10/27/2020

Assignment E1 double credit

Consult WDS/Shoaff (some questions are from the notes).

Assignment E1-

21

A				B					
1	0	0		1	0	-1			
0	1	0		0	1	2			
-1	2	1		0	0	1			

Post multiply B by [x, y ,1]^T → translation
Pre multiple p=[x, y, 1] by A → translates p.

22 – translation and scaling in 2d Homogeneous (x, y, w) 2D

What is the transpose of 22?

23 – looks like rotation

The dot product

$$V = (Vx, Vy, Vz)$$
$$U = (Ux, Uy, Uz)$$

$$V.U \ = \ Vx \times Ux \ + \ Vy \times Uy \ + \ Vz \times Uz$$

In n dimension it is a sum of the products of elements in the same dimension
IN DSP Multiply Accumulate (MAC) Takes 1 cycle.

Length of V = L(V) = $\sqrt{V.V}$

U is normalized if $U \ = \ (U.U)/\sqrt{U.U}$ 3.8 in Shoaff

The angle between a U and V

$\theta = cos^{-1}(\hat{U}.\hat{V})$ $\hat{V}$ – normal version of V.

The unit vector in the X dimension direction

What is the angel between U and V If U is perpendicular to V then the angel 90 degrees

$cos^{-1}(90)$ ➔ the dot product is 0.

A plan given by (3.9) $ax + by + cz + 1 = 0$ ➔ $[a, b, c, 0]$ is the vector normal to the plan give

The Cross product

Let x, y, z, be the basis unit vectors in 3D
The cross product between $V = [Vx, Vy, Vz]$
And $U=[Ux, Uy, Uz]$

	x	y	z			
	Vx	Vy	Vz			
	Uz	Uy	Uz			

The cross product is obtained in a way that is similar to finding the cofactors or the determinant of a matrix

$[(Vy \times Uz - Vz \times Uy), -(Vx \times Uz + Ux \times Vz), (Vx \times Uy + Ux \times Vy)]$

The cross product of V and U is a vector W which is perpendicular to V and to U

Vector perpendicular to a plan using cross-product?

Take any two vectors on the plan and find their cross product.

The cross product.

Described in CG10-22

Shading – adding light sources and light effects (light interaction with material vertices ➔ geometry objects) to the

Scene (instead of glColor())

Shadowing (not supported in OGL) – the way the light sources gerate shadows upon interaction wit the objects.

OGL model (Phong Model) is not carefully following the physical model of lighting/light interaction
Contains many degrees of freedom that enable realistic rendering.

Physical model requires ray tracing
Phong model requires trial and error

Slide 11 types of light sources

Point source finite position light is dispersed from the source to every directions

infinite (e.g., the sun) light is dispersed from the sourcein parallel rays.

Spotlight – limits the point source dispersion. GL-20 9.
Ambient light uniform (almost like glColor) throughout the scene.