PictoVera

What is it...

PictoVera is a high performance product processor software that provides high fidelity geo-location of source imagery acquired from multiple sensor platforms of various configurations. In short, it makes pixels valuable!

What it does...

PictoVera ingests platform trajectory data (e.g. Applanix, IPAS, Ixsea systems) and sensor payload data (e.g. images from multiple camera sensors, and range data from multiple lidar sensors). It analyses the sensor data and uses the derived information to match sensor features between multiple images (along track, cross track, and above/below track simultaneously).

The image (and range data) matches are utilized as generalized "tie points" in a photogrammetric (computer vision) bundle adjustment which computes "best-fit" corrections to the nominal trajectory data. This results in a much higher fidelity trajectory - one with which image fidelity is can be geo-referenced within about one pixel.

Once the data are precisely geo-referenced, various export products may be created. These include export of adjusted sensor orientation data as a function of time (e.g. camera orientation data at each exposure for each camera and lidar sensor orientation for each pulse). In addition, classic orthophoto images may be generated from an imported terrain model, or from a surface model generated by PictoVera™.

What's the concept...

PictoVera is designed from the ground up, as a high performance "product processor". Technology such as this has previously been available only within defense, reconnaissance and large space agency projects.

How it works...

PictoVera begins by ingesting source data - source data from different individual sensors, and source data from sensors operating in different modalities (e.g. imaging, ranging, positioning, etc.)

It assumes that the nominal flight trajectory is "about right" although "not good enough" - when it comes to making money.

Overall, the PictoVera technical processing is designed to convert a "nominal trajectory" into a "golden goose trajectory" - specifically to provide high fidelity sensor location and attitude information - that are used to provide precision geo-coding of sensor products - to "make the data match reality".

To establish sensor data into an existing geospatial framework the “block-adjusted” sensor data (which are expressed in WGS84/G-current ECEF datum) are compared with control point coordinates provided in the project-specific geodetic datum. An independent geodetic datum adjustment is performed to compute optimum horizontal and vertical datum conversion parameters.

Adjusted image and object point data may be exported with expression in a map reference system. For the export of image orientation data, an independent cartographic adjustment is performed in order to best reference each image to the curvilinear cartographic reference system.

How does it do it...

PictoVera models the *physical system* as a wholistic process. i.e. the PictoVera model starts with the vehicle (aircraft or automobile), continues through one or more "payload pods" mounted on the same vehicle, represents multiple sensors mounted within each payload - while representing diverse sensors including those that sense images, position, ranges, attitude, and more.

The conceptual model within PictoVera includes vehicle dynamics, sensor calibration performance and characteristics, external world characteristics, and various presentation methods involving cartographic production and any number of image formats.

In short - PictoVera includes the following sophisticated capabilities:

- ingest source data from arbitrary payload packages, multiple navigation/trajectory systems, different modality sensors (e.g. GNSS, IMU, Imaging, Lidar, Tilt/Rotation)
- utilize sensor data to detect, analyse and model platform/payload trajectory errors
- provide a "best-fit" trajectory most consistent with entire sensor payload
- evaluate and compute a "geodetic adjustment" that recognized differences between the geodetic datum in which modern sensor system platforms operate - vs. - often requested deliverable products
- horizontal datums – provide optimum transformation between global horizontal datums
- vertical datums - provide best fit of data to local V-datum
- perform an independent cartographic adjustment to export image orientation parameters that are “best fit” to curvilinear cartographic reference systems.

i.e. PictoVera - **first** - separates the navigation, from the photogrammetry, from the geodesy, from the cartography, it then solves each of these **independent** and orthogonal problems separately -- then it combines - in an optimal manner - the optimum solutions of each.

PictoVera is a software application and is an established, commercial software product developed by the industry-recognized and very well-respected Stellacore Solutions, LLC. PictoVera is an exclusive confidential property software product of Stellacore Solutions, LLC. PictoVera was previously in use processing a significant portion of the US National Agriculture Imagery Program (NAIP) pushbroom sensor data each year and is currently in use processing a 25+ million oblique frame images per year.

Stellacore Solutions, LLC and Stellacore Corporation have been providing sophisticated photogrammetry, advanced consulting, state-of-art algorithms and highly-profitable software applications and products into the industry at large and to preferred clients for nearly two decades.

In addition to the PictoVera product, Stellacore Solutions, LLC has created and offered a number of significant software products. In the photogrammetry market, Stellacore Solutions, LLC is perhaps best known for its product OrthoVista® the original and widespread mosaicking program which is perhaps the most widely deployed and recognized mosaicking software today (OrthoVista® has now been replaced by OrthoVista® Xtreme). One of Stellacore Corporation's creative custom offerings underpinned the success of AirPhotoUSA (and eventual sale of that company to DigitalGlobe). Another interesting Stellacore underpinning is a sister company (eventually sold to Fabricator's Choice) offering the "PhotoTop®" close-range photogrammetric system providing precision measurements to support residential and commercial countertop fabrication.