AGFA'S :APERTUNE SOFTWARE

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I am delighted to be able to describe Agfa's AperTune software, and how it is being used by Aerial Photographers worldwide right now.

Firstly, a note on what :AperTune is, what was behind its creation and what benefits it provides. :AperTune is a program which runs on the versatile Mac platform, and is designed to perform image processing and quality enhancements as part of the pre-mosaiicing process.

Our concept was to provide something to
- Make the mosaic process easier, and produce better results
- Save intensive manual work on each image
- Salvage poor quality images, potentially saving reflights
- Extend the flying time of each trip
- Make images conform to radiometric standards

The working philosophy for :AperTune was not to reproduce existing software that operators use for manual editing, but rather to use intelligent algorithms to simply batch process a large number of images so that they emerge from :AperTune ready for mosaiicing.

Below are two mosaics, the left-hand one using images optimised manually, and the right-hand one using images automatically processed via :AperTune. This shows how mosaiicing becomes much easier, and that it saves intensive manual work on each image.

Negative to Positive conversion

:AperTune can of course work with digital images, but it is at its best when the images are scanned. Traditionally, the scanner needs to be configured for each run in order to set its parameters to produce the best result. :AperTune does not require this for scanners running at say 12 bits upwards. The image is scanned as a negative using the full range (DMin=0, Dmax=4), and :AperTune automatically produces a set of consistent outputs. This totally eliminates any repetitive scanner setup issues – once set up, it just runs.


The three basic tools

Putting aside all the interesting features that :AperTune can provide, there are three basic tools that are recommended to use for pre-mosaiicing purposes. These are :-
- Variable-Frequency Dodging
- Lens Correction
- Histogram Matching

Dodging is well-known to all Aerial Photographers, and is used to average out the highlights and shadows of the image – for example reducing the effect of the sun shining at an angle and making one side of an image brighter that the other. :AperTune has added many levels of tunability, ranging from simply changing the extent of the dodging, to selecting the amount of protection of shadows, highlights and neutral colours from the dodging.

An example is given below, showing how :AperTune handles such an image :-
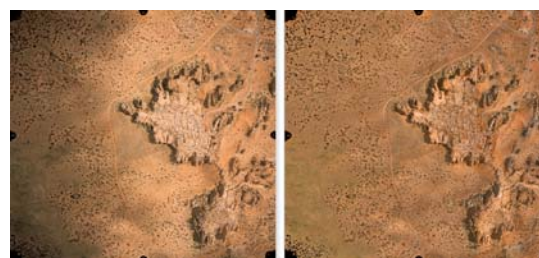
Original image   *Image after AperTune dodging*

Under some conditions, especially for high-altitude shots or if there is a slightly hazy atmosphere, the outside of an image can take a bluish cast, and the centre a yellowing cast. :AperTune can automatically detect and correct this, and the effect can look like the haze is simply removed. For example :-

Original image   *Image after AperTune Lens correction and dodging*

The third basic tool is Histogram matching. :AperTune follows the lead taken by the Ordnance Survey, who have defined histogram characteristics of acceptable images. For example, the mean luminosity of the Red channel must be within certain limits, and similarly for Green and Blue.

With :AperTune, a customer can select their own histogram characteristics, although to date all :AperTune users have been content to use the default values we provide.

A good example of its power is when images have been taken at different times of the day, or even different times of the year. The example below shows a pair of images around the same area which are totally mismatched in terms of colour, and what the normal default histogram matching can achieve :-

Original pair of images

Images after Histogram matching

With negative to positive conversion and these three basic tools, many of the pre-mosaiicing requirements can be met.

For those people who need to conform to radiometric standards, :AperTune provides a perfect way of automatically ensuring that all images conform.

Other :AperTune features

There is a large number of other features, and I will skim through most of them.

They include scratch removal, noise removal without blurring the image, JPEG artefact removal and intelligent sharpening. How is it intelligent? – it checks how sharp the edges are already, and the decides how much extra sharpening is needed.

There are other features such as a comprehensive Tonal Gradation which gives fine control of contrast, clipping and saturation.

:AperTune also provides a Selective Colour Correction capability where one colour can be swapped out for another. This has been used to remove the effect of cloud shadows, and is expected to have application in highlighting certain types of crops for agricultural or other surveys.

Perhaps the most intelligent of all of them is the Variable Frequency Detail enhancement. It uses wavelet analysis to pick out features that are otherwise difficult to see. Below is an interesting example :-

Once the parameters are set up and the appropriate features selected, all of the images in a run can then simply be sent to :AperTune and it will process the whole batch automatically. For film users, the scanner can output directly to :AperTune, and this way of working can be run without adding significantly to the throughput.

How :AperTune is being used

There are now many interesting uses :AperTune users have found helpful.

The most common ones are :-

- to reduce the burden of setting up the film scanning
- to process files so that they produce mosaics with less manual editing required
- to salvage bad images caused by atmospheric conditions
- to conform to histogram standards, and demonstrate conformance

However, there have been some interesting other uses.

Some customers are successfully using :AperTune for enhancing satellite imagery.

Another has a web site where the user clicks on a feature such as a building, and four images come up, taken from the North, South, East and West. This is oblique photography, so that each side of the feature can be seen. Before :AperTune, the images varied in brightness, contrast and even colour, :AperTune enables a much more consistent and pleasing set of images to be shown.

Agfa is continuing to develop :AperTune, and we expect some interesting additions and enhancements over the next few years as increasingly more customers start to expand the way it is used and bring us more challenges.

This is just a brief overview of the capabilities and uses of :AperTune so far. If you wish to know more, please contact me at barry.landsberg@agfa.com