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Whitebox Geospatial™

April Newsletter: Whitebox Geospatial Updates

Over the past month, Whitebox Geospatial has been working hard to improve the WhiteboxTools software platform by adding functionality, fixing bugs and making our software more accessible to our loyal community of users. We are pleased to announce the following updates:

Whitebox Geospatial is thrilled to announce the release of five new LiDAR processing tools for the LiDAR and Remote Sensing Extension and the General Toolset Extension. These extension tools include LidarEigenvalueFeatures, SortLidar, PiecewiseContrastStrech, ColourizeBasedOnPointReturns and ColourizeBasedOnClass.

We have updated the ModifyLidar and FilterLidar tools in the LiDAR and Remote sensing Extension to now accept the eigenvalue-based point neighbourhood measures, including linearity and planarity.

Lastly, we have temporarily created a QGIS plugin tool called WhiteboxTools for QGIS. This is the official QGIS Plugin for WhiteboxTools. This plugin allows you to use WhiteboxTools within QGIS. In addition, we have updated the description files for each tool in WhiteboxTools, including the Whitebox Geospatial extensions. If you have purchased a license to any of our extension products, you can now use them within this plugin.

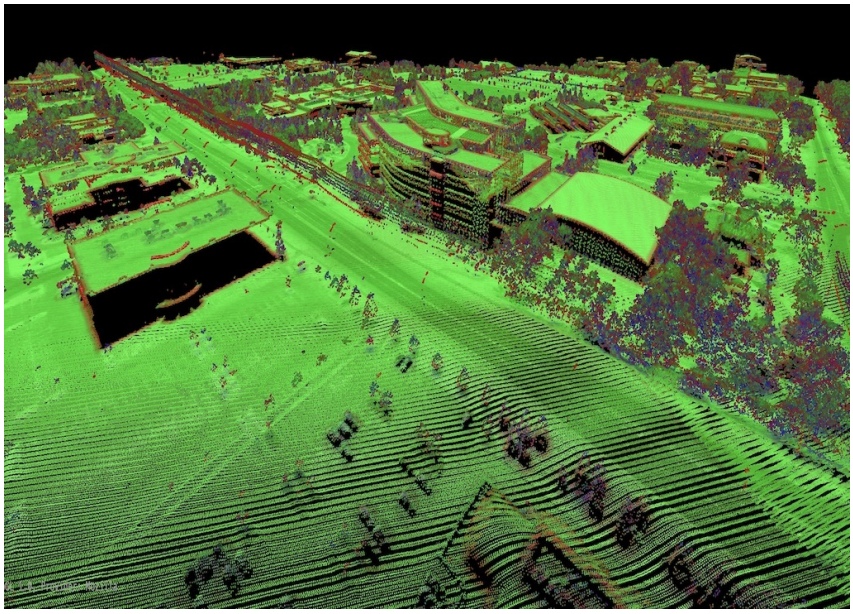
Extension Pricing

LidarEigenvalueFeatures

This tool can be used to measure eigenvalue-based features that describe the characteristics of the local neighbourhood surrounding each point in an input LiDAR file. Eigenvalues are used to describe the extent to which the neighbouring points can be characterized by a linear, planar, or volumetric distribution.

The tool outputs a total of 10 point features, including the eigenvalues (lambda1, lambda2, and lambda3), linearity, planarity, sphericity, omnivariance, eigentropy, planar slope, and point residual.

These features can then be used in point classification applications, or as the basis for point filtering (FilterLidar) or modifying point properties (ModifyLidar).



Check out this tool ›

SortLidar

We are pleased to announce that the LidarSortByTime tool has been replaced in this release of the LiDAR & Remote Sensing Extension by the new, and far more flexible, SortLidar tool. This new tool can be used to sort the points in an input LiDAR file based on their properties with respect to one or more sorting criteria. The sorting criteria may include: the x, y or z coordinates, the intensity data, the point class value, the point user data field, the point source ID, the point scan angle data, the scanner channel, and the acquisition time. Users can now sort their LiDAR files using complex sorting criteria statements, such as:

x 100.0, y 100.0, z 10.0, time

The statement above can be used to sort LiDAR points into 100 m x 100 m x 10 m bins and then, within each bin, will sort the data by time.

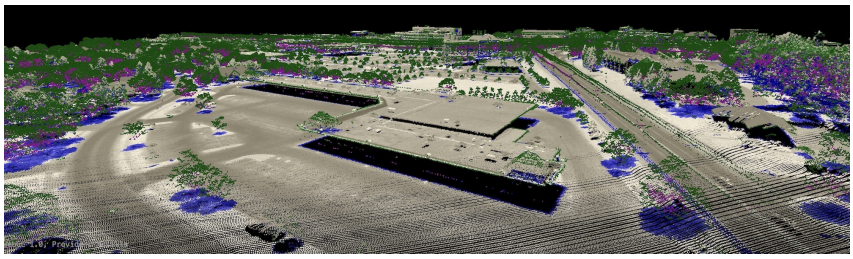
Check out this tool ›

ColourizeBasedOnPointReturns

This tool sets the RGB colour values of a LiDAR point cloud based on the point returns. It specifically renders only-return, first-return, intermediate-return, and last-return points in different colours, storing these data in the RGB colour data of the output LiDAR file. Colourizing the points in a LiDAR point cloud based on return properties can aid with the visual inspection of point distributions, and therefore, the quality assurance/quality control (QA/QC) of LiDAR data tiles.

For example, this visualization process can help to determine if there are areas of vegetation where there is insufficient coverage of ground points, perhaps due to acquisition of the data during leaf-on conditions. There is often an assumption in LiDAR data processing that the ground surface can be modelled using a subset of the only-return and last-return points. However, under heavy forest cover, and in particular if the data were collected during leaf-on conditions or if there is significant coverage of conifer trees, the only-

return and last-return points may be poor approximations of the ground surface. This tool can help geomatics professionals to determine the extent to which this is the case for a particular data set.



Check out this tool ›

ColourizeBasedOnClass

This tools sets the RGB colour values of a LiDAR point cloud based on the point classifications. Rendering a point cloud in this way can aid with the determination of point classification accuracy, helping geomatics professions to determine if there are certain areas within a LiDAR tile, or certain classes, that are problematic during the point classification process. The tool also provides the option to render each building in a unique colour, providing a visually stunning LiDAR-based map of built-up areas.

Check out this tool ›

PiecewiseContrastStretch

This tool can be used to perform an advanced piecewise contrast stretch on an input image. This new tool can be used to significantly improve the contrast characteristics, and visual interpretability, of single-band or colour composite images. Users may specify any number of break-points in the piecewise function, which will have the effect of reducing the number of tones used to display the under-populated tails of the distribution and spreading out the well-populated regions of the image histogram. The flexibility of the piecewise contrast stretch can often makes it one of the most applicable image pre-processing methods.

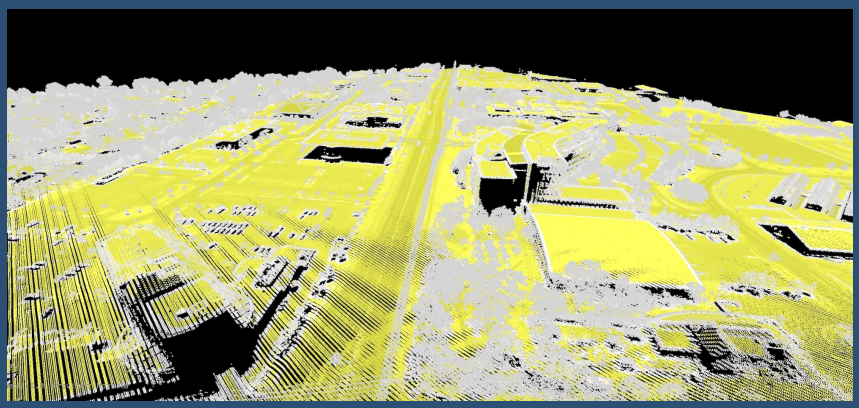
Check out this tool ›

Tool Updates: ModifyLidar and FilterLidar

With the addition of the LidarEigenvaluesFeatures tool, we have now added support in the FilterLidar and ModifyLidar tools for manipulating point properties based on eigenvalue-based point neighbourhood properties, including linearity, planarity, sphericity, and many others. The output of the

LidarEigenvaluesFeatures tool can be used directly by the FilterLidar and ModifyLidar tools, and will be automatically read by the tools when the data are present in the same folder as the accompanying source LiDAR file. This allows users to apply data filters, or to modify point properties, using these point neighbourhood features.

For example, the statement, rgb = if((planarity>0.7&&residual<0.10), (255,255,0),(255,255,255)) used with the ModifyLidar tool, can render the point RGB colour values based on some of the eigenvalue features. Such a statement could help geomatics professionals to find points with highly planar neighbourhoods and low planar residual values (indicating that the point is itself part of that neighbourhood plane).

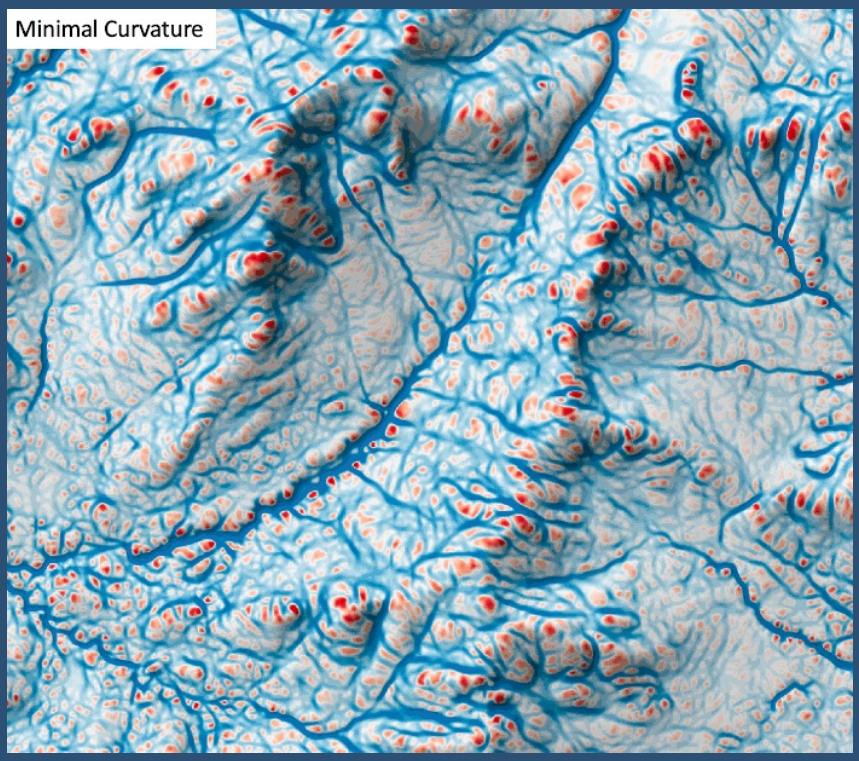


WhiteboxTools for QGIS Plugin

Over the past month, we have received abundant feedback from users who could no longer access the volunteer-developed QGIS plugin, **WhiteboxTools for Processing**, due to an interruption related to the war in Ukraine. We have responded to this situation by developing an in-house official QGIS plugin, WhiteboxTools for QGIS. This plugin will allow you to access all the 460+ tools in the WhiteboxTools Open Core, as well as the 60+ tools within the Whitebox extension products, from within the QGIS environment. We recognize how important QGIS is for the Whitebox user community and we are committed to maintaining this frontend so that it is always up-to-date and remains a first-class frontend option within the Whitebox platform.

Whitebox Geospatial Blog: Why are there so many surface curvatures

In our most recent blog post "Why are there so many surface curvatures", we introduce the numerous amount of surface curvatures tools that exist within WhiteboxTools. We briefly touch on which curvatures in WhiteboxTools are useful for certain applications and also how to use these tools within WhiteboxTools. While some of the more common curvatures like Profile and Total exist in the WhiteboxTools open core, more advanced algorithms such as Ring, Rotor and Horizontal Excess curvature and more exist within the DEM and Spatial Hydrology Extension. Check out the blog post today!



Check out the blog ›

WhiteboxTools Merchandise

If you have ever thought about ways to support the project, in addition to purchasing a license, you can now choose from our official WhiteboxTools Merchandise line of products. Looking for a new mug for your office? How about a cool new t-shirt? Check out our shop to pick out something today!

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