2.5-Dimension Ray Tracing

2.5-dimension ray tracing relates to 2D areas that occupy 3-dimensions in ray space, through having 3rd axis values associated with each 2D coordinate, so therefore require special hit-detection (tracing) to determine intersection. This may appear to be essentially a triangle mesh, but there may be linear distribution of coordinates, so only 3rd axis values are stored.

This essentially refers to ‘height fields’, which may be rendered 1:1 or values combined for distant lookups.

Various optimizations can be made within each 2.5D volume; quad-trees seem a good idea, allowing large area to be bypassed depending on max-height values in each node. ‘Clip-maps’ may be also used to reduce distant lookup counts, by sampling a geometrically larger/courser data set of the actual data set. One thing to note is rays are not just being cast from the eye to the field, but from the field to the light source (etc.) for lighting and shadowing, so any optimizations need to be view independent.

Calculating weighted point on 1-axis with 2 samples, where v is the 2 sample values and w is the weighting (>=0 <=1)