

fig/ETH.png

fig/LogoIGP.png

Photometric recording and modelling of the “Plan of St. Gall”

INTERDISCIPLINE PROJECT WORK

SS 2019

Zurich

Author

Jon Allemand and Sabine Rüdisühli

Professorship

Photogrammetry and Remote Sensing

Supervision

Prof. Dr. Konrad Schindler

Abstract

Abstract mit anderer Seiteneinrückung welche über "newgeometry" gelöst wird. Später■ wird die ursprüngliche geometrie mit ""restoregeometry" wieder zurückgeholt.

Acknowledgements

We would like to sincerely thank Professor Schindler, because he made possible an extraordinary project that brought together our acquired technical knowledge and a cultural asset. In addition, for the simple, but still very good care. Furthermore, we sincerely thank the whole Stiftsbibliothek of St. Gall, who received us a very warm welcome and a great confidence to work with the unique plan. Very big help was the Abbey librarian Cornel x, who made all the impossible things possible, and Silvio y, who was always available for our questions and made the whole measuring process possible.

Contents

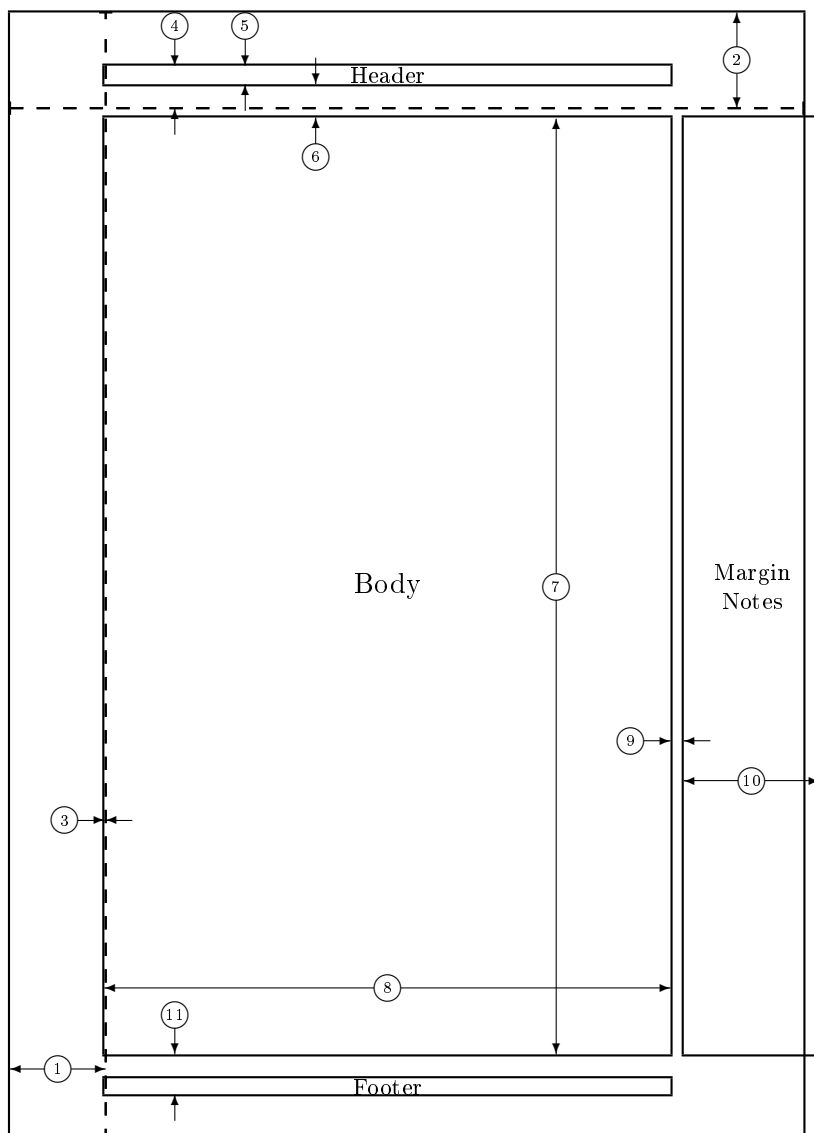
List of Figures	vi
List of Tables	vi
1 Introduction	1
2 Measurement	5
2.1 Setup	5
2.2 Minidome	5
2.2.1 Shape of Shading	5
2.2.2 Data	5
3 Stitiching	7
4 Feature detection	8
4.0.1 Needle holes	8
4.0.2 Scratches	8
5 Conclusion	9
References	9
A Appendix	11

List of Figures

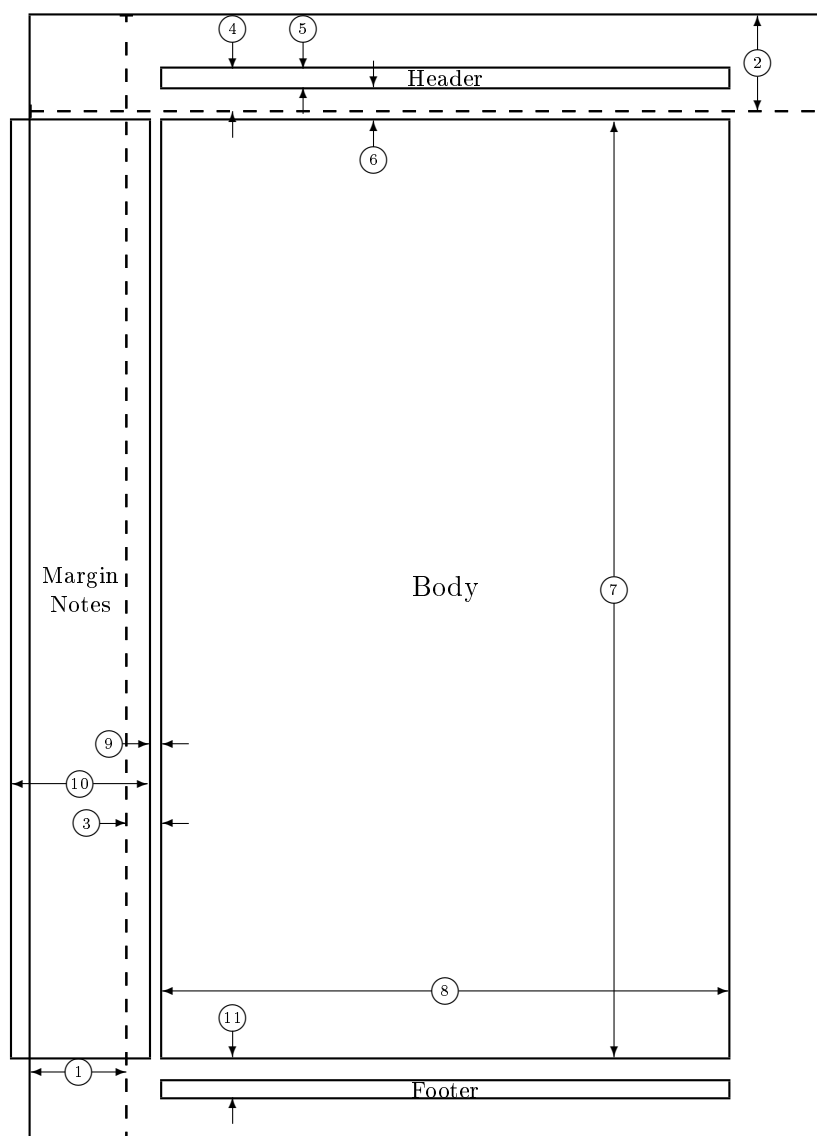
1	Difficult trees to estimate defoliation for	2
2	Human estimation of defoliation	3
3	Basic structure of a CNN	3

List of Tables

1	Quantification of errors for the images in Figure 1.	2
---	--	---



1	one inch + \hoffset	2	one inch + \voffset
3	\oddsidemargin = -1pt	4	\topmargin = -32pt
5	\headheight = 14pt	6	\headsep = 25pt
7	\textheight = 705pt	8	\textwidth = 426pt
9	\marginparsep = 10pt	10	\marginparwidth = 103pt
11	\footskip = 30pt		\marginparpush = 5pt (not shown)
	\hoffset = 0pt		\voffset = 0pt
	\paperwidth = 597pt		\paperheight = 845pt



1	one inch + \hoffset	2	one inch + \voffset
3	\evensidemargin = 27pt	4	\topmargin = -32pt
5	\headheight = 14pt	6	\headsep = 25pt
7	\textheight = 705pt	8	\textwidth = 426pt
9	\marginparsep = 10pt	10	\marginparwidth = 103pt
11	\footskip = 30pt		\marginparpush = 5pt (not shown)
	\hoffset = 0pt		\voffset = 0pt
	\paperwidth = 597pt		\paperheight = 845pt

1 Introduction

The start of the painting of the Plan of Saint Gall was in 16xx and afterwards, new parts were added. Due to the lifetime and the painting the plan gets some "injuries". To detect traces of the past, the Plan was recorded with the best measurement system nowadays, the Minidome, which allows to measure with mm-submillitre resolution and in 2.5D.

To substract some information from the Plan, firstly, the patches recording have to be stitched together. This steps have to be done because the portable Minidome can only record patches of a size of $x \times x$ cm and the Plan has a totally size of x m. For the extracting of research features, ideas have to build up which should work on an old, crumbled plan. These detected features will be afterwards analysed from plan experts. To prepare information for the experts, the plan was stitched together with Photoshop because all other program reached their limits with the given 1.5 TB dataset. The key point in this step was to get the transform parameters for each patch. After a lot of tries, Finally, a self-written C++ script solved the program. The second challenge, extracting research features like needle holes and scratches, can be only solved with manual detecting because the crumbled old plan destroyed all the genius, theoretical ideas for detecting. For examples, the made assumption that needle holes should be round and have some height differences are logical, but the circle matching program gave a lots of more possible circles which lays in wrinkled regions.

"textcite" für in den Fliesstext ergibt "Dobbertin et al. (2005)"

"parencite" für in der Klammer ergibt "(Dobbertin et al. 2005)"

Neue Linie mit doppelbackslash oder "newline" Befehl oder zwei Absätzen.

"quote": Wie man etwas wörtlich zitieren kann so dass es schön formatiert ist:

However blabla bla on average small.

Ein externes Latex-Dokument einbinden ist ganz einfach mit "input" zu bewältigen:

Dies ist in einem separaten .tex Dokument namens notmian.tex abgespeichert.

Eine Aufzählung machen...

- item one
- item two

und mit weniger Abstand:

- item one
- item two

Italics mit "textit" *dies ist schraeggestellt*

Url einfügen und Footnote mit Accessdatum <https://deephunt.in/the-gan-zoo-79597dc8c347>¹. ■

Schwarzer Balken am Ende der Zeile wird angezeigt da wir im Draft-Modus sind, zeigt an, dass wir eine unschöne überlänge haben...

"ref" für automatische Verweise welche mit "label" beim Objekt definiert werden. Benam-sung mit prefixen wie: "sec:" (section), "fig:" (figure) tab: (Tabelle) helfen übersicht zu

¹accessed: 05.06.2018

behalten.

Beispiel: siehe für weiteres in Section 2.

"cleardoublepage" wenn "twosides" (d.h. wenn doppelseitig bedruckt werden soll) damit der neue Abschnitt wieder auf der Rechtenseite neu anfängt.

"clearpage" wenn neue Seite angefangen werden soll

"FloatBarrier" aus package "placeins" macht, dass einfach alle noch herumliegenden Bilder eingefügt werden...

"newpage" macht irgendwie auch eine neue Seite...

Beispiel Tabelle und Figuren mit package subcaption

Table 1: Quantification of errors for the images in Figure 1.

Name	I	II	III	IV	V	VI
Standard deviation	15.8	16.3	17.4	16.0	15.7	16.5
Smallest defoliation	25	30	35	10	15	20
Highest defoliation	70	75	80	50	60	65

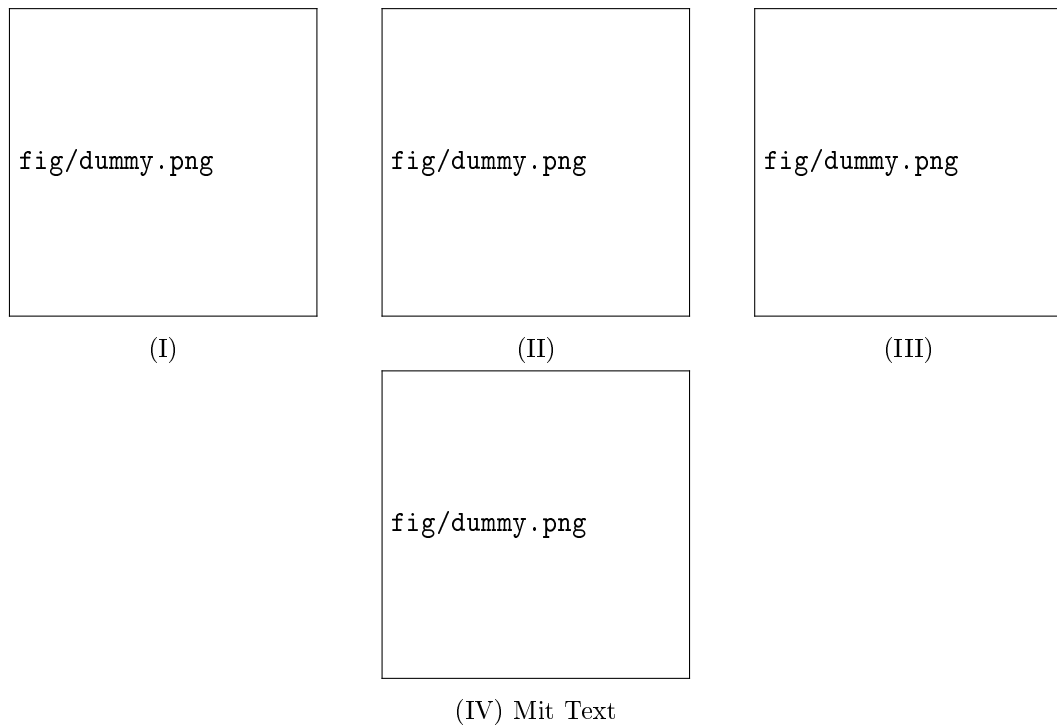
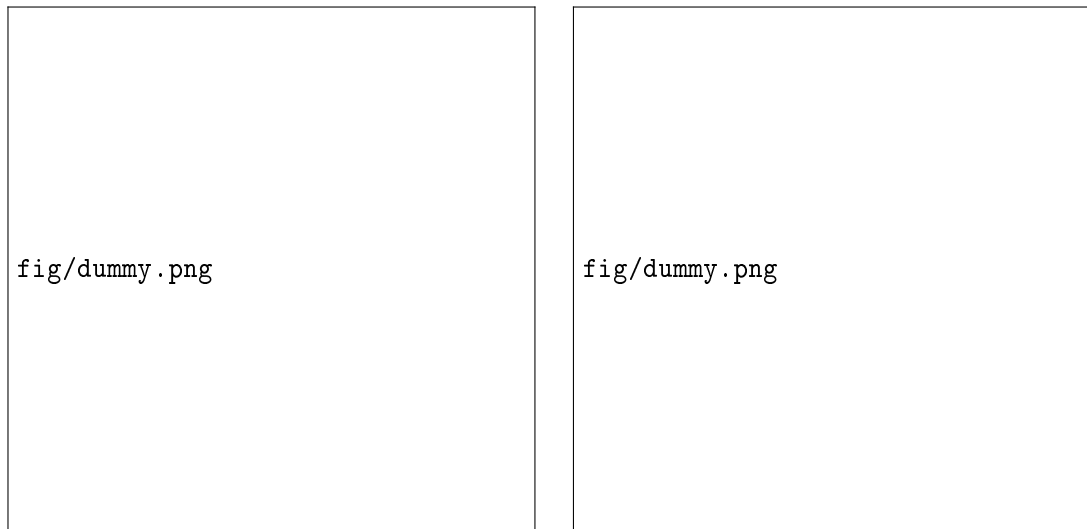


Figure 1: Trees that caused the highest deviations in the estimations.



(I) Error curves showing the accuracy of the different observers.

(II) Distribution of predicted values to ground-truth for my personal estimation.

Figure 2

Zwei Kolonnen nebeneinander mit Formeln:

$$L_i = \|f - y_i\|_2^2 = \sum_j (f_j - (y_i)_j)^2 \quad (1)$$

$$L_i = \|f - y_i\|_1 = \sum_j |f_j - (y_i)_j| \quad (2)$$

Zum Text um Figure umfliessen lassen:

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet,

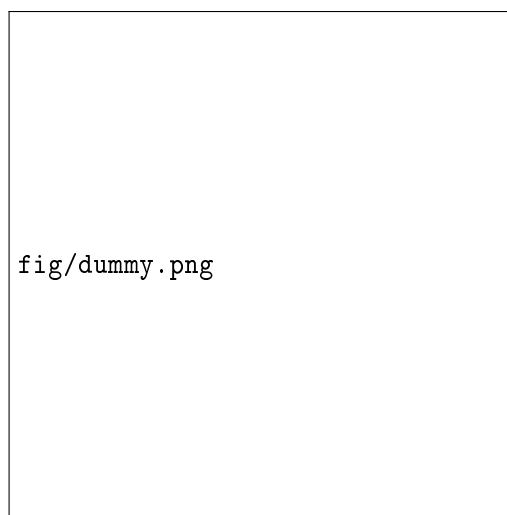


Figure 3: Basic structure of a CNN.(Adapted from: Chollet (2017))

tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

2 Measurement

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

2.1 Setup

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

2.2 Minidome

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

2.2.1 Shape of Shading

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

2.2.2 Data

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetur a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet

volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consetetuer. Nullam elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus.

3 Stitiching

4 Feature detection

4.1 Needle holes

4.1.1 Scientific Approach

4.1.2 Reality

4.2 Scratches

5 Conclusion

Blabla

References

- Chollet, F. (2017). *Deep Learning with Python*. Manning Publications Company. ISBN: 9781617294433.
- Dobbertin, M., Hug, C., and Mizoue, N. (2005). “Using slides to test for changes in crown defoliation assessment methods part II: Application of the image analysis system CROCO”. In: *Environmental Monitoring and Assessment* 102.1, pp. 167–178. ISSN: 1573-2959. DOI: 10.1007/s10661-005-6019-1. URL: <https://doi.org/10.1007/s10661-005-6019-1>.

A Appendix

Appendix blabla

pdf/dec_dummy.pdf