



SMS 14.0 Tutorial

Scatter Data – Filter

Basics of filtering scatter data



Objectives

This tutorial covers the basics of filtering larger TIN files to facilitate in processing the data.

Prerequisite Tutorials

- Overview
- Scatter Data Import

Required Components

- SMS Core

Time

- 10–20 minutes

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1 Introduction

Sometimes available data can be rather large, which can result in time-consuming processing. In the case where the available data is too large to effectively process, SMS provides different ways to filter certain data points when those points are not important for later simulations.

For this part of the tutorial, a set of evenly distributed cross section data points defined in the file “Raster-in.xyz” will be imported into SMS using two types of filter options.

2 Getting Started

Before importing the file, change the display options to show the points by doing the following:

1. Launch SMS. If it is already launched, press *Ctrl+N* to reset to the default settings. Click **Don't Save** if asked to save changes.
2. Click **Display Options**  to bring up the *Display Options* dialog.
3. At the bottom of the list on the left, turn off *Show option pages for existing data only*.
4. Select *Scatter* from the list on the left.
5. Turn on *Points* and *Use contour color scheme*.
6. Turn off *Triangles*.
7. Click on the  button to bring up the *Symbol Attributes* dialog.
8. Enter “8” as the *Size* and select the circle icon from the section on the right.
9. Click **OK** to exit the *Symbol Attributes* dialog.
10. Click the  button to the left of *Inactive color* to bring up the *Color* dialog.
11. Select a purple or magenta color and click **OK** to close the *Color* dialog.
12. Click **OK** to exit the *Display Options* dialog.

3 File Import Filter Options

Input data files can be large. They may have higher resolution than is needed, or cover a larger area than is needed for a specific project. In those situations, it is useful to limit the data imported into SMS. SMS provides options to perform this filtering.

The “Raster-in.xyz” file will be imported multiple times to illustrate the options. Start by importing the entire file:

1. Click **Open**  to bring up the *Open* dialog.
2. Browse to the *data files* folder for this tutorial and select the “Raster-in.xyz” file.
3. Click **Open** to exit the *Open* dialog and bring up the *Step 1 of 2* page of the *File Import Wizard*.

The first page gives the option to specify delimiters and a starting point for importing.

4. In the *Set the column delimiters* section, turn on *Space*.
5. Click **Next >** to accept the remaining defaults and go to the *Step 2 of 2* page of the *File Import Wizard* dialog.
6. Select “Scatter Set” from the *SMS data type* drop-down.

This tells SMS to import these points as scatter points.

7. In the *Mapping options* section, turn off *Triangulate data*. Triangulation is not needed for this tutorial.
8. Click **Finish** to close the *File Import Wizard* and import the scatter points.

SMS imports the raster data and converts each point to a scattered vertex (Figure 1). This may take a few minutes because there are over 561,000 points in this dataset.

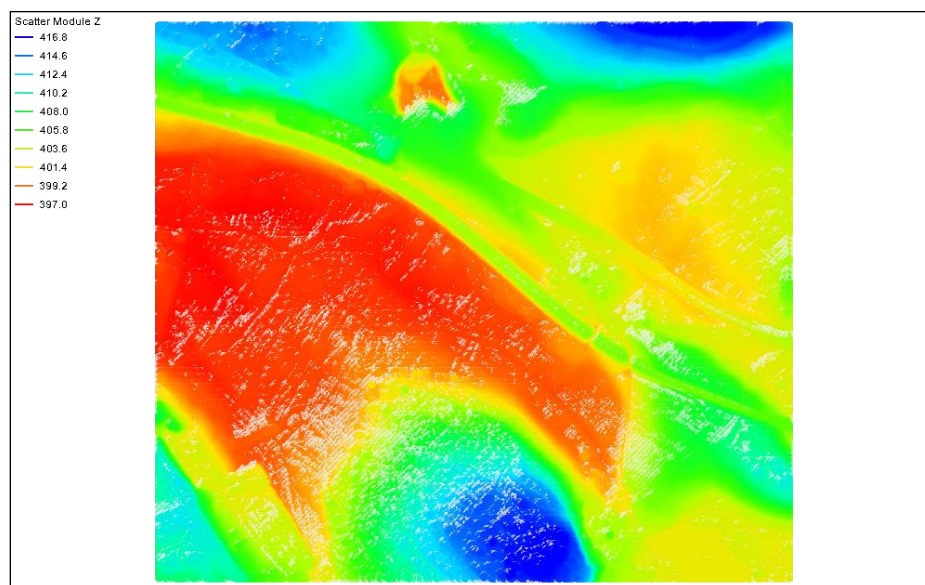


Figure 1 Imported scatter dataset

Now import the file again, but this time with filtering. This allows the resulting scatter sets to be compared in order to understand the differences made by filtering.

9. Repeat steps 1–5, then click **Filter Options** to bring up the *File Import Filter Options* dialog.

The different options allow for only certain sections of the data to be imported into SMS. There are three options in the *Filter Type* section:

- *nth Point*: Allows only the *nth* points to be selected, *n* being any positive whole number. The whole area will be imported into SMS, but will be less dense and easier to work with when working with very large files.
- *Area*: Used when only a section of the data is needed. A rectangle of data will be selected with specified X and Y coordinates.
- *Grid*: Similar to the filtering by *nth* point, but done on a grid basis.

Continue by doing the following:

10. In the *Filter Type* section, turn on *nth Point* and enter “4” in the field below the *Filter Type* section.

11. Click **OK** to exit the *File Import Filter Options* dialog.
12. Click **Finish** to close the *File Import Wizard* dialog.
13. Turn off “ Raster-in” in the Project Explorer.

A new “ Raster-in (2)” dataset will appear in the Project Explorer, and the dataset will appear almost identical to the other one (Figure 2). It may be necessary to hide the file that was imported first.

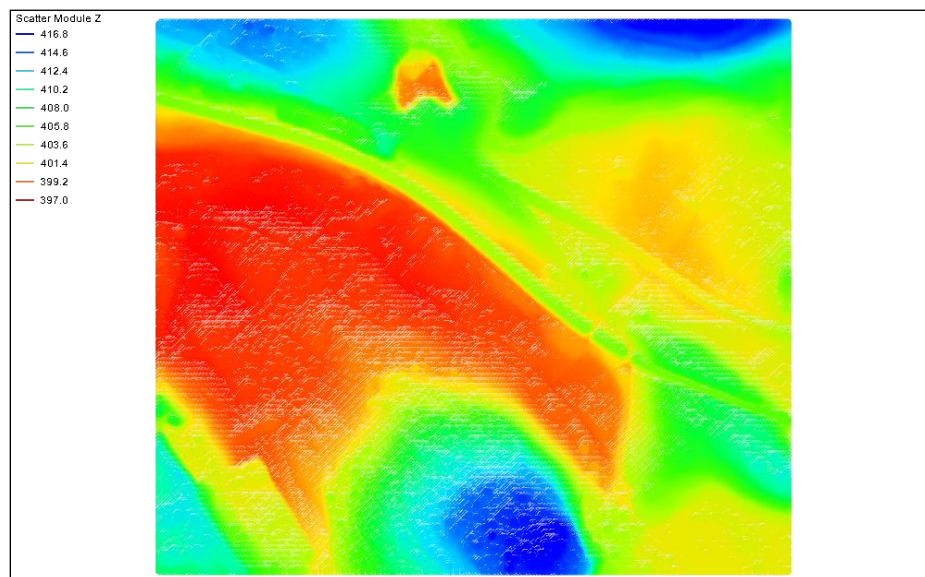


Figure 2 Filtered scatter set for raster data

14. Turn on both “ Raster-in” and “ Raster-in (2)”.
15. Select “ Raster-in” to make it active.
16. **Zoom**  in to the top left corner of the dataset.

The purple or magenta points are the filtered data. Those only exist in the filtered set. The unfiltered scattered dataset includes all of the points.

4 Filtering Based on Angle

Now investigate another filtering option that is available after a file has been imported into SMS. These filtering options operate on the TIN, and therefore require triangulation.

1. Turn off “ Raster-in (2)”.
2. Select “ Raster-in” to make it active.
3. **Frame**  the project.
4. Select *Triangles* | **Triangulate**.

This method involves the removal of redundant data because this data does not add any details to the TIN surface. For example, when a point lies in the plane of all the surrounding points, no new features are represented and that point is superfluous.

This filtering option allows the user to specify a tolerance angle. Each data point is checked to see if it is within that tolerance of being flat. (Note: a dot product of the

"normal vectors" is used to determine this – see Figure 3). Vertices that are deemed to be redundant are deleted.

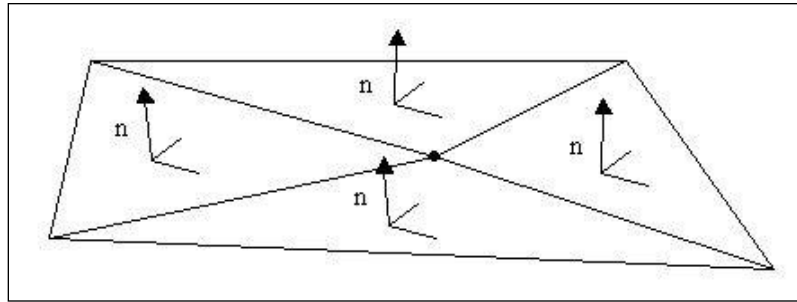


Figure 3 Triangles with relatively same normals

It is recommended to create a copy of the dataset prior to filtering by doing the following:

1. Right-click on "[Raster-in]" and select **Duplicate**.

This creates a new "[Scatter]" dataset.

2. Right-click on "[Scatter]" and select **Rename**.
3. Enter "Raster-in -2 degree filter" and press *Enter* to set the new name.
4. Turn off "[Raster-in]".
5. Select *Data | Filter...* to bring up the *Filter Options* dialog.
6. Enter "2" (degrees) as the *Filter Angle*.
7. Click **OK** to close the *Filter Options* dialog and bring up the *Filter Report* dialog.

Depending on the speed of the computer being used, this may take a few minutes. There are around 50,000 points to be deleted, or about 9% of the total points. Note that SMS re-triangulates the remaining points, so any editing of the TIN performed on the original will be lost.

8. Click **Close** after viewing the report to close the *Filter Report* dialog.

The screen should appear similar to Figure 4. Notice the blank spaces where the data has been deleted.

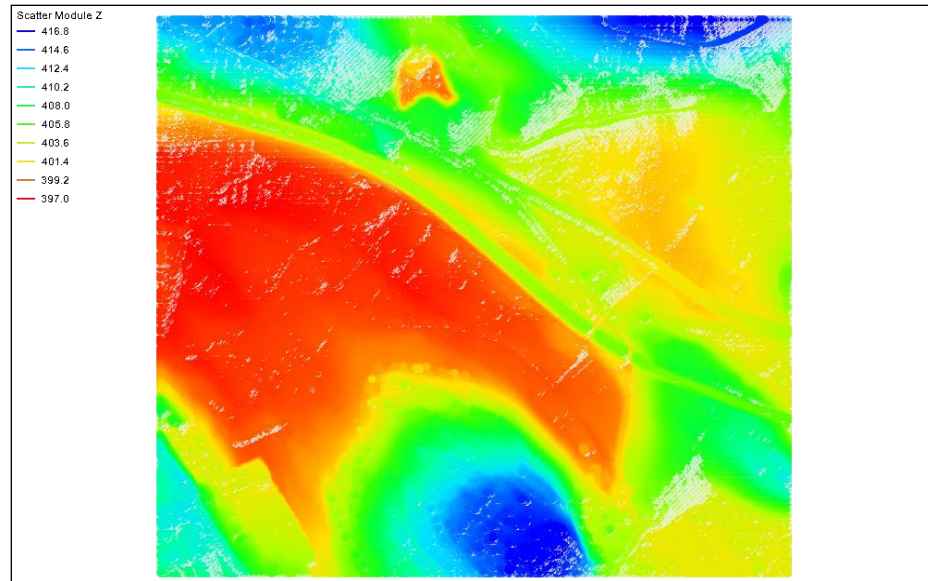


Figure 4 Scatter set after filtering by angles

5 Conclusion

This concludes the “Scatter Data – Filter” tutorial. It reviewed some of the features that SMS provides for TIN data. Feel free to continue experimenting with the interface, or exit the program.