

TerraPhoto colour corrections and seam line editing

Arttu Soinen

Software developer

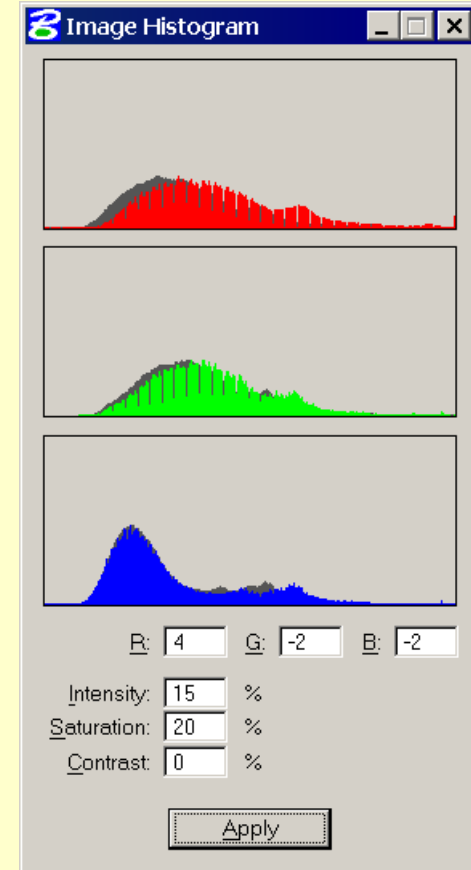
Terrasolid Ltd

New rectification workflow

- *Generate thumbnails for raw images*
- *Define color corrections to balance large color differences*
 - *Use Define color points for viewing*
- *Reach best positioning for image list (tie points, camera parameters, Adjust positions)*
- *Vectorize buildings+bridges if aiming for true ortho*
- *Search automatic color points*
- *View orthomosaic and fix color points where needed*
- *Search best seamlines automatically*
- *View orthomosaic and fix seamlines where needed*
- *Run rectification*

View image adjustments

- *R, G and B add values to RGB channels*
 - ◆ *For balancing color channels*
- *Intensity multiplies value in HSV model*
 - ◆ *Makes image brighter or darker*
 - ◆ *Expressed as a percentage*
 - ◆ *+40 multiplies value with 1.40*
 - ◆ *-25 multiplies value with 0.75*
- ◆ *Saturation multiplies saturation in HSV*
 - ◆ *Makes color stronger or weaker*
 - ◆ *Expressed as a percentage*
 - ◆ *+40 multiplies saturation with 1.40*
 - ◆ *-25 multiplies saturation with 0.75*
- *Contrast moves RGB values away from 128*



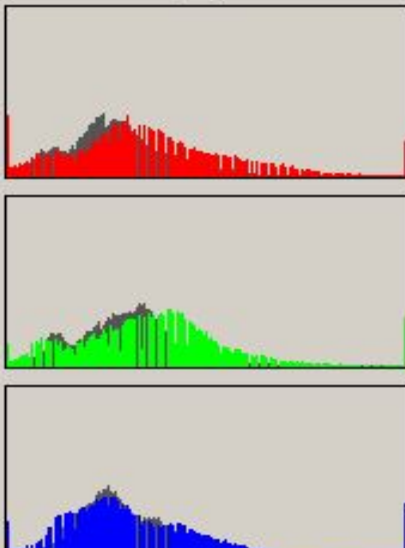
Define color corrections

- *For defining a unique color correction for each image*
- *Stores corrections in the image list (.iml)*
- *Applies corrections on the fly whenever using raw images*
 - *tie point entry*
 - *perspective views*
 - *rectification*
- *Correction algorithm selected to have minimal adverse effects on image quality*

Define color corrections

Define color corrections

Display... Select by...



Color balance

Red: 10
Green: 5
Blue: 0

Apply


Intensity, saturation & contrast

Intensity: 20 ... Apply

Saturation: 10 Apply

Contrast: 20 Apply

Show location Identify



Define color corrections workflow

- *Start with initial image list (no positional adjustment)*
- *(Optional) Use Tools / Analyze images command:*
 - *Check average color value, intensity, saturation and contrast*
 - *Display averages for each camera or time intervals (=flight passes or flight sessions)*
- *Use Define color corrections to set correction values*
- *Save image list*
- *Create positionally adjusted lists later*

Rectify images menu command

- *Rectifies individual images*
 - *One rectified raster for each raw image*

Rectify images

Ortho images

Rectify: All images

Output naming: rec01234567

Pixel size: 0.12 m

Format: GeoTIFF

Create TFW files

Coord system: AGD66 / AMG zone 51

Select...

Ground model

Search points: 100.0 m around tile

Laser points: Keep in memory

Options

Use surface objects Levels: 1,4

Use breaklines Levels: 30,34-37,43

Ortho image quality

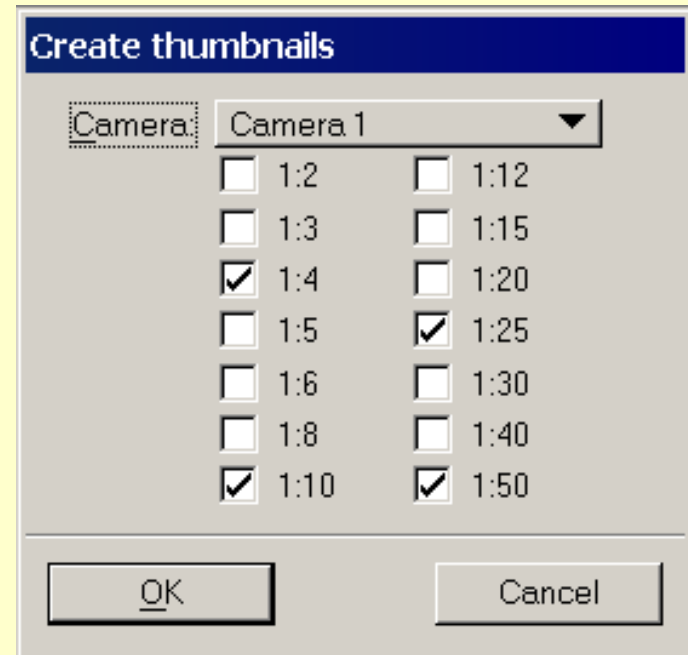
Sample pixel color

Fill object gaps Upto: 3 pixels

OK Cancel

Create thumbnails command

- *Can now create multiple thumbnail ratios as one operation*
- *Thumbnails used by:*
 - *Define color corrections command*
 - *Active full view in tie points*
 - *Color point display*



New set of rectification tools

- *Ability to view resulting orthomosaic*
 - *No rectified images stored*
 - *Software computes orthomosaic on the fly*
- *Tools for placing color points to define color balancing between raw images*
 - *Automatic search*
 - *Manual placement and editing*
- *Tools for seamline selection*
 - *Automatic search for best seamlines (=least cost)*
 - *Manual placement of selection shapes*

Source data for color point display

- *Ground model from points*
- *(Optional) Object shapes for buildings & bridges*
- *Raw images, orientation, camera calibration*
- *Color points for color balancing*
- *Image selection shapes*

Color point display speed

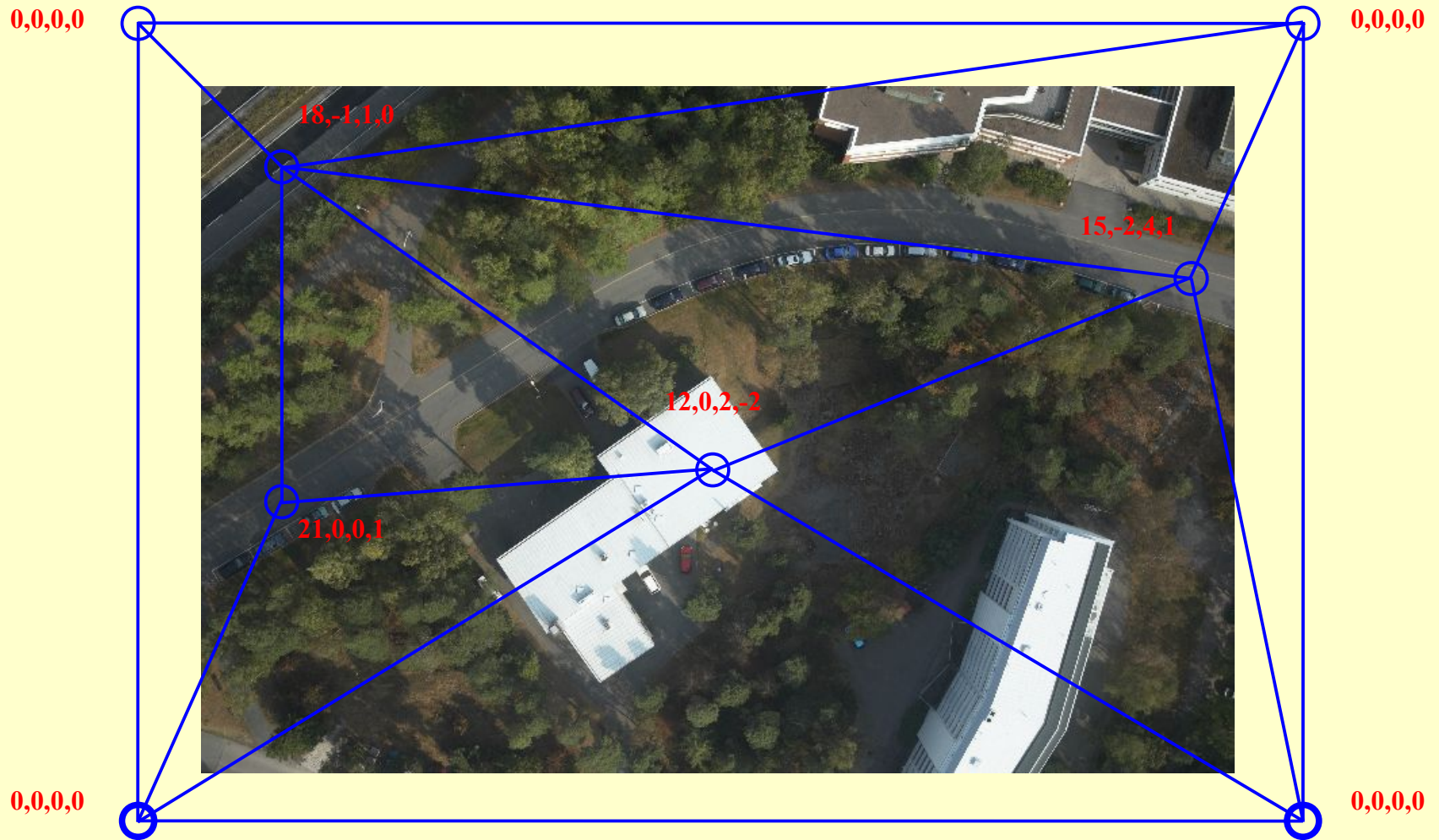
- *Hard disk speed – RAID recommended*
- *Use large buffer for images – memory configuration*
 - *XP Pro SP2 with/3GB*
 - *XP x64*
 - *Vista 64*
- *Fast dual core processor or two processors*
 - *Many routines use two threads, some four*

Color points & Selection shapes

- *Color points stored as .cpt text file*
- *Selection shapes stored as shapes in the design file*
 - *32 MB design file limit in SE/J may cause trouble*

Color point correction model

- *Each color point gives intensity and RGB balance corrections for the image at point xy location*
- *These points form a triangulated correction model*



Automatic color point search

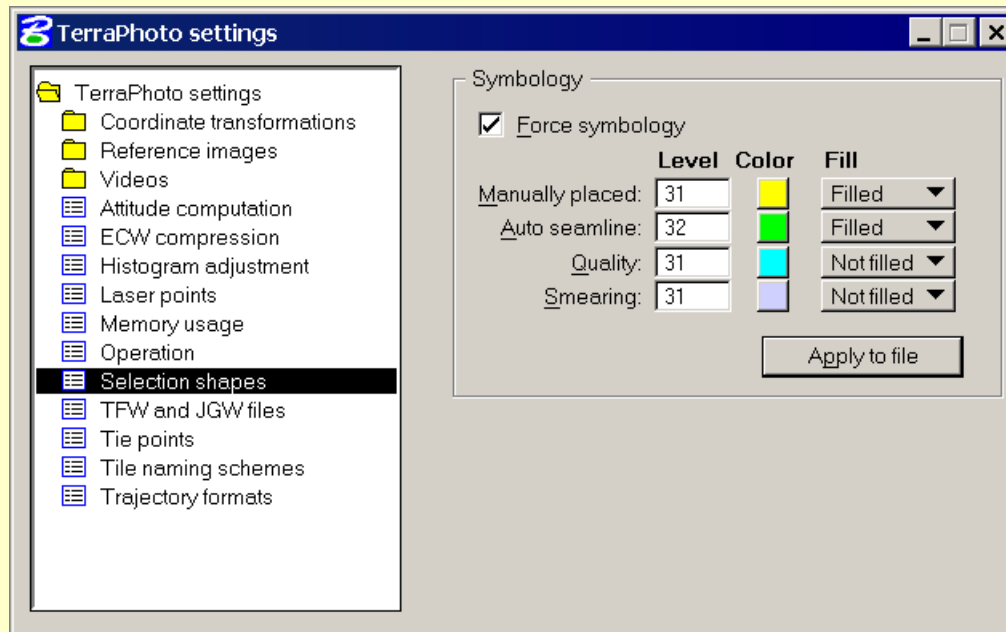
- *Searches for a large number of potential color points*
- *Uses object shapes to search also on roof tops*
- *Uses laser points to determine locations with trees or some other objects causing coverage*
- *Rates each potential point by:*
 - *Is the point needed? Do images differ?*
 - *Do images see the same object? Do images match after intensity and RGB correction?*
- *Select best points to use*
- *Runs iteration adding points which differ too much from the current correction model*

What to do when you change....

- *Delete images: Open and Save*
- *Define color corrections & Color points active: update view*
- *Define color corrections: Recompute all*
- *Coordinate system: Transform positions (TBD)*
- *Adjust model elevations: Recompute all*
- *Vectorize buildings: delete points & shapes in that area*
- *Modify ground: delete points & shapes in that area*

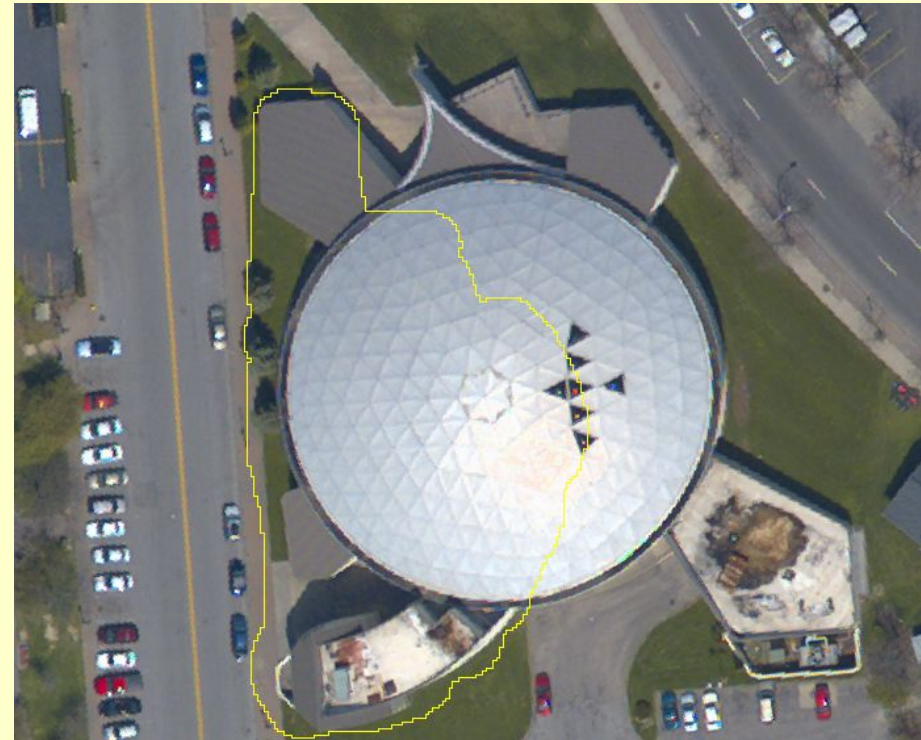
Selection shape types

- *Four different level & symbology settings*
- *Selection shapes stored only as design file vectors*
- *Modify with MicroStation tools*
- *Elements have attribute information*



Manually Placed Shapes

- *Place using:*
 - *Assign selection polygons*
 - *Paint selection*
 - *Place selection*
- *Specify one image to use inside shape*
- *Shape placed last overrides overlapping older shapes*



Auto Seamline Shapes

- *Place using Search seamlines*
- *Specify one image to use inside shape*
- *Good for going around small features*
- *Not so good with:*
 - *Large features (large buildings)*
 - *Some forest places (tries to find perfect solution)*

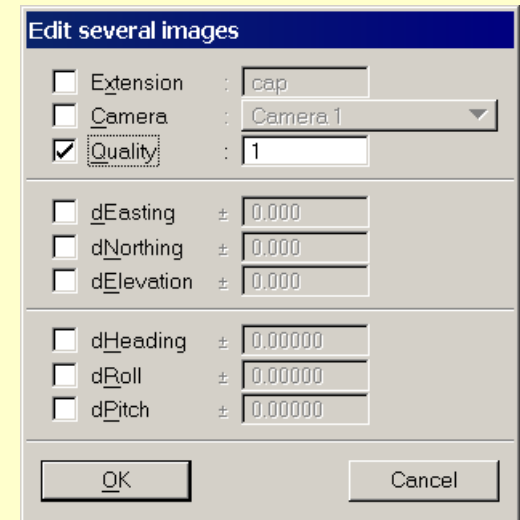


Quality Shapes

- *Specify an area to be rectified only using images with at least given quality level*
- *Example:*
 - *Road flown at 100m altitude and 300m altitude*
 - *Set 100m images to have quality 1*
 - *Set 300m images to have quality 3*
 - *Place quality shape along the road area covered by 100m images*
 - *Will use 300m images only outside the shape*

Image Quality

- *Each image list image now has quality value 1 – 126*
- *For ranking images based on visual quality*
 - *Often used for images from different altitudes*
- *You can set image quality by:*
 - *Select one or several images in the list*
 - *Select Image / Edit menu command*
- *Quality affects:*
 - *Weight factors in color points*
 - *Rectification inside quality shapes*



Smearing Shapes

- *Specify that images should be blended close to seamlines*
- *Use when images do not match otherwise*
- *Good for:*
 - *Water with sun reflection*
 - *Fields with small vegetation*

