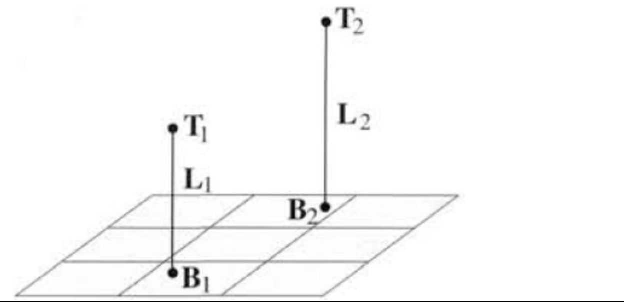
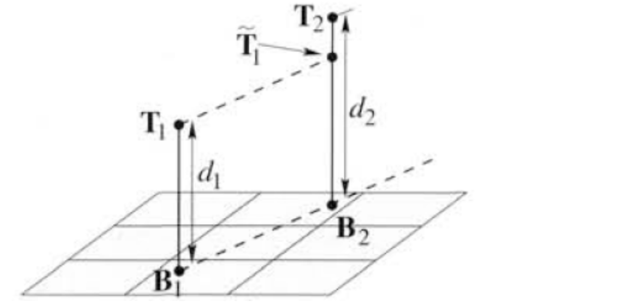
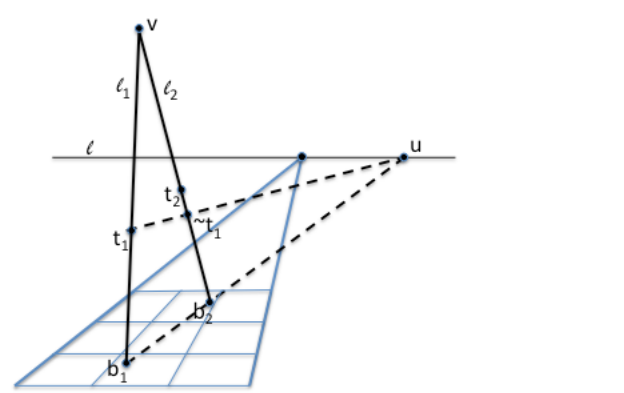
(a) Example in 3D Euclidian geometry:
The vertical line segments $\mathbf{L_1} = <\mathbf{B_1},\mathbf{T_1}>$ and $\mathbf{L_2} = <\mathbf{B_2},\mathbf{T_2}>$ have length d_1 and d_2 respectively. The base points $\mathbf{B_1}$, $\mathbf{B_2}$ are on the ground plane. We wish to compute the scene length ratio d_1:d_2 from the imaged configuration



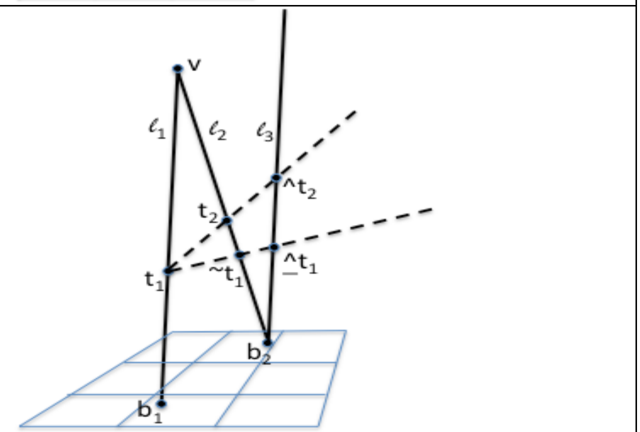
(b) Idea (in 3D Euclidian geometry):
In the scene the length of the line segment $\mathbf{L_1}$ may be transferred to $\mathbf{L_2}$ by constructing a line parallel to the ground plane to generate the point $\tilde{\mathbf{T}}_1$.



(c) in projective image geometry:
$\boldsymbol{\ell}$ is the ground plane vanishing line, and $\mathbf{v}$ the vertical vanishing point. A corresponding parallel line construction in the image requires first determining the vanishing point $\mathbf{u}$ from the images $\mathbf{b_i}$ of $\mathbf{B_i}$, and then determining $\tilde{\mathbf{t}}_1$ (the image of $\mathbf{t_1}$) by the intersection of $\boldsymbol{\ell}_2$ and the line $<\mathbf{t_1},\mathbf{u}>$.



(d) using rectified, parallel lines:
The line $\boldsymbol{\ell}_3$ is parallel to $\boldsymbol{\ell}_1$ in the image. The points $\hat{\mathbf{t}}_1$ and $\hat{\mathbf{t}}_2$ are constructed by intersecting $\boldsymbol{\ell}_3$ with the lines $<\mathbf{t_1},\tilde{\mathbf{t}}_1>$ and $<\mathbf{t_1},\mathbf{t_2}>$ respectively. The distance ratio $d(\mathbf{b_2}, \hat{\mathbf{t}}_1) : d(\mathbf{b_2}, \hat{\mathbf{t}}_2)$ is the computed estimate of d_1:d_2.



Use this Test data

null null	0	0	at lower left ground grid
b1	222	43	
b2	389	168	
t1	232	311	
~t1	344	340	
t2	331	391	
v	247	713	
u'	590	451	
u	767	451	