DATA MODEL IN GIS

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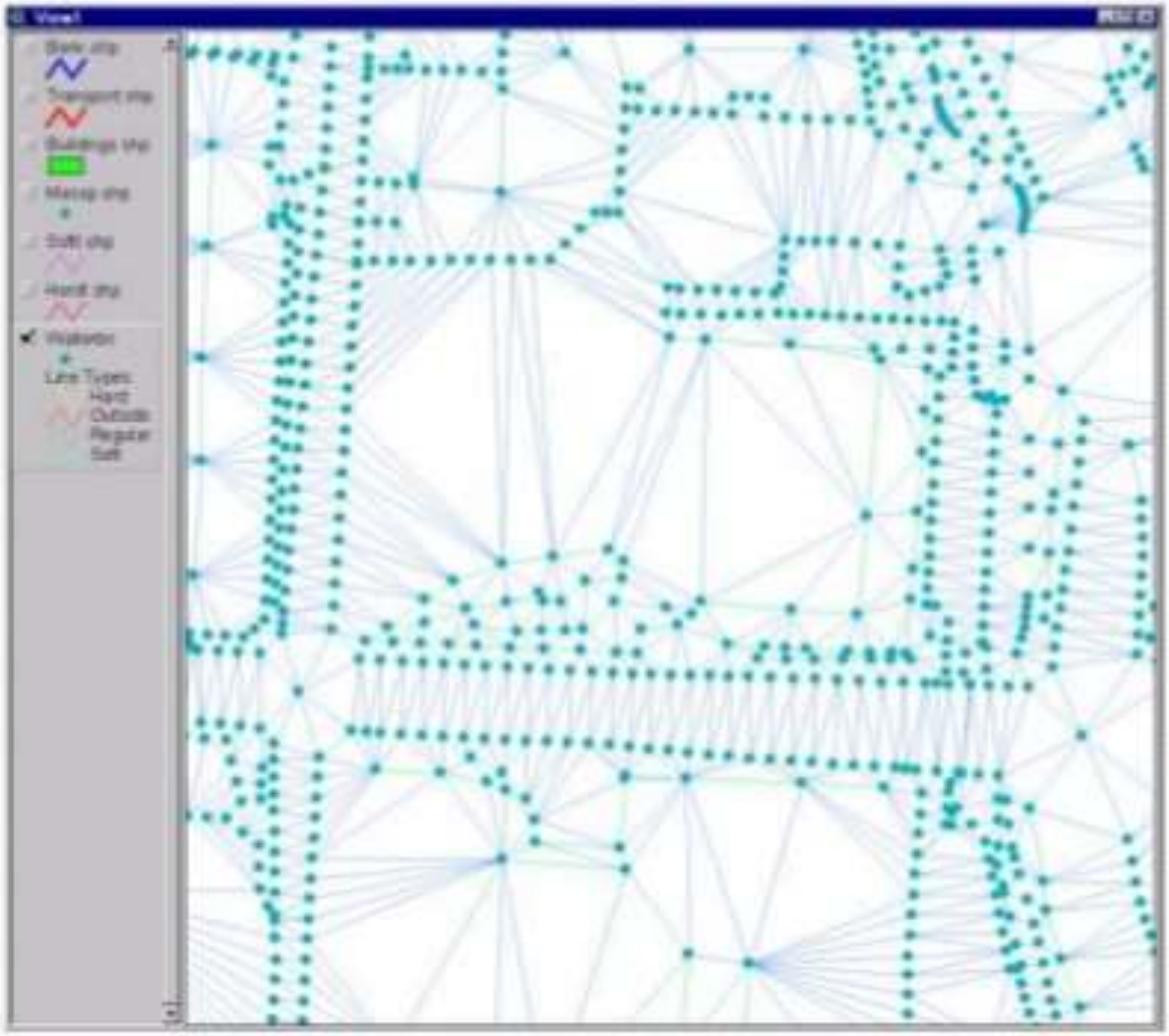
Triangulated Irregular Network

What is a TIN?

- TIN stands for Triangular Irregular Network, which is a vector approach to handling a digital elevation model. TIN's are used to interpolate surfaces using multiple triangles.
- TIN's are able to interpolate surfaces by selecting representative points that are usually data points. TIN's connect these points to form a set of continuous and connected triangles. The data points consist of X, Y and Z values. The final result gives users a TIN surface.


Line Types
Hard
Outside
Regular
Soft

Advantages of TIN

- TIN's give researchers the ability to view 2.5D and 3D at an area that was interpolated from minimal data collection.
- Users can describe a surface at different levels of resolution based on the points that were collected.
- TIN interpolation gives GIS users greater analytical capabilities. TIN models are easy to create and use.
- They provide users a simplified model that represents collected data points.
- Using a TIN surface in conjunction with ArcMap extensions such as Spatial Analysis and 3D Analyst, TIN users can also derive slope, aspect, elevation, contour lines, hillshades, etc.

Different Types of TIN Methods and Processes

There are many different types of TIN interpolation methods.

Some of the most popular TIN methods include

- Natural Neighbour,
- Krigging,
- Spline,
- Nearest Neighbour and
- Inversed Distance Weighting.
- These TIN interpolation methods use mathematical algorithms in order to generate interpolated surfaces. Each of these methods will produce different types of surfaces.

Digital Elevation Model (DEM)

DEM

- Digital Elevation Model is a data model which represents the surface of a terrain in 3 dimension.
- DEM can be represented as a raster or as TIN.
- The TIN DEM dataset is also referred to as a primary DEM or measured DEM.
- Raster DEM is referred to as secondary DEM or computed DEM.

MTM -05/277 E: Tithonium Chasma (3 X Vertical Exaggeration)

3D rendering of DEM of Tithonium Chasma on Mars

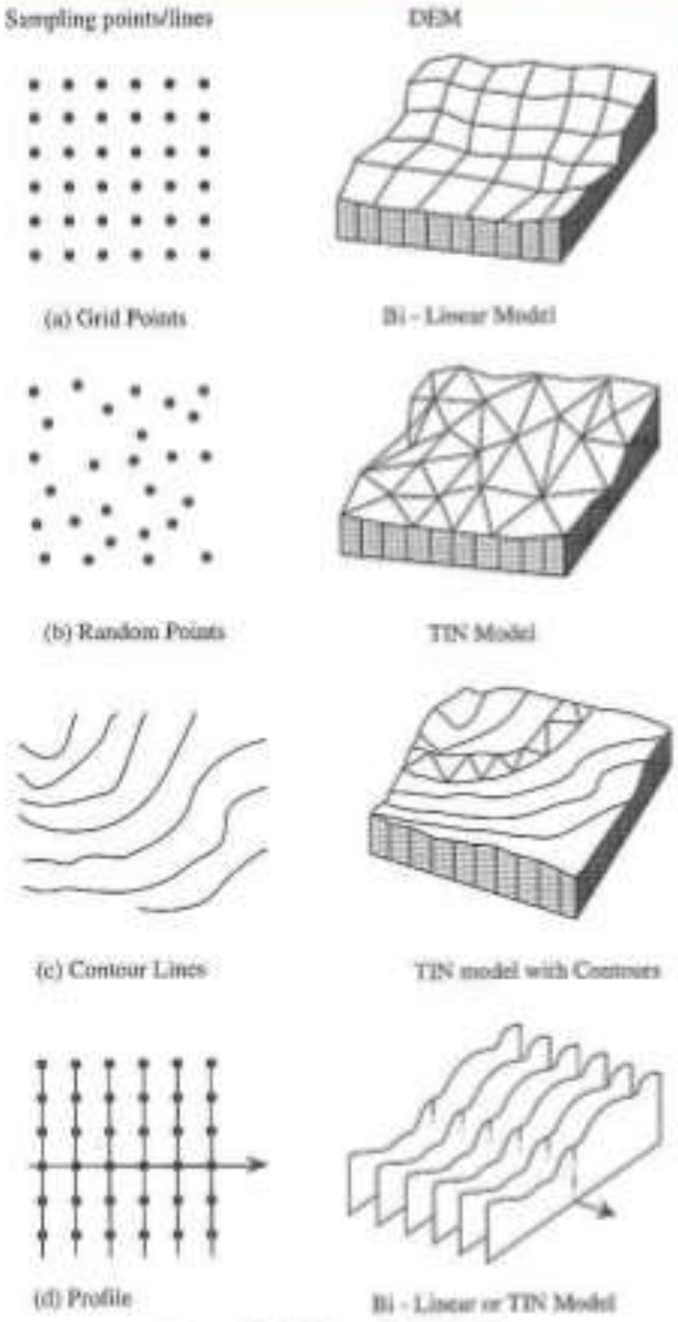


Figure 2.11 Different Types of DEMs

Types of DEM

Conclusion

- Geographic Information System is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface.
- A data model in GIS is a mathematical construct for representing geographic objects or surfaces as data.
- The two basic data models of GIS are Raster and Vector. Other important data models are TIN (Triangulated Irregular Network) and DEM (Digital Elevation Model).
- Raster consists of matrix of cells organized into rows and coloumns where as vector represents data using points, lines and polygons. In TIN data is represented by irregular triangles. DEM can be represented as a raster or as TIN.

References

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