



INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE

MicMac – a global overview

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IGN

Technical seminar

Introduction

Tie points extraction

- Without a priori geometry

- With a priori geometry

- Reduction algorithms

Image orientation

- SfM

- Collinearity-based BBA

- Structureless BBA

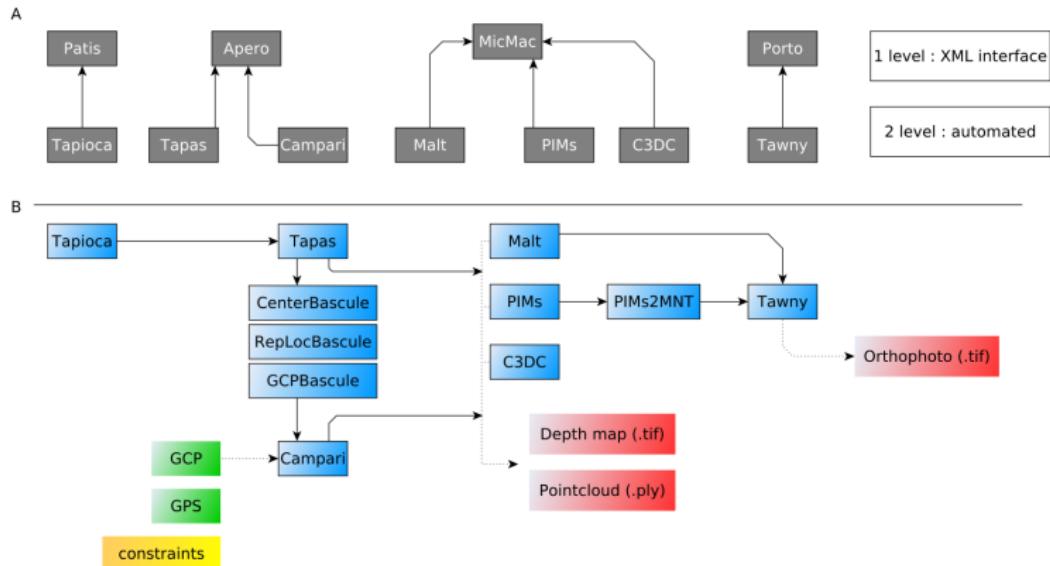
Georeferencing



1

Introduction

Overview of the processing pipeline





2

Tie points
extraction



Tie points extraction

Without a priori geometry

Tie points extraction Without *a priori* geometry

Tie points detection

- ▶ SIFT : default
- ▶ Digeo : slightly faster, possibility to use only max or min
- ▶ AIME (presented by MPD during spotlight), under developpment; generally faster than SIFT

Tie points Matching

- ▶ ANN (Approximate Nearest Neighbor)
- ▶ for a point in pic A, find best and second best points in pic B. The best point is accepted if his score is high and second best score is low.

Tie points extraction Without *a priori* the geometry

Extraction organization : lists of pictures pairs

- ▶ All, MulScale, Line...
- ▶ from an orientation (GPS, approximate orientation)

Tapioca command. See §3.3 and §16 of documentation.

Tie points files format (binary and ASCII)

- ▶ Default : 1 file per pair, simple and universal
- ▶ New format : 1 file with points multiplicity, faster but only usable with few commands

mm3d TestLib ConvNewFH command. See §16.8 of documentation.



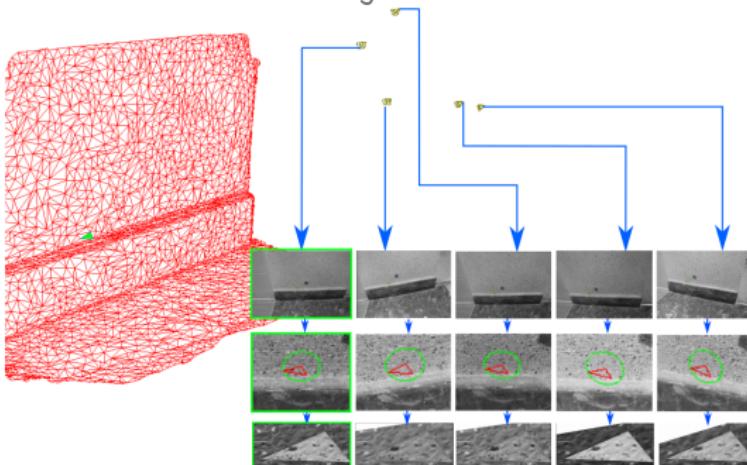
Tie points extraction

With a priori geometry

Tie points extraction With *a priori* geometry

- ▶ “Second iteration”: using camera orientations and a 3d mesh
- ▶ finds tie points with good repartition on pictures and 3d mesh
- ▶ use orientations for perspective corrections before correlation

mm3d TiePTri command. See §16.9 of documentation.





2

Tie points extraction

Reduction algorithms

Tie points reduction algorithms

- ▶ bla bla



Image
orientation

Image orientation Approaches

1. no a priori, iterative (i.e. SfM)
2. with a priori, collinearity-based bundle block adjustment (BBA) when initial orientations are known
3. structureless BBA



Image orientation

SfM

SfM



Image orientation

Collinearity-based BBA

Collinearity-based BBA



Image orientation

Structureless BBA

Structureless BBA



Georeferencing

Mathematical model

- ▶ rigid spatial similarity transformation (SST)
(i.e. 7-param trafo)
- ▶ "non-rigid" SST (i.e. 7-param and a polynomial)

Georeferencing

Mathematical model

- ▶ rigid spatial similarity transformation (SST)
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Possible input data

1. ground control points
2. GNSS perspective centers



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Thank you for your
attention!

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