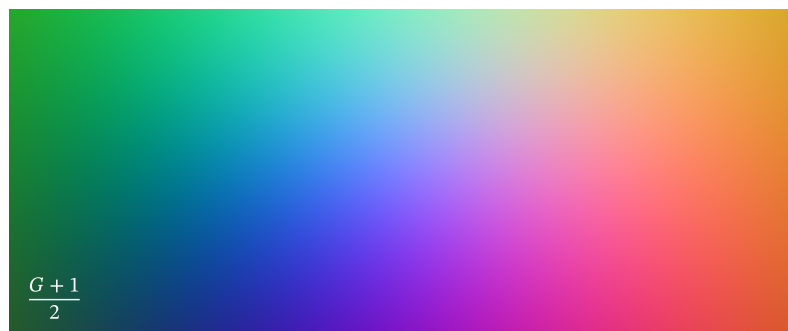
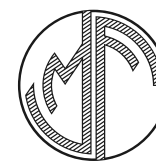


# Perspective map rasterization

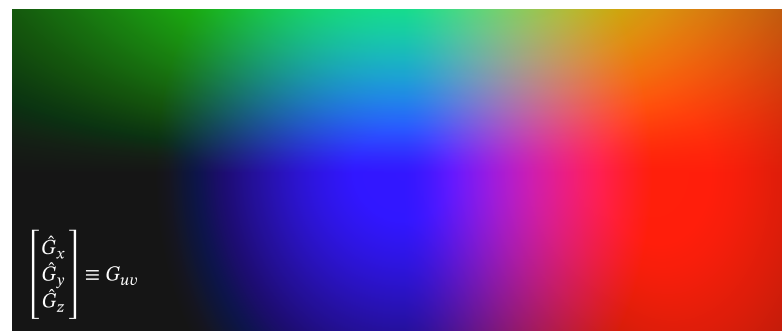
by Jakub Max Fober, learn more on <http://maxfober.space/> or contact [talk@maxfober.space](mailto:talk@maxfober.space)

January 29  
2020



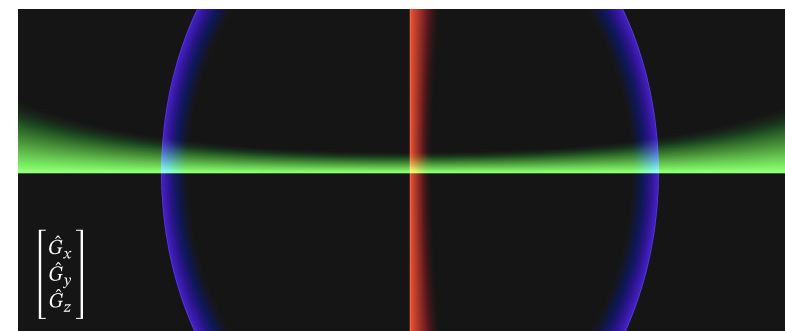
Perspective map source format of some type projection

M  
a  
p



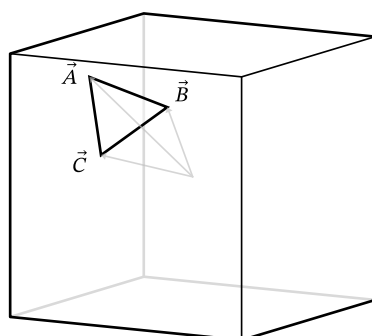
Visual-sphere texture map G representing unit vectors in range  $[-1, 1]^3$

M  
a  
p



Visualization of visual-sphere texture axis position 0

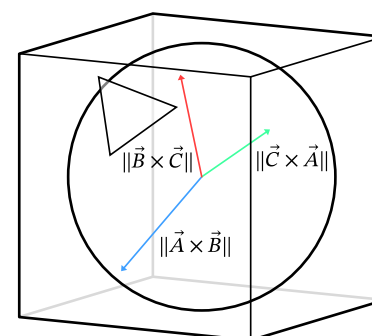
$\vec{A}$   
 $\vec{B}$   
 $\vec{C}$



Triangle in clip space

V  
e  
r  
t  
e  
x

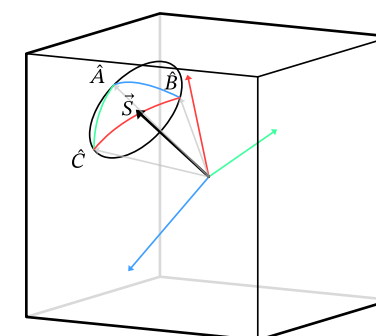
$$\begin{bmatrix} \|\vec{A} \times \vec{B}\| \\ \|\vec{B} \times \vec{C}\| \\ \|\vec{C} \times \vec{A}\| \end{bmatrix}$$



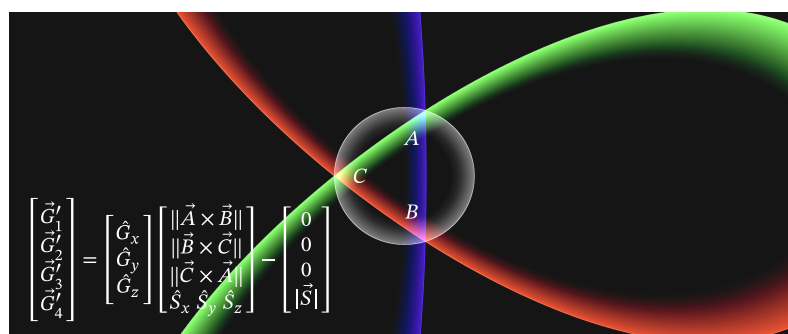
Triangle rasterization matrix

V  
e  
r  
t  
e  
x

$$\begin{aligned} a^2 &= |\vec{B} - \vec{C}|^2 \\ b^2 &= |\vec{C} - \vec{A}|^2 \\ c^2 &= |\vec{A} - \vec{B}|^2 \\ \begin{bmatrix} \vec{O}_s \\ \vec{O}_t \\ \vec{O}_p \end{bmatrix} &= \begin{bmatrix} a^2(b^2 + c^2 - a^2) \\ b^2(c^2 + a^2 - b^2) \\ c^2(a^2 + b^2 - c^2) \end{bmatrix} \\ \vec{S} &= \begin{cases} 0.5(\vec{B} + \vec{C}), & \text{if } \vec{O}_s \leq 0 \\ 0.5(\vec{C} + \vec{A}), & \text{if } \vec{O}_t \leq 0 \\ 0.5(\vec{A} + \vec{B}), & \text{if } \vec{O}_p \leq 0 \\ \frac{\vec{O}_s \vec{A} + \vec{O}_t \vec{B} + \vec{O}_p \vec{C}}{\vec{O}_s + \vec{O}_t + \vec{O}_p}, & \text{otherwise} \end{cases} \blacksquare \end{aligned}$$

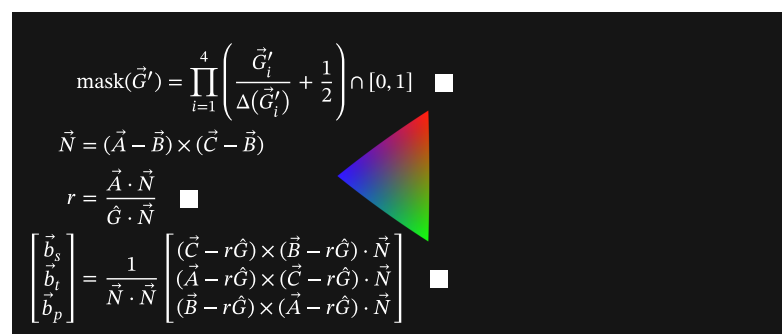


Center of the smallest circle over triangle



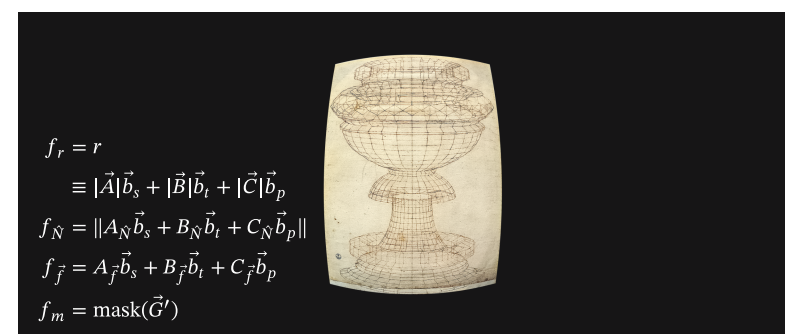
Visualization of rotated perspective map  $G'$

F  
r  
a  
g  
m  
e  
n  
t



Rasterized triangle with barycentric coordinates and distance occlusion mask

F  
r  
a  
g  
m  
e  
n  
t



Fragment data interpolation of model with texture (Paolo Uccello, 15<sup>th</sup> century)