

Digital Photogrammetry

Wilfried Linder

Digital Photogrammetry

A Practical Course

Fourth Edition

 Springer

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Preface to the Fourth Edition

During the time since the last edition, the software development went on, and therefore it was necessary to adapt the text according to the actual program versions which were also tested to work properly under MS Windows 10. A few options which are obsolete nowadays were removed, some new options were added, handling of the software was simplified in several places, and so on. For the use of own images taken with a custom digital camera, a new chapter offers an easy way of lens calibration and explains how to get good results with a minimal work. Nevertheless, the general structure and the aims of this book remain unchanged: Step by step the reader is led through several tutorials to see and learn the basics of photogrammetric processing.

Like in the previous editions, not only the input data but also the intermediate and final results are presented, so that it is possible to skip parts of a tutorial and go on with a later state. The software and the data are no more delivered on CD-ROM but are available in a server: Just go to extras.springer.com and key in the ISBN number of this book.

Many thanks to Mrs. Angela Rennwanz (University of Düsseldorf) for her help with the layout of this book!

Düsseldorf
March 2016

Wilfried Linder

Preface to the Third Edition

Also the second edition was sold successful. It seems that the hope I wrote about in chapter 6.8 (“A view into the future: Photogrammetry in 2020”) will be fulfilled—photogrammetric techniques are not only in use until today but even new fields of applications came up. One of them is stereo photogrammetry with high resolution satellite images about which we will talk and learn in a new tutorial, see chapter 6.6. Another interesting new chapter (6.7) deals with simple flatbed scanners which you can use to create anaglyph images from small objects.

Again the software (included on the CD-ROM) was improved, a new programme (LISA FFSAT) was added, and the text in this book was actualised to the new possibilities of the software.

This is the place to thank the publisher and in particular Dr. Christian Witschel for the pleasant and straightforward collaboration since nearly 10 years!

January 2009
Düsseldorf

Wilfried Linder

Preface to the Second Edition

During the short time between the first edition and now many things happen giving the editors and me the idea not only to actualise this book but also to include further chapters. The changes are (among others):

The subtitle. It was the goal to give readers a compact and practical course with theoretical background only as far as necessary. Therefore we changed the subtitle from “Theory and Applications” to “A practical course”. Nevertheless, and this was a remark of several reviewers, some more theory than before is included.

More about close-range photogrammetry. The first edition dealt mainly with aerial photogrammetry, now the field of terrestrial or close-range applications is expanded. For instance, an automatic handling of image sequences (time series) was developed and will be presented.

In this context we also take a special look to digital consumer cameras which now are available for low prices and which the reader may use for own projects in close-range applications. Regarding the lens distortion of such cameras, a chapter dealing with lens calibration was added.

A glossary now gives the reader a quick reference to the most important terms of photogrammetry. All words or technical terms included there are written in *italics* in this book.

Last but not least: The software which you find on the CD-ROM was improved and expanded, and the installation of software and data is now easier than before.

July 2005
Bad Pyrmont

Wilfried Linder

Preface to the First Edition

Photogrammetry is a science based technology with more than a century of history and development. During this time, the techniques used to get information about objects represented in photos have changed dramatically from pure optic-mechanical equipment to a fully digital workflow in our days. Parallel to this, the handling became easier, and so it's possible also for non-photogrammetrists to use these methods today.

This book is especially written for potential users which have no photogrammetric education but would like to use the powerful capabilities from time to time or in smaller projects: Geographers, Geologists, Cartographers, Forest Engineers who would like to come into the fascinating field of photogrammetry via “learning by doing”. For this reason, this book is not a textbook—for more and deeper theory, there exists a lot of literature, and it is suggested to use some of this. A special recommendation should be given to the newest book from KONECNY (2002) for basic theory and the mathematical backgrounds or to the book from SCHENK (1999) for the particular situation in digital photogrammetry. For a quick reference especially to algorithms and technical terms see also the Photogrammetric Guide from ALBERTZ & WIGGENHAGEN (2005).

This book includes a CD-ROM which contains all you need from software and data to learn about the various methods from the beginning (scanning of the photos) to final products like ortho images or mosaics. Starting with some introductory chapters and a little bit of theory, you can go on step by step in several tutorials to get an idea how photogrammetry works. The software is not limited to the example data which we will use here—it offers you a small but powerful Digital Photogrammetric Workstation (DPW), and of course you may use it for your own projects.

Some words about the didactic principle used in this book. In Germany, we have an old and very famous movie, “Die Feuerzangenbowle” with Heinz Rühmann. This actor goes to school, and the teacher of physics explains a steam engine:

“Wat is en Dampfmaschin? Da stelle mer us janz dumm, un dann sage mer so: En Dampfmaschin, dat is ene jroße, schwachze Raum...” (SPOERL, 1933.

A language similar to German, spoken in the area of Cologne; in English: What is a steam engine? Suppose we have really no idea, and then let's say: A steam engine, that is a big black hole...). This "suppose we have no idea" will lead us through the book—therefore let's enter the big black hole called photogrammetry, let's look around and see what happens, just learning by doing. Theoretical background will only be given if it is indispensable for the understanding, but don't worry, it will be more than enough of theory for the beginning!

Concerning the object(s) of interest and the camera position(s), we distinguish between terrestrial (close-range) and aerial photogrammetry. This book mostly deals with the aerial case. Nevertheless, the mathematical and technical principles are similar in both cases, and we will see an example of close-range photogrammetry in the last tutorial.

A briefly description of the software is included in the last part of this book (chapter 10).

This is the right place to give thanks to all people who helped me:

To my chief, Prof. Dr. Ekkehard Jordan, for all the time he gave me to write this book, and for his interest in this science—he was one of the first Geographers using analytical photogrammetric methods in glacier investigation—and to all my friends and colleagues from the Geographic Institute, University of Düsseldorf, for many discussions and tests. To Mrs. Angela Rennwanz from the same institute—she made the final layout, therefore my special thanks to her!

To Prof. Dr. mult. Gottfried Konecny, who encouraged, helped and forced me many times and gave me a lot of ideas, and to all my friends and colleagues from the Institute of Photogrammetry and GeoInformation (IPI), University of Hannover, for their scientific help and patience—especially to my friend Dr.-Ing. Karsten Jacobsen. To Prof. Dr.-Ing. Christian Heipke, now chief of the IPI, who agreed that I could use all of the infrastructure in this institute, and for several very interesting discussions especially concerning image matching techniques.

For proof-reading of this book thanks (in alphabetical order) to Dr. Jörg Elbers, Glenn West and Prof. Dr. mult. Gottfried Konecny.

Un agradecimiento de corazón a mis amigos del America del Sur, especialmente en Bolivia y Colombia!

It may be of interest for you: All figures in this book are also stored on the CD-ROM (directory ...figures) as MS PowerPoint™ files. Whenever you would like to use some of them, may be for education or scientific texts, please refer to this book! Thanks to the publishers for this agreement.

March 2003
Bad Pyrmont

Wilfried Linder

Contents

1	Introduction	1
1.1	Basic Idea and Main Task of Photogrammetry	1
1.2	Why Photogrammetry?	3
1.3	Image Sources: Analogue and Digital Cameras	3
1.4	Digital Consumer Cameras	5
1.5	Short History of Photogrammetric Evaluation Methods	6
1.6	Geometric Principles 1: Camera Position, Focal Length	7
1.7	Geometric Principles 2: Image Orientation	9
1.8	Geometric Principles 3: Relative Camera Positions (Stereo)	11
1.9	Some Definitions	12
1.10	Length and Angle Units	13
1.11	A Typical Workflow in Photogrammetry	14
2	Included Software and Data	17
2.1	Hardware Requirements, Operating System	17
2.2	Image Material	18
2.3	Overview of the Software	18
2.4	Installation	19
2.5	General Remarks	20
3	Scanning of Photos	21
3.1	Scanner Types	21
3.2	Geometric Resolution	22
3.3	Some Practical Advice	23
3.4	Import of the Scanned Images	23
4	A Single Model	25
4.1	Project Definition	25
4.2	Orientation of the Images	26
4.2.1	Camera Definition	26
4.2.2	Interior Orientation	28
4.2.3	Brightness and Contrast	31

4.2.4	Control Points	32
4.2.5	Exterior Orientation	34
4.2.6	Over-Determination and Error Detection	37
4.3	Model Definition	38
4.4	Stereoscopic Viewing	40
4.5	Measurement of Object Co-ordinates	42
4.6	Creation of DTMs via Image Matching.	44
4.6.1	Some Theory.	44
4.6.2	Practical Tests	49
4.6.3	Additional Manual Measurements.	51
4.6.4	Quality Control	51
4.7	Ortho Images	52
4.7.1	Some Theory.	52
4.7.2	Resampling Methods	54
4.7.3	Practical Tests	55
4.7.4	Creation and Overlay of Contours	56
4.7.5	Simple 3D Data Collection	58
5	Aerial Triangulation	61
5.1	Aerial triangulation measurement (ATM)	61
5.1.1	Common Principles	61
5.1.2	Interior Orientation.	62
5.1.3	Manual Measurement	63
5.1.4	Automatic Measurement via Image Matching: Introduction.	67
5.1.5	Co-ordinate Input and Measurement of Ground Control Points	67
5.1.6	Strip Definition	68
5.1.7	Measurement of Strip Connections	71
5.1.8	Automatic Image Co-ordinate Measurement (AATM)	72
5.2	Block Adjustment with BLUH.	75
5.2.1	Introduction.	75
5.2.2	Running the Block Adjustment	76
5.2.3	Discussion of the Results	78
5.2.4	Improvement of Strip Connections	83
5.2.5	Second Run of BLUH	84
5.2.6	Additional Analysis of the Results	84
5.3	Mosaics of DTMs and Ortho Images	88
5.3.1	Model Definition	88
5.3.2	Creation of a DTM Mosaic	88
5.3.3	Creation of an Ortho Image Mosaic	88
5.3.4	Shaded Relief	89
5.3.5	Contour Lines Overlay	90
5.3.6	3D View.	91

- 6 A Soil Erosion Experiment** 93
 - 6.1 The Situation 93
 - 6.2 Interior and Exterior Orientation 94
 - 6.3 Model Definition, Start Points 95
 - 6.4 DTM Creation 96
 - 6.5 Differential DTM 97
- 7 Wave Measurements** 99
 - 7.1 The Situation 99
 - 7.2 Interior and Exterior Orientation 101
 - 7.3 Model Definition 104
 - 7.4 DTM Creation 104
 - 7.5 Image Sequences 106
- 8 Lens Distortion and Calibration** 109
 - 8.1 Introduction 109
 - 8.2 Lens Calibration 111
 - 8.3 A Simple Self-made Model 113
- 9 Two Final Examples** 115
 - 9.1 Stereo Images from Satellites 115
 - 9.2 Stereo Images from Flatbed Scanners 117
 - 9.3 A View into the Future 119
- 10 Programme Description** 121
 - 10.1 Some Definitions 121
 - 10.2 Basic Functions 121
 - 10.3 Limitations 122
 - 10.4 Operating the Programmes 122
 - 10.5 Buttons in the Graphics Windows 123
 - 10.6 LISA BASIC 123
 - 10.6.1 File > Select Project 124
 - 10.6.2 File > Define Project 124
 - 10.6.3 File > Edit Project 124
 - 10.6.4 File > Import 125
 - 10.6.5 File > Export 126
 - 10.6.6 Vector Data > Control Points 126
 - 10.6.7 Vector Data > Define Symbols 126
 - 10.6.8 Vector Data > Projections 127
 - 10.6.9 Vector Data > Vector → Raster 127
 - 10.6.10 Image Processing > Two-Dimensional Histogram 128
 - 10.6.11 Image Processing > Rectification 128
 - 10.6.12 Image Processing > Mosaic 131
 - 10.6.13 Image Processing > Classification 131
 - 10.6.14 Image Processing > Matching 131
 - 10.6.15 Image Processing > Area Symbols 133

- 10.6.16 Terrain Models 133
- 10.6.17 Terrain Models > Interpolation. 134
- 10.6.18 Terrain Models > Filtering. 135
- 10.6.19 Terrain Models > Contour Lines Vector 135
- 10.6.20 Terrain Models > Numerical Evaluation 136
- 10.6.21 Terrain Models > Matching 136
- 10.6.22 Analysis 137
- 10.6.23 Data Base 137
- 10.6.24 Display Raster Image 137
- 10.6.25 Display Vector Graphics 142
- 10.6.26 Display Text 144
- 10.6.27 Display Attributes 144
- 10.7 LISA FOTO 145
 - 10.7.1 File > Select, Define or Edit Project 145
 - 10.7.2 File > Import. 145
 - 10.7.3 Pre Programmes > Camera Definition 146
 - 10.7.4 Pre Programmes > Control Points. 148
 - 10.7.5 Pre Programmes > Strip Definition 148
 - 10.7.6 Pre Programmes > Orientation > Measure > Interior Orientation. 148
 - 10.7.7 Pre Programmes > Orientation > Measure > Exterior Orientation 150
 - 10.7.8 Pre Programmes > Orientation > Measure > Calibration Pattern 151
 - 10.7.9 Pre Programmes > Parameters of the Exterior Orientation 152
 - 10.7.10 Pre Programmes > Select Model 152
 - 10.7.11 Pre Programmes > Define Model 152
 - 10.7.12 Aerial Triangulation Measurement (ATM). 154
 - 10.7.13 ATM > Manual Measurement 154
 - 10.7.14 ATM > Calculate Strip Images 157
 - 10.7.15 ATM > Measure Connections 157
 - 10.7.16 ATM > Automatic Measurement (AATM). 159
 - 10.7.17 ATM > Export > BLUH. 160
 - 10.7.18 Processing > Stereo Measurement 161
 - 10.7.19 Processing > Stereo Correlation (Matching). 163
 - 10.7.20 Processing > DTM Interpolation. 164
 - 10.7.21 Processing > Ortho Image 164
 - 10.7.22 Processing > Camera Positions. 165
 - 10.7.23 Processing > Image Sequences. 165
 - 10.7.24 Display Raster Image 166
 - 10.7.25 Display Text 166

- 10.8 Aerial Triangulation with BLUH 166
 - 10.8.1 Pre Processing > Select Project, Define Project 166
 - 10.8.2 Pre Processing > Control Point Editor 167
 - 10.8.3 Pre Processing > Strip Definition 167
 - 10.8.4 Pre Processing > Photo Co-ordinates Editor 167
 - 10.8.5 Block Adjustment > Strategy 167
 - 10.8.6 Block Adjustment > the Central BLUH Modules 168
 - 10.8.7 Block Adjustment > All (Batch). 169
 - 10.8.8 Block Adjustment > Analysis (BLAN) 169
 - 10.8.9 Display Graphics 170
 - 10.8.10 Display Text 170
 - 10.8.11 Some More Theory 170
- 10.9 LISA FFSAT 172
 - 10.9.1 Introduction 172
 - 10.9.2 Image Sources 173
 - 10.9.3 File > Select, Define or Edit Project 173
 - 10.9.4 File > Import 173
 - 10.9.5 Pre Programmes > Sensor Definition 174
 - 10.9.6 Pre Programmes > Orientation Measurement 174
 - 10.9.7 Processing > Stereo Measurement, Correlation,
DTM Interpolation 175
 - 10.9.8 Processing > Ortho Image 175
- Appendix** 177
- Glossary** 199
- References** 203
- Index** 207

List of Figures

Figure 1.1	Geometry in an oriented stereo model. Changing the height in point P (on the surface) leads to a linear motion (<i>left—right</i>) of the points P' and P'' within the photos along <i>epipolar lines</i>	2
Figure 1.2	The DMC (Digital Mapping Camera) from Z/I imaging—an example of a digital aerial camera. <i>Left</i> camera mounted on carrier. <i>Right</i> view from below—you can see the lenses belonging to the four area sensors. Courtesy of Intergraph Corp., USA	4
Figure 1.3	Example of a semi-metric digital camera: The medium-format H5D from Hasselblad. Courtesy of Hasselblad Vertriebsgesellschaft m.b.H., Germany	5
Figure 1.4	Different positions and lens angles. The situation, view from above	7
Figure 1.5	The results: Photos showing the house in same size but in different representations due to the central perspective	8
Figure 1.6	Focal length, projection centre and rotation angles	10
Figure 1.7	Relations between focal length f , height above ground h_g and the photo scale f/h_g	10
Figure 1.8	Camera positions parallel (<i>above</i>) and convergent (<i>below</i>)	12
Figure 1.9	Photos, models and strips forming a block	13
Figure 1.10	A typical workflow	14
Figure 4.1	Shapes (<i>first</i> and <i>second row</i>) and positions (<i>third row</i>) of fiducial marks in aerial photos.	27
Figure 4.2	Result of automatic centring of a fiducial mark	29

Figure 4.3	Relations between grey values in the image and on the screen.	31
Figure 4.4	Examples for natural ground control points.	33
Figure 4.5	Positions of the control points in the left image (No. 157)	35
Figure 4.6	Positions of the control points in the right image (No. 158)	37
Figure 4.7	Calculated versus correct graph of the function $f(x) = ax + b$ using two, three or more observations ($r =$ residuals)	38
Figure 4.8	Anaglyph method. Colours are used for separation of the left and the right image.	41
Figure 4.9	Homologous points (<i>white arrows</i>). Take care of moving objects like ships! Area: River Rhein near Düsseldorf	45
Figure 4.10	Situation in the terrain and kinds of digital elevation models	45
Figure 4.11	Relation between image positions and correlation coefficient.	46
Figure 4.12	Parts of the left and the right image, strongly zoomed. The grey values are similar but not identical. Therefore, the correlation coefficient will not be equal but will be near to 1	47
Figure 4.13	Displacements caused by the relief, grey value differences from reflections. Area: Nevado de Santa Isabel, Colombia	48
Figure 4.14	DTM derived from image matching.	49
Figure 4.15	Central projection (images) and parallel projection (map, ortho image)	53
Figure 4.16	The resampling problem: Find the grey values for the pixels in the new image	54
Figure 4.17	Effect of the grey value adjustment	55
Figure 4.18	Example of contour lines in 3D representation.	56
Figure 4.19	Ortho image, 10-m contours overlaid	57
Figure 5.1	Proposed positions of control points in the block. From Jacobsen (2007).	62
Figure 5.2	Scheme of a block adjustment.	63
Figure 5.3	Principles of point transfer within a block.	64
Figure 5.4	Position and terrain co-ordinates of the control points.	69

Figure 5.5 Part of the graphics interface for the measurement of strip connections. Click with the left mouse button for instance onto the position of this point in all of the 6 images in which it is represented, the sequence is without any meaning. Then, after the last position is digitised, click onto the right mouse button to finish this point and to increase the internal point number by 1 71

Figure 5.6 Automatic search of connection points (tie points) starting with already measured points 73

Figure 5.7 Workflow and interchange files in BLUH. Simplified from Jacobsen (2007). 77

Figure 5.8 Distribution of control- and tie points. 86

Figure 5.9 Area covered by each image 87

Figure 5.10 DTM mosaic, 25 m contours overlaid 89

Figure 5.11 Ortho image mosaic 90

Figure 5.12 Ortho image mosaic draped over the DTM mosaic (see also the book cover) 91

Figure 6.1 Test field for soil erosion, a camera position, control points. From Santel (2001) 94

Figure 6.2 Schematic drafts of points with good contrast. *Left* suitable for all purposes. *Middle* suitable only for y parallax correction. *Right* suitable only for measurement of the x parallax (\rightarrow height or z value) 96

Figure 6.3 Situation before rain (*left*) and afterwards (*middle*), 10 mm contours overlaid in both images, differential DTM (*right*) 97

Figure 7.1 The test area (*above*) and the camera positions on top of two houses (*below*). From Santel et al. (2002). 100

Figure 7.2 Approximate positions of the control points 102

Figure 7.3 Positions of the control points in detail. 103

Figure 7.4 Points found by correlation, showing the wave structures. The cameras are looking from bottom right. 105

Figure 7.5 Wave movement, time interval 0.25 s. 107

Figure 8.1 Barrel-shaped (*left*) and pincushion-shaped (*right*) distortions. 110

Figure 8.2 Effects of lens distortion. *Above* wide angle, barrel-shaped distortions. *Below* normal angle, very few distortions. 110

Figure 8.3 Photo of a calibration pattern, displayed on a flat-screen monitor 111

Figure 8.4 Distortion vectors at the target marks and position of principal point (*cross*) 112

Figure 8.5 Polynomial modelling the radial-symmetric displacements at the 88 target marks 113

Figure 8.6 Test object and control points: No. 1 = *lower left*, No. 2 = *lower right*, No. 3 = *upper right*, No. 4 = *upper left corner*. 114

Figure 8.7 3D point cloud of the relief. 114

Figure 9.1 Geometry of stereo images from satellites. From Jacobsen, 2007 116

Figure 9.2 Geometry of flatbed scanners 118

Figure 10.1 Enhanced connection of the images (within each strip: *green dots*, between neighbouring strips: *red dots*). 160

Formulas

1.7.1	Relation between height above ground, focal length and photo scale.	9
1.10.1	Length units	13
1.10.2	Angle units.	13
3.2.1	Relation between pixel size [dpi] and geometric resolution [μm].	22
4.2.1	Co-ordinate transformations	30
4.3.1	Collinearity equations	39
9.1.1	Rational polynomial coefficients (RPCs).	116