Quality Report

Generated with Pix4Ddiscovery version 3.0.18

Important: Click on the different icons for:

Help to analyze the results in the Quality Report

Additional information about the sections

Click here for additional tips to analyze the Quality Report

Summary

Project	uppercampus
Processed	2022-03-11 02:46:38
Camera Model Name(s)	FC220_4.7_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	3.8 cm / 1.49 in
Area Covered	0.2496 km^2 / 24.9581 ha / 0.0964 sq. mi. / 61.7047 acres
Time for Initial Processing (without report)	03h:13m:33s

Quality Check

Images	median of 34862 keypoints per image	✓
Dataset	417 out of 417 images calibrated (100%), all images enabled	✓
Camera Optimization	1.35% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 18249.8 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

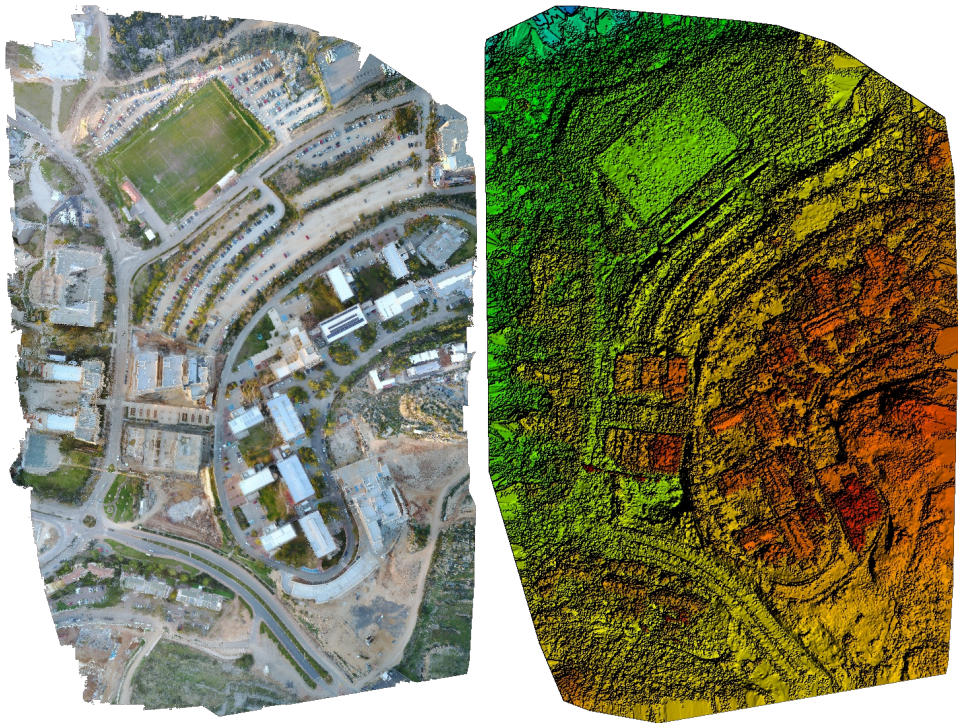


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	417 out of 417
Number of Geolocated Images	417 out of 417

Initial Image Positions

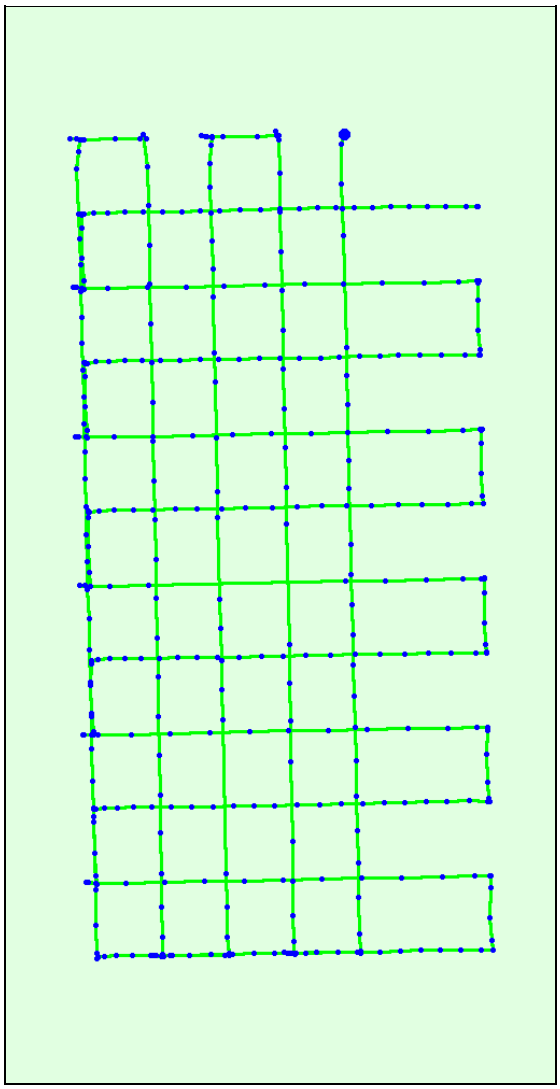


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

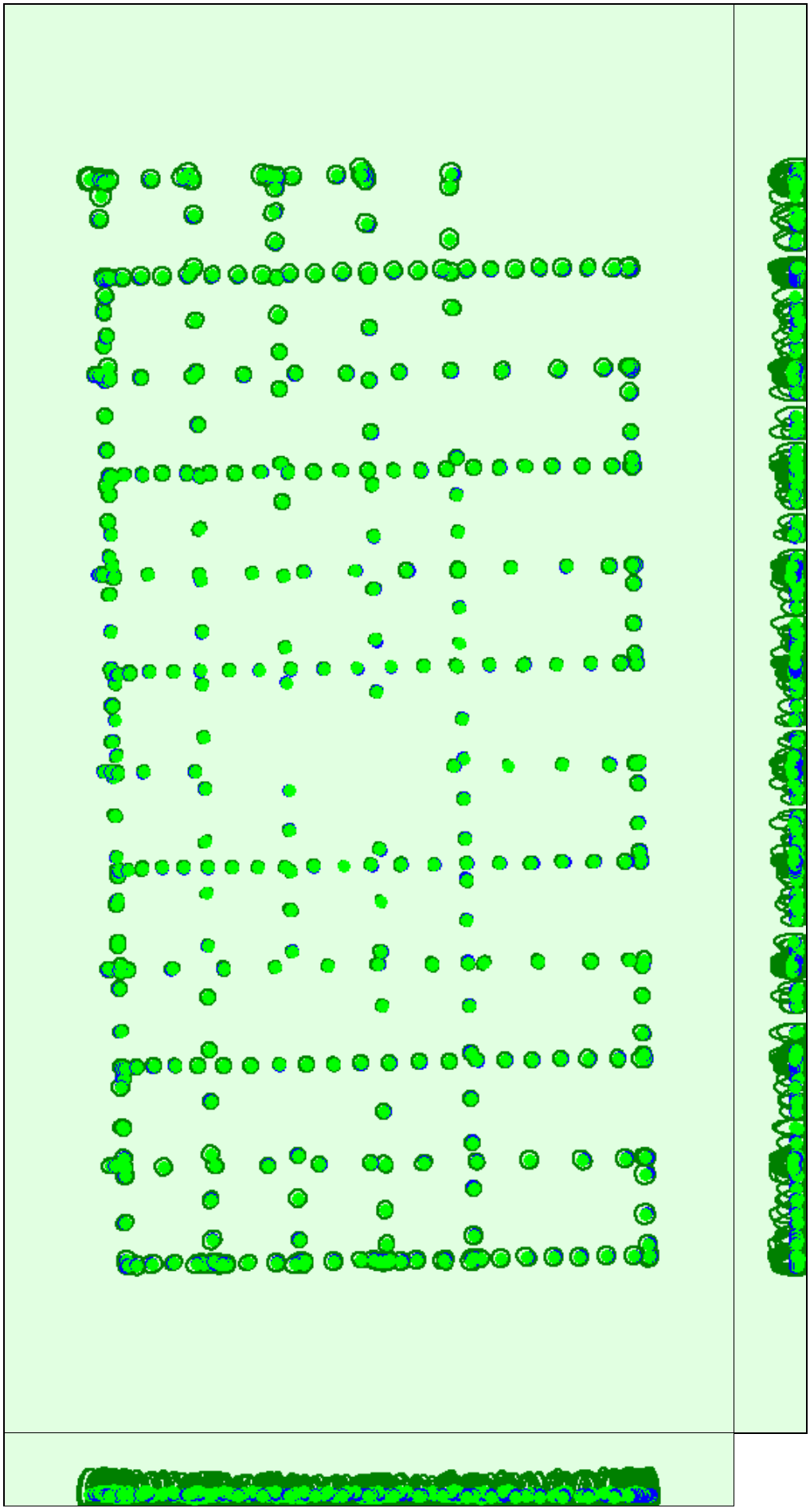


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

Absolute camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.556	0.555	1.353	0.374	0.676	0.295
Sigma	0.093	0.093	0.263	0.051	0.048	0.021

Overlap

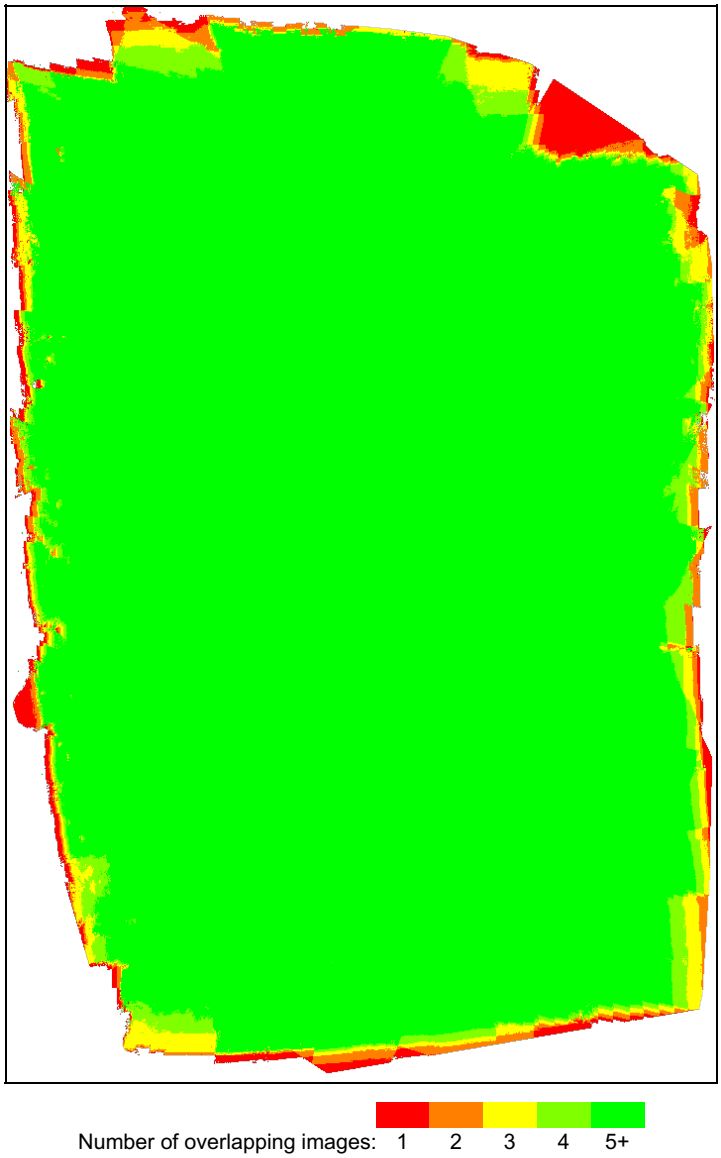


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

Bundle Block Adjustment Details

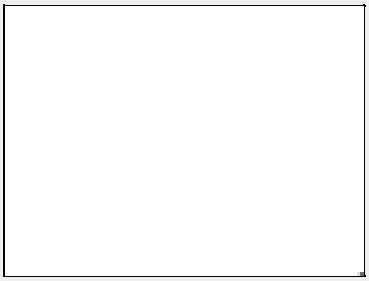
Number of 2D Keypoint Observations for Bundle Block Adjustment	7529797
Number of 3D Points for Bundle Block Adjustment	2256213
Mean Reprojection Error [pixels]	0.301

Internal Camera Parameters

FC220_4.7_4000x3000 (RGB). Sensor Dimensions: 6.327 [mm] x 4.745 [mm]

EXIF ID: FC220_4.7_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3073.410 [pixel] 4.861 [mm]	1917.790 [pixel] 3.033 [mm]	1485.800 [pixel] 2.350 [mm]	0.033	-0.086	0.078	0.000	-0.001
Optimized Values	3115.152 [pixel] 4.927 [mm]	1970.897 [pixel] 3.117 [mm]	1444.877 [pixel] 2.285 [mm]	0.041	-0.121	0.130	-0.000	0.000
Uncertainties (Sigma)	1.836 [pixel] 0.003 [mm]	0.285 [pixel] 0.000 [mm]	1.249 [pixel] 0.002 [mm]	0.001	0.002	0.003	0.000	0.000



The number of Automatic Tie Points (ATPs) per pixel averaged over all images of the camera model is color coded between black and white. White indicates that, in average, more than 16 ATPs are extracted at this pixel location. Black indicates that, in average, 0 ATP has been extracted at this pixel location. Click on the image to the see the average direction and magnitude of the reprojection error for each pixel. Note that the vectors are scaled for better visualization.

2D Keypoints Table

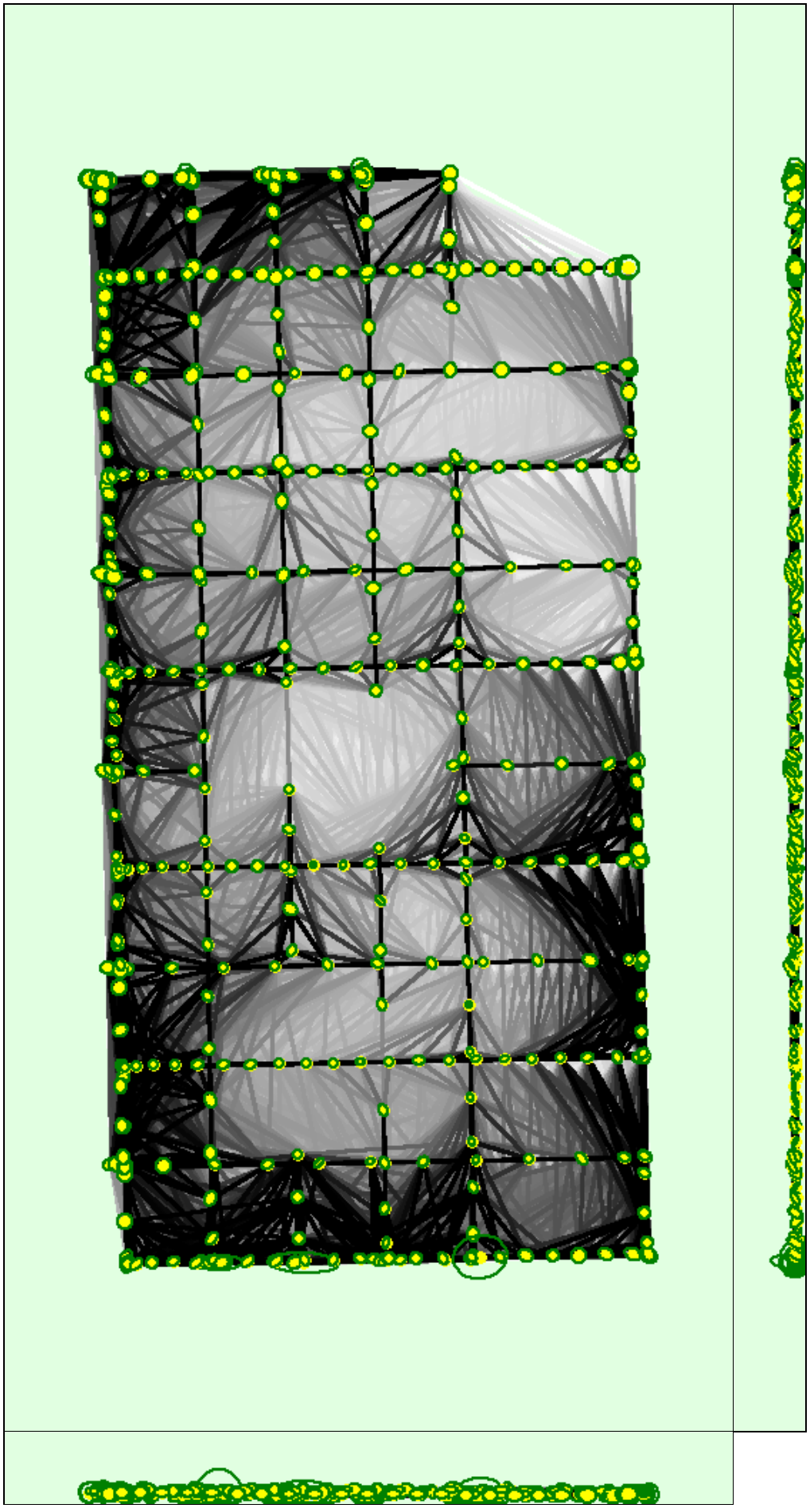
	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	34862	18250
Min	19536	805
Max	51165	35431
Mean	35180	18057

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1298014
In 3 Images	409991
In 4 Images	193010
In 5 Images	109090
In 6 Images	67368
In 7 Images	44443
In 8 Images	30478
In 9 Images	21865
In 10 Images	16311
In 11 Images	12402
In 12 Images	9737
In 13 Images	7447
In 14 Images	5960
In 15 Images	4843
In 16 Images	3879
In 17 Images	3189
In 18 Images	2499
In 19 Images	2180
In 20 Images	1859
In 21 Images	1486
In 22 Images	1377
In 23 Images	1120
In 24 Images	1035
In 25 Images	851

In 26 Images	696
In 27 Images	655
In 28 Images	561
In 29 Images	528
In 30 Images	418
In 31 Images	395
In 32 Images	331
In 33 Images	264
In 34 Images	241
In 35 Images	238
In 36 Images	200
In 37 Images	190
In 38 Images	152
In 39 Images	135
In 40 Images	119
In 41 Images	94
In 42 Images	65
In 43 Images	85
In 44 Images	61
In 45 Images	49
In 46 Images	54
In 47 Images	38
In 48 Images	35
In 49 Images	24
In 50 Images	29
In 51 Images	18
In 52 Images	14
In 53 Images	13
In 54 Images	16
In 55 Images	14
In 56 Images	7
In 57 Images	11
In 58 Images	10
In 59 Images	6
In 60 Images	3
In 61 Images	3
In 62 Images	1
In 63 Images	2
In 64 Images	1
In 65 Images	2
In 66 Images	1

2D Keypoint Matches



Uncertainty ellipses 50x magnified

Number of matches

25 222 444 666 888 1111 1333 1555 1777 2000

Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.046	0.045	0.039	0.038	0.028	0.014
Sigma	0.016	0.010	0.013	0.014	0.008	0.005

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	0.00	0.00
-3.00	0.00	51.56	54.92	44.84
0.00	3.00	48.44	45.08	55.16
3.00	6.00	0.00	0.00	0.00
6.00	9.00	0.00	0.00	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		0.000000	0.000000	-0.000000
Sigma [m]		0.372248	0.256868	0.630330
RMS Error [m]		0.372248	0.256868	0.630330

Min Error and Max Error represent geolocation error intervalsbetween -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the intial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	100.00	100.00	100.00
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	1.439
Phi	1.506
Kappa	4.604

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Core(TM) i7-4870HQ CPU @ 2.50GHz RAM: 16GB GPU: no info (Driver: unknown)
Operating System	Darwin 21.1.0 x86_64

Coordinate Systems

Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS84 / UTM zone 36N (egm96)

Processing Options

Detected Template	3D Maps
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes Bundle Adjustment: Classic

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Matching Window Size	7x7 pixels
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Advanced: Limit Camera Depth Automatically	no
Time for Point Cloud Densification	08h:27m:06s
Time for 3D Textured Mesh Generation	37m:24s

Results

Number of Generated Tiles	1

Number of 3D Densified Points	26178646
Average Density (per m^3)	73.59