Extracting information from building façades

-from airborne RGB data-

UAV service providers specialized on building façades like the Syrphus GmbH in Munich appreciate the flexibility of professional drones. Especially in cities and in front of buildings, the entry hurdles like GPS shading, permanent delivery traffic, legal clarifications, and mixed illumination conditions are challenging. As soon as reasonable orthophotos and point clouds are available, the yet cumbersome and hardly reproducible manual work of image analysis starts. Particularly the evaluation of spallings and cracks, or crack changes, can visually be done in broad strokes only. However, for experts and insurance companies the detailed and reproducible analysis is a completely new category of image analysis. In this domain Syrphus cooperates with the Tama Group.

The application which was developed based on project basis is adapted specific to the façade. This is exemplified by the analysis of two different building façades: a historical monastery façade (data basis: RGB with 1.3 mm spatial resolution, Fig. 1) as well as a modern industrial façade (data basis: RGB with 1.1 mm spatial resolution, Fig. 2). The focus of the analysis is the positional accurate - and by exact outlines - quantified methodology for the recognition of damages, like spallings of paint, cracks in the walls, residues by dripping water outlets, and determination of areas of further characteristic façade details.

Fig. 1: Historical building façade with damages

The data processing follows a five-stage procedure. At the first step, the available data is imported and reviewed. Subsequently, the creation of important additional information (raster layer) follows, e.g. brightness, texture, and detected image edges. The imported as well as the generated layers are then utilized for a segmentation of the image in order to create preferably precise object borders. Afterwards, the produced segments are assigned to target classes

Tama Group GmbH
Lochhamer Str 1, DE-82166 Gräfelfing
Telefon +49 89 8007 5010, Fax +49 89 8989 1514

www.tama-group.com
www.tamaportal.com
info@tama-group.com

Fig. 2: Modern industrial façade

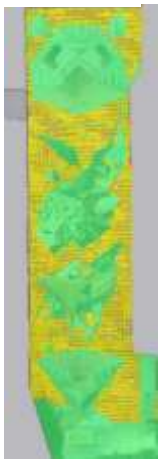
based on significant criteria, like object shape, color, and contextual relations. Thereby, segmentation and classification can be mutually dependent and repeated as often as necessary, focusing on certain classes if needed. Finally, the export of results takes place in the form of statistics, vector data, and raster layer. By these quantifications and the spatial allocation of damages also time series and their analyses can be established. This allows experts and insurance companies to determine the intensity and the course of damages and their causes faster, more exact, and cost-effective in contrast to manual methods.

The following illustrations represent an abstract of the classification results. Moreover, in Table 1 it is shown that besides the creation of graphics especially the elicitation of various statistics with regard to the extracted objects is possible.

Fig. 3: Extract of the classification results, partly with displayed object information

Table 1: Different statistics of the extraction results regarding the modern industrial façade

Feature	Size / Number
Total façade area	165.5 m² / 9,093 bricks – about 140 polluted by rain gutter
Sprayed bricks	96.3 m² / 5,839
Unsprayed bricks	53.7 m² / 3,254
Joints	15.2 m²
Pollution by rain gutter	0.2 m²
Gaps in joints	0.12 m² / 154



Overview of the application of UAV data for the detection of building façades

Input data	UAV based RGB mosaics
Preprocessing	Creation of additional information on raster basis
Software	eCognition Developer eCognition Server (recommended for large data sets) eCognition Architect
Ruleware	Tama Group multi-stage approach: • Precise segmentation of damages/objects based on all available layers • Assignment of object classes with the help of manifold parameter • GUI with the possibility of manual postprocessing of the results • Calculation of damage statistics for export
Results	Output format: • Image data (JPEG/TIF/PNG) • Maps (SHP) • Statistics

Tama Group GmbH
Lochhamer Str 1, DE-82166 Gräfelfing
Telefon +49 89 8007 5010, Fax +49 89 8989 1514

www.tama-group.com
www.tamaportal.com
info@tama-group.com

CITY MAPPING APPLICATIONS
INFORMATION EXTRACTION FROM UAV DATA

Tama Group specializes in automated information extraction, especially in object-based image analysis with eCognition.

We analyze images from various sensors and continue to refine our methods of automating information extraction. In doing so we combine machine learning, deep learning and expert knowledge.

With our **forest portal**, we are able to offer an image-based digital twin of his forest to practically every forestry company. This allows us to provide important information about the managed forest area in a clear manner.

Our **information factories** offer solutions for specific questions in various industrial areas such as agriculture, construction, energy, transport, environmental protection and materials science.

Distribution of Trimble eCognition: We offer an extensive sales, support and training portfolio, including our 4D maintenance package.

Tama Group GmbH
Lochhamer Str 1, DE-82166 Gräfelfing
Telefon +49 89 8007 5010, Fax +49 89 8989 1514

www.tama-group.com
www.tamaportal.com
info@tama-group.com