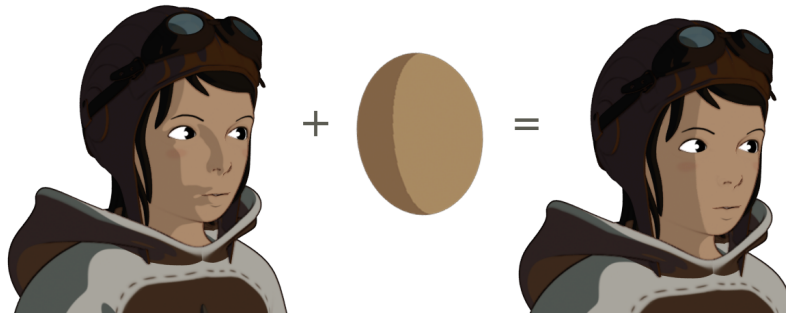


Controlling the Dark Side in Toon Shading

Ole Gulbrandsen*



1 Introduction

Sharply separating a diffuse surface into a light and dark side often results in unwanted details. Combining normals from the actual surface with the normals from a simplified surface we get better control of the dark side.

2 Theory

Our solution is to create a shell covering the actual geometry (as in figure 1), and store the shell normals in a point cloud.

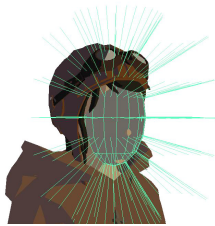


figure 1: Sampling normals from an outer shell

The surface shader samples the point cloud and calculates a new normal (1) which is then used as the new shading normal. The weighting between the shell normals and the actual surface normal can easily be controlled by storing β in a texture map.

$$n_{avg} = \frac{1}{N+1} \left(\beta n_{surface} + (1-\beta) \sum_{i=1}^N n_{ptc_i} \right) \quad (1)$$

3 Implementation

```
surface bakeNormals(string Filename="",
                   string CoordSys="")
{
    bake3d( Filename, "", P, n,
            "coordsystem", CoordSys,
            "interpolate", 1,
            );
}

surface readNormals(string Filename="",
                   float b=0.5;
                   string CoordSys="")
{
    uniform string category = concat(
        "pointcloud",
        ":",
        Filename );

    point p_ptc = transform(CoordSys,P);
    normal n = normalize(N);
    normal Nsample,Navg,n_avg,n_shade=0;
    float Samples=8;
    float MaxDist=1;

    gather(category, Pworld, n, PI/2,Samples,
           "maxdist",MaxDist,"point:normal", Nsample
    ){
        Navg += Nsample;
    }
    n_avg = ntransform(CoordSys,"current",Navg);
    n_shade = b*n+(1-b)*n_avg;

    //pass n_shade on to the toon shader
}
```

*e-mail: olegul@hotmail.com