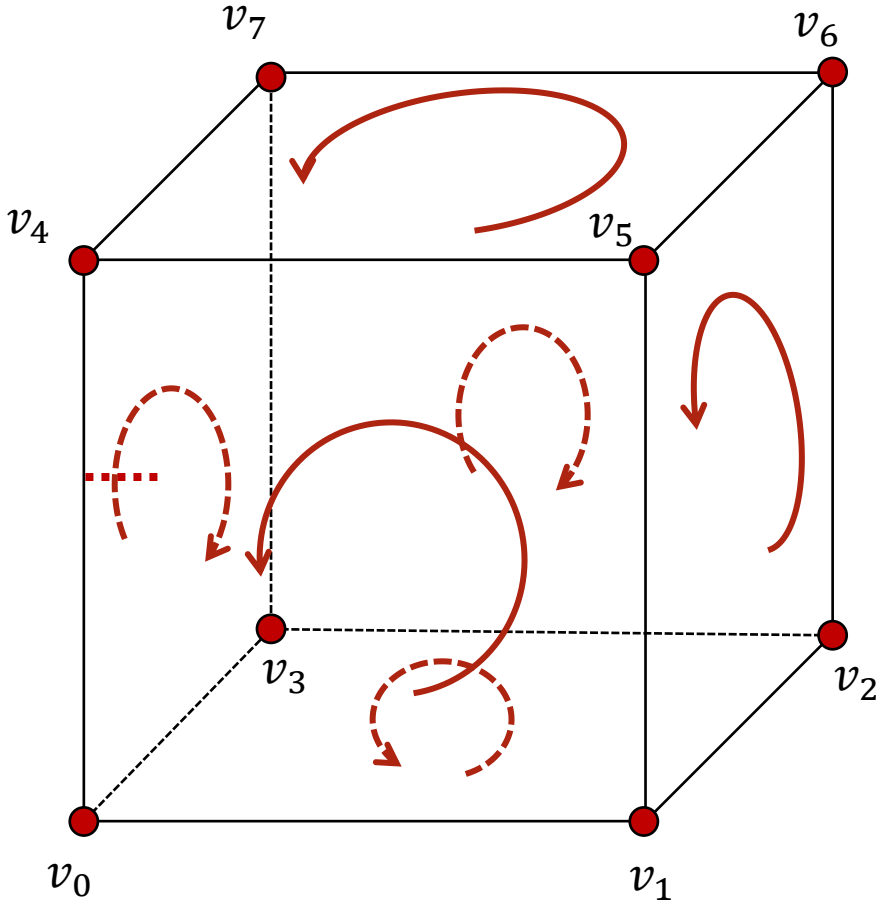




Add Face under the half-edge structure

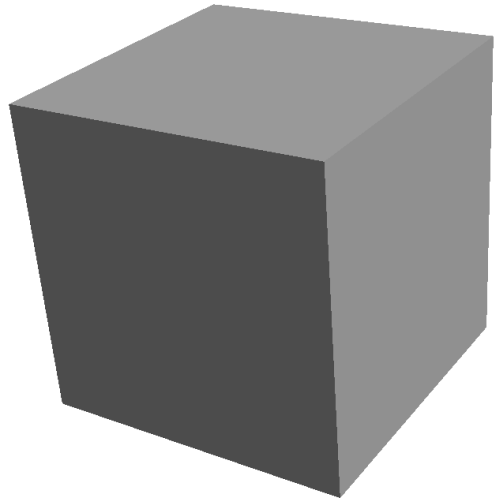
- $v_0 \rightarrow v_4 \rightarrow v_6 \rightarrow v_3$





[과제] 정육면체 만들기 2

- InitMyMesh() 활용하여 크기가 2인 정육면체 만들어보기
- pmp::write(mesh, "output.obj"); 활용하여 obj 파일로 출력한 후 meshlab 등 다양한 외부 3D 모델링 프로그램에서 열어보기
- 마감 : 5/17(금) 23:59
- 제출물 : PDF 보고서



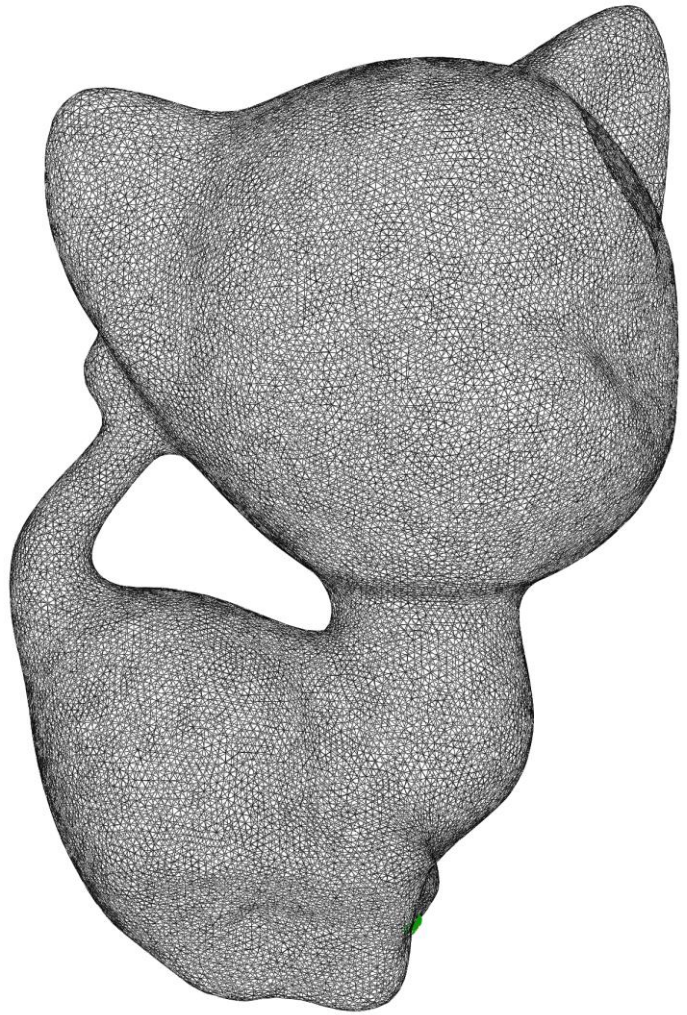
Add & Get Attributes

- mesh.add_face_property<*DATA TYPE*>("*NAME*");
- auto *VARNAME* = mesh.get_face_property<*DATA TYPE*>("*NAME*");

```
void DrawComponent::AddAttributes()
{
    mesh.add_face_property<pmp::Color>("f:color");

    // compute vertex normals
    pmp::vertex_normals(mesh);

    // compute face normals
    pmp::face_normals(mesh);

    // colorize faces based on normals
    auto fn = mesh.get_face_property<pmp::Normal>("f:normal");
    auto fc = mesh.get_face_property<pmp::Color>("f:color");

    for (auto f : mesh.faces())
    {
        auto n = fn[f];
        pmp::Color c(std::abs(n[0]), std::abs(n[1]), std::abs(n[2]));
        fc[f] = c;
    }
}
```

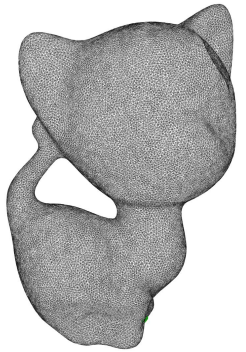
Traverse the mesh

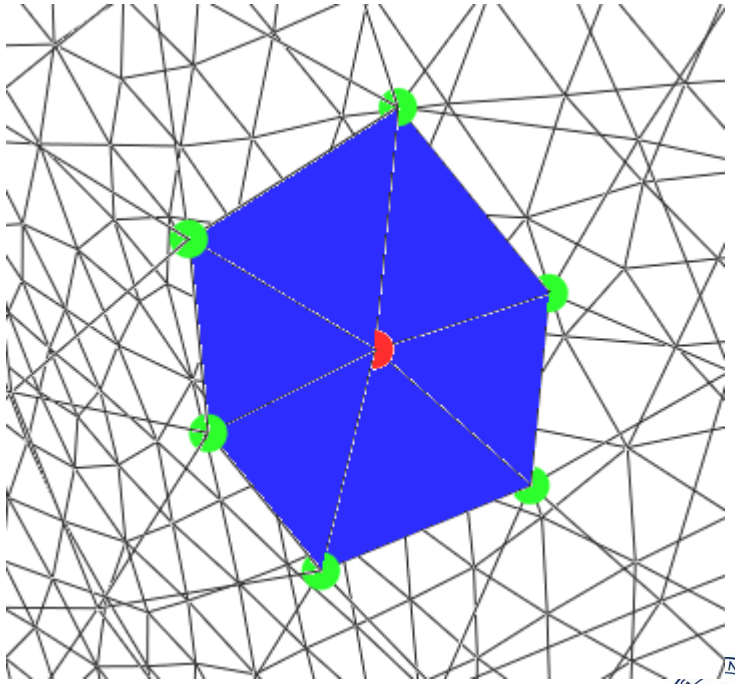
```
//3-1. Draw the mesh with wireframe.
glColor3f(0, 0, 0);
for (auto f : mesh.faces()) {
    DrawFace(f, true);
}
```



Traverse the mesh

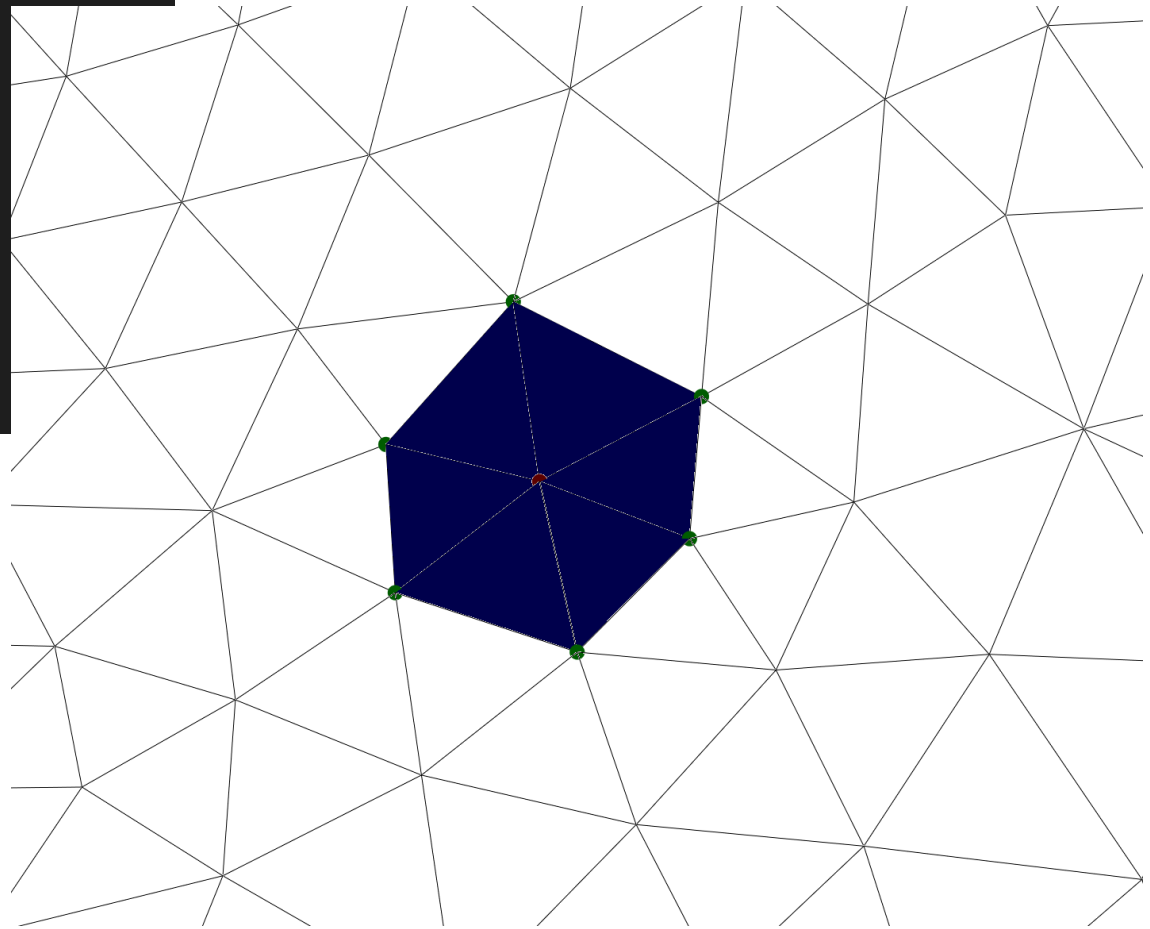
```
//3-2. Draw a vertex which index is 0 with red.
pmp::Vertex startV(0);
glColor3f(1, 0, 0);
glBegin(GL_POINTS);
glVertex3dv(mesh.position(startV).data());
glEnd();

//3-3. Draw face(s) which has vertex(0) with blue.
for (auto f : mesh.faces(startV)) {
    glColor3f(0, 0, 1);
    DrawFace(f);
}

//3-4. Draw vertices which are connected with vertex(0) with green.
glColor3f(0, 1, 0);
glBegin(GL_POINTS);
for (auto v : mesh.vertices(startV)) {
    auto p = mesh.position(v);
    glVertex3dv(p.data());
}
glEnd();
```





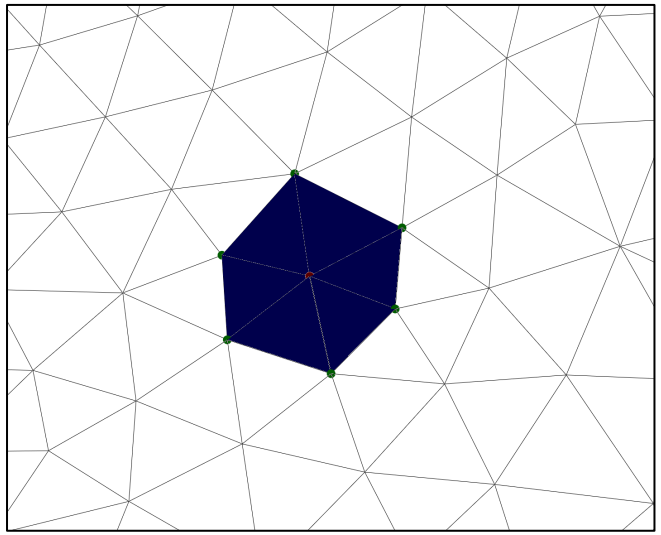
Traverse the mesh

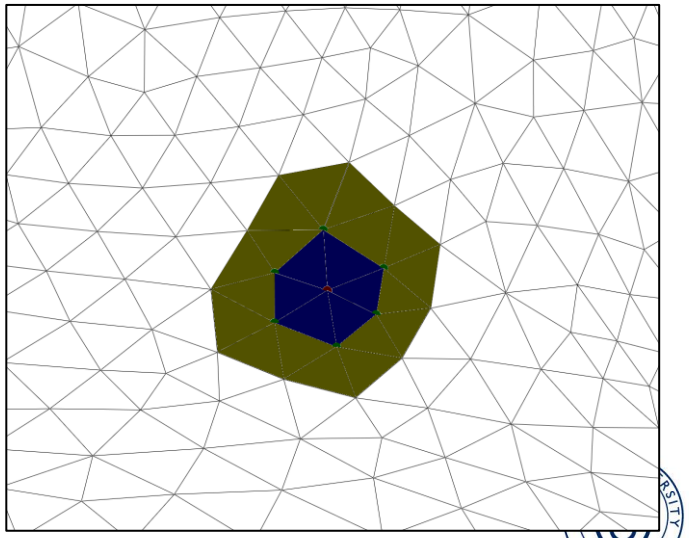
```
//3-5. Draw faces which has green vertices but no red vertex,
//                                                  with yellow.
glColor3f(1, 1, 0);

std::set<pmp::Face> visitedFaces;
for (auto f : mesh.faces(startV))
    visitedFaces.insert(f);

for (auto v : mesh.vertices(startV)) {
    for (auto f : mesh.faces(v)) {
        if (visitedFaces.find(f) == visitedFaces.end())
        {
            DrawFace(f);
        }
    }
}
```



[텀 과제] 3, 4-ring Face 찾기

- 0번 인덱스의 정점을 가지고 있는 face들을 0-ring face라 하자.
- 1-ring face는 0-ring face들의 정점을 가지고 있는 face들 중 0-ring face에 속하지 않은 face를 의미한다.
- 2-ring face는 1-ring face들의 정점을 가지고 있는 face들 중 0, 1-ring face에 속하지 않은 face를 의미한다.
- 이와 같은 방식으로 정의될 때,
  - 1-ring face는 현재 파란색으로 강조되어 있다. 2-ring face는 노란색으로 강조 가능하다. (코드 참조)
  - 3-ring face는 초록색으로, 4-ring face는 보라색으로 강조하여라.
- 마감 : 5/24(금) 23:59
- 제출물 : 보고서 PDF 및 DrawComponent.cpp
  zip 압축하여 제출
- 참고사항 : face index 수작업으로 획득 후 색칠 하는것은 허용하지 않습니다.. 자료구조 활용 필수!





Any Questions?