

Interpolation & DTM:

- Interpolation can be used to determine a height value of a point by using known neighboring points ---> ASSUMING...
 - Terrain surface is continuous and smooth
 - High correlation between neighboring data points or phenomenon

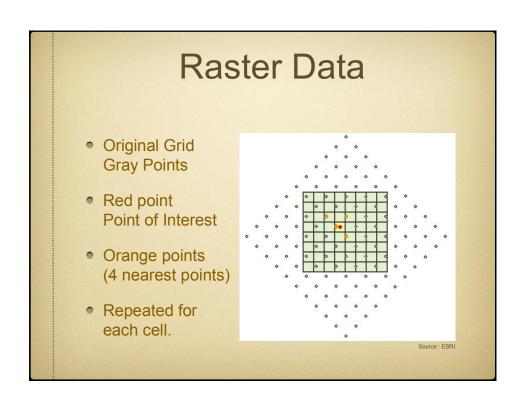
And this means...

- Basically it is linear interpolation in **both** X and Y directions (or rows and columns) (and Z if 3D)
- Interpolation can be used for estimating the values on a continuous grid based model
- Interpolation can also be used for estimating the value of a point by using 4 other known neighboring point values on proximity basis.

Definition

- <u>Bilinear Interpolation</u>: is a resampling method that uses the distance-weighted average of the four nearest pixel values to estimate a new pixel value.
- The four cell centers from the input raster are closest to the cell center for the output processing cell will be weighted and based on distance and then averaged.

Vector Data P = Desired Point Q = Known Points (four closest pixels) R = Point on the line with the known points



Another Use...

- ArcGIS tool : Extract Values to Points
- Uses Bilinear Interpolation to extract the values from a grid into a point feature class.
- Used as a result of the distance weighted average for interpolating such values.
- For more info see:

ract Values to Points

Equation

 $Z = A_0 + A_1X + A_2Y + A_3XY$

Where A0, A1, A2, and A3 are coefficients... determined by four equations using the REFERENCE POINTS

Quiz

- How many neighboring cells does Bilinear Interpolation use when interpolating a value? A) 1 B) 4 C) 8 D) 16
- \bullet T / F : Bilinear Interpolation can only be performed with a grid based system
- What are two assumptions when employing Bilinear Interpolation ?
- T / F: Bilinear Interpolation uses a distance weighted average when interpolating an unknown value.

Answers

- 4
- False
- The surface is continuous and the neighboring points are related.
- True

Sources

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