Choosing an Interpolation Technique

The most challenging task about creating a surface through interpolation is choosing the most appropriate technique. All interpolators will create gridded surfaces, however, the result may not properly represent how the data behaves through space. The idea of data behaving through space refers to how the values change from one location to the next. For example, if an elevation surface were created from sample points taken in a mountainous area, it would be necessary to choose a technique that could simulate the severe elevation changes because this is how this type of data behaves.

It is not always easy to understand how data behaves before commencing with the gridding process and therefore it can be difficult to know what technique should be used. However, there are some questions that can be asked about a data set that will help determine the most appropriate technique. These questions are listed below.

1. **What kind of data is it or what do the data points represent?**

Some interpolation techniques can be automatically applied to certain data types.

Data Type	Possible Interpolation
Elevation	TIN, NN
Soil Chemistry	IDW, Kriging
Demographic	NN, IDW, Kriging
Drive Test	NN

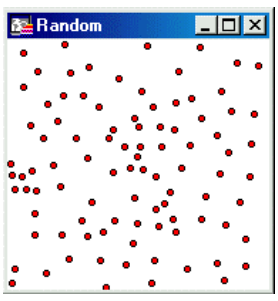
2. How accurate is the data?

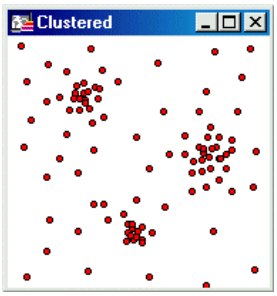
Some techniques assume that the value at every data point is an exact value and will honour it when interpolating. Other techniques assume that the value is more representative of an area.

Point Value Accuracy	Possible Interpolator
Very Accurate	NN, TIN, Rectangular
Not Very Accurate	IDW, Kriging

3. **What does the distribution of the points look like?**

Some interpolation techniques produce more reasonable surfaces when the distribution of points is truly random. Other techniques work better with point data that is regularly distributed.

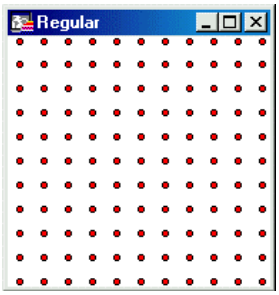
Point Distribution	Possible Interpolator
	Most interpolation techniques work quite well on randomly scattered data points. NN, TIN, IDW, Kriging



Highly clustered data presents problems for many interpolators.

NN, IDW, Kriging

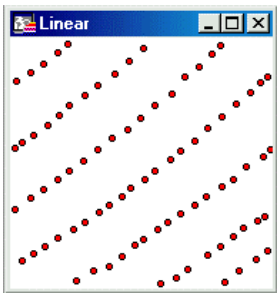
TIN – only for slightly cluster data



Rectangular can only properly handle data that is distributed in an evenly space pattern.

Rectangular, NN, Kriging

Point Distribution **Possible Interpolator**



This type of linear pattern generally occurs when data is collected from aircraft. Samples are taken close together but flight lines are some distance apart.

IDW, NN, Kriging

This type of linear pattern generally occurs when samples are taken along roads.

NN, Kriging

4. **Is interpolation speed a factor?**

All interpolation techniques have certain factors that will influence the speed of interpolation. Two factors common to all interpolators is the cell size and the number of points. The smaller the cell and/or the more points in the data set, the longer it takes to calculate the surface. However, some interpolators are faster than others.

Interpolator	Speed	Limiting Factors
TIN	Fast	None
IDW	Fast	Search and Display Radius size

Rectangular		Very Fast	Search Radius size
NN		Slow	Point distribution
Kriging	Slow	Number of directions analyzed	

5. **Is it necessary to over/undershoot the local Min. and Max. values?**

Some interpolators allow for overshooting and undershooting the local minimum and maximum values in a data set. This is generally necessary when interpolating elevation surfaces.

Over/Undershoot?	**Interpolators**
Yes	TIN, NN
No	IDW, Rectangular, Kriging