équipe GMCAO

Gestes Médico-Chirurgicaux Assistés par Ordinateur

DEA IMAGERIE, VISION, ROBOTIQUE

3D bone surfaces identification in Three-dimensional Scanner Data Image with Statistical Models

Supervisor: Laurent Desbat

2003

Introduction

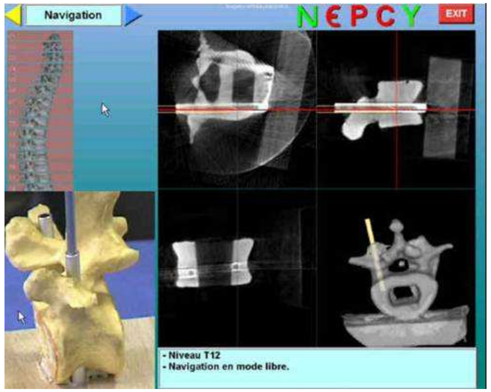
LABORATOIRE TIMC
EQUIPE GMCAO

- *Image, Model and Perception Techniques*
- *Computer Assisted Surgery*
- *Multidisciplinary research team (~35 people)*
- *Help surgeons in the planification process and cirugy process*

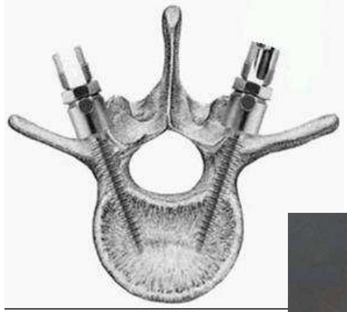
Statistical and Deformable models

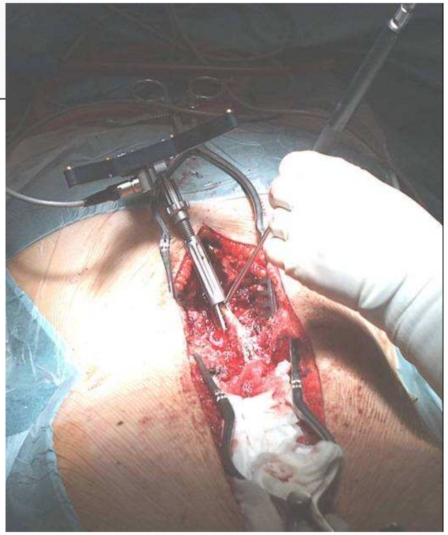
PRINCIPAL ORTHOPAEDIC SCENARIO

- *Pedicle screw placement*
  - *Rigid segmental fixation for various spinal disorders (scoliosis, fractures, …)*
  - *Posterior approach that involves vertebrae realignement with hooks and screws connected by rods*



- Niveau T12
- Navigation en mode libre.



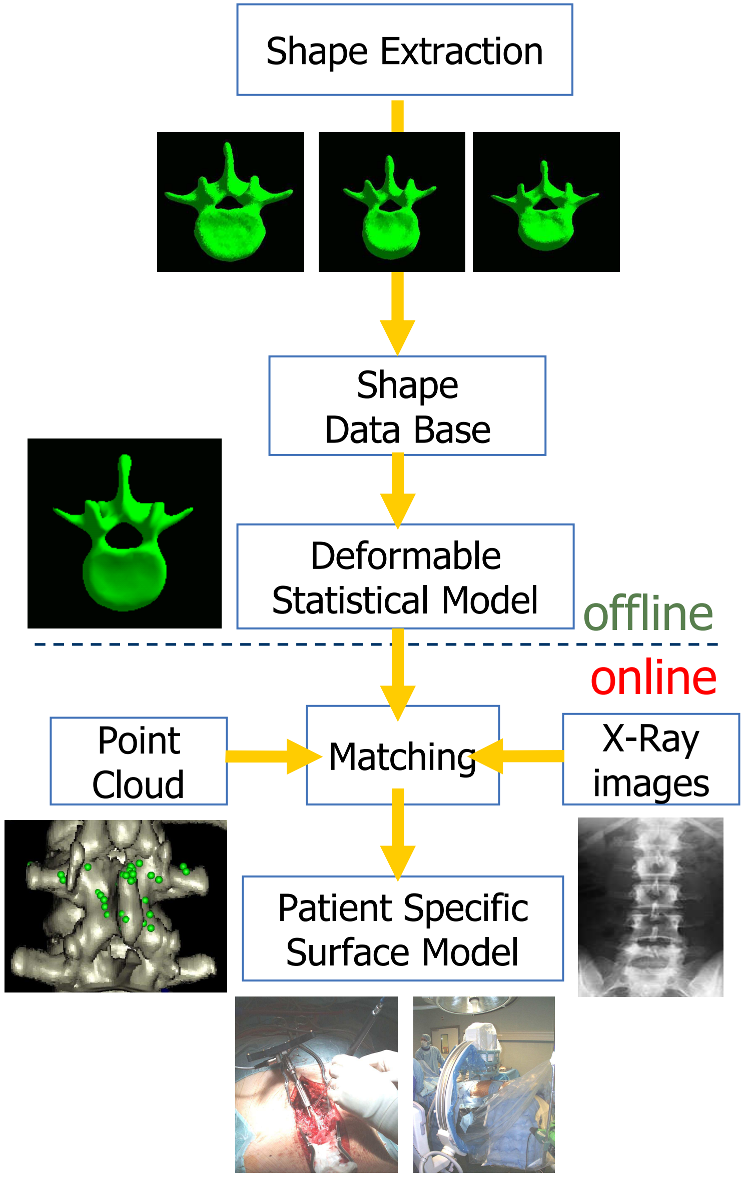


Statistical and Deformable models

THESIS MARKUS FLEUTE **[Fle01]**

- *Automatic extraction of training shapes from unsegmented scanner data images using a generic model*
- *Based on the statistical shape model known Point Distribution Model (PDM) proposed by Cootes et al* **[CTCG92]**
- *Eigenmodes model decomposition from shape the training set* **[CTCG95]**

Fleute's method



Shape Extraction

Shape Data Base

Deformable Statistical Model

offline

online

Point Cloud

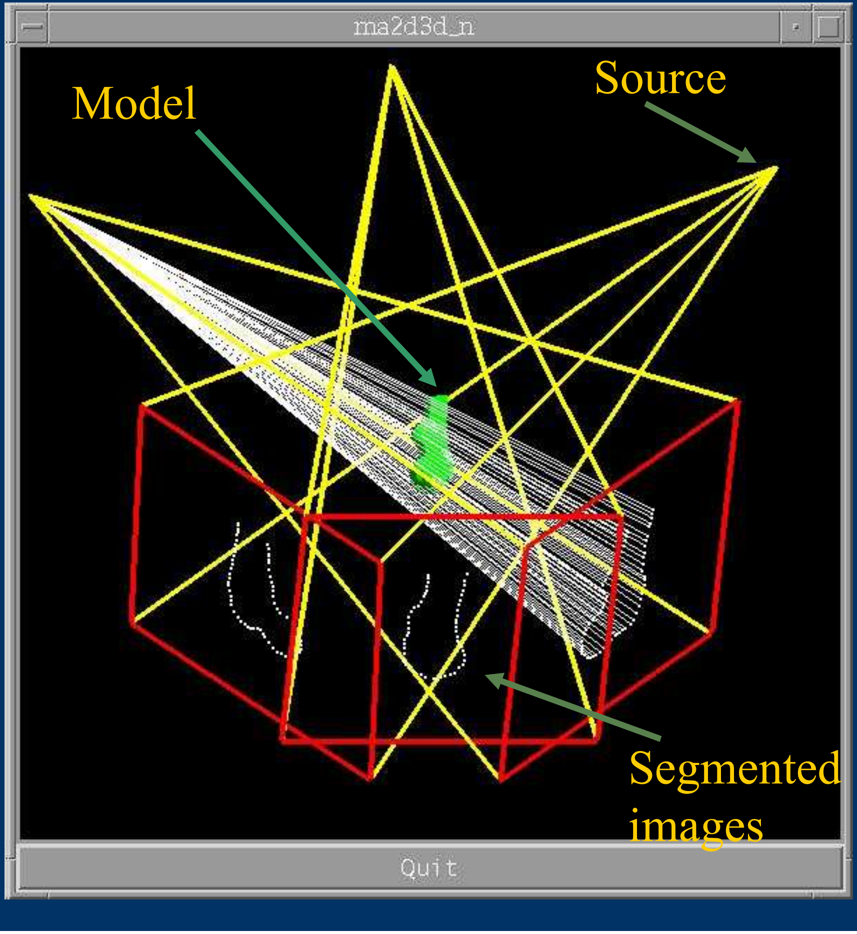
Matching

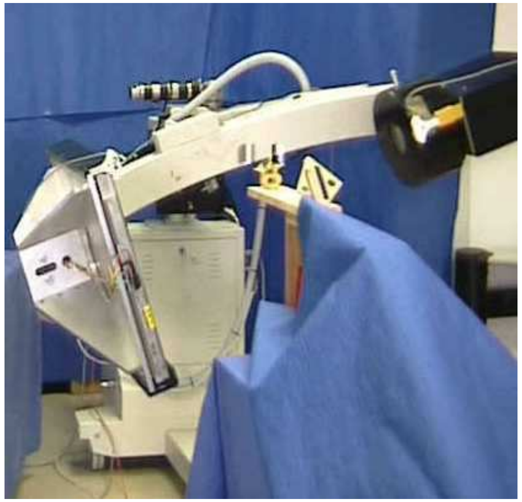
X-Ray images

Patient Specific Surface Model

Statistical and Deformable models

MI3 IMAGING SYSTEM EUROPEAN PROJECT


ma2d3d_n
Model
Source
Segmented images
Quit



Statistical and Deformable models

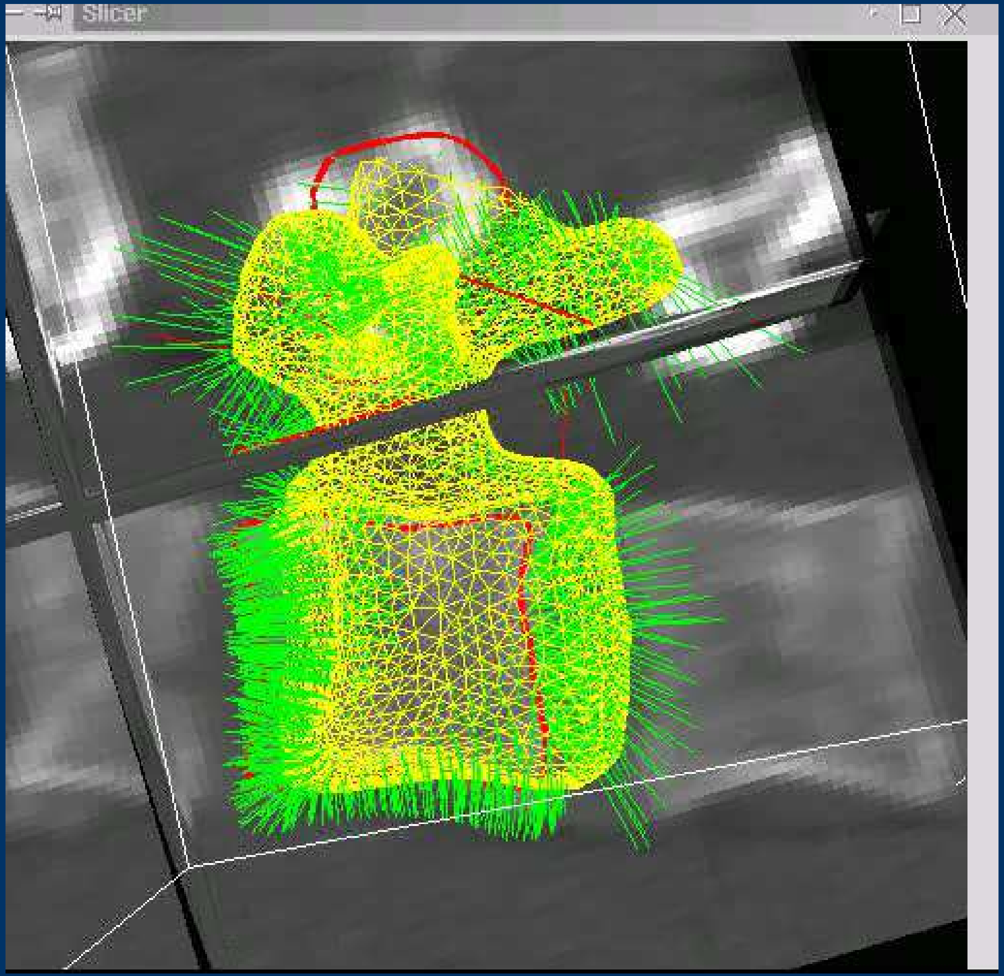
PROBLEM

GMCAO APPROACH

Create a system that will be able to obtain the shapes of the training set from different scanner database placed in different hospitals without knowing anything a priori about the image scanner characteristics

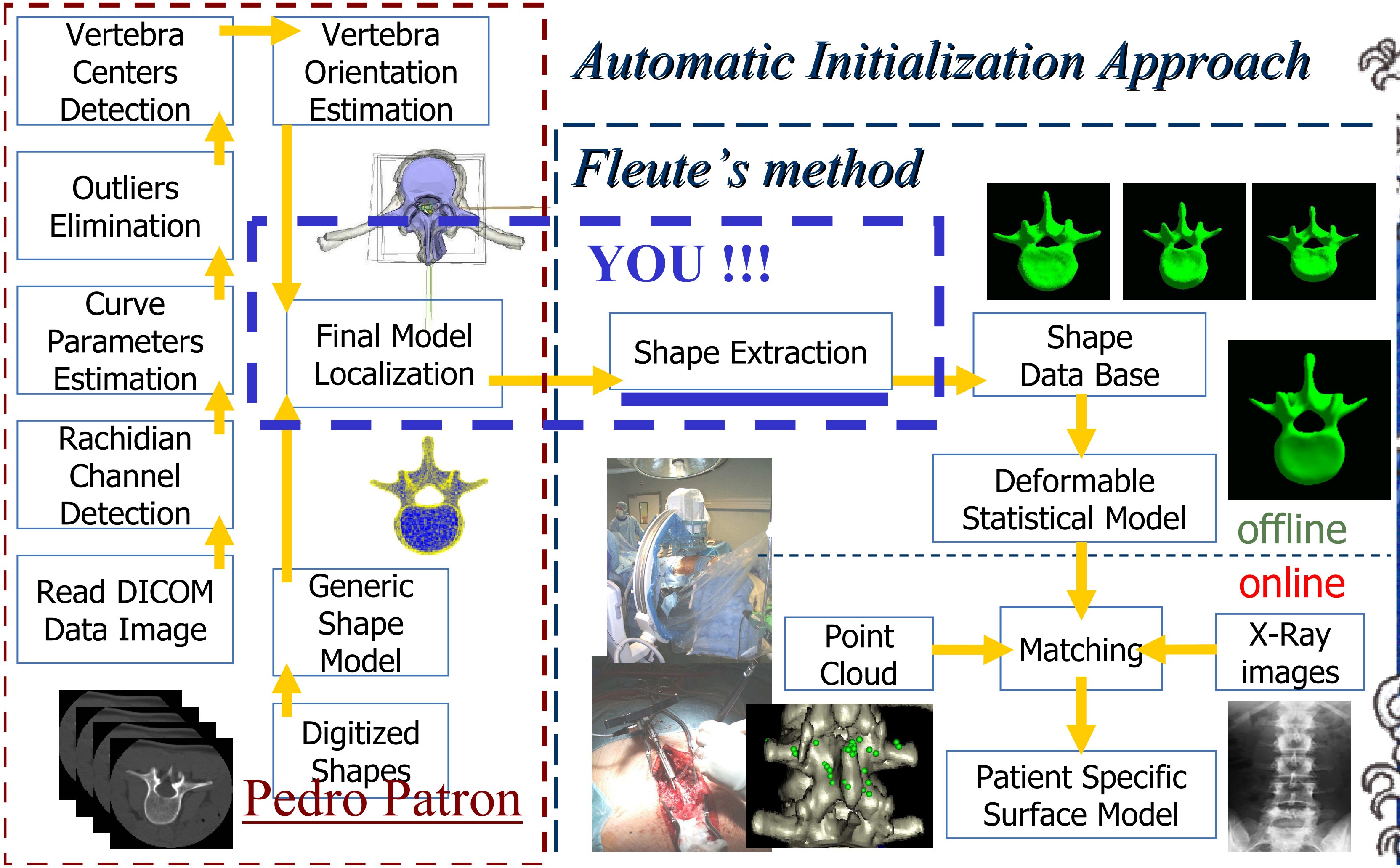
Statistical and Deformable models

RIGID & ELASTIC SEGMENTATION



Statistical and Deformable models

CONTRIBUTION



Read DICOM Data Image

Rachidian Channel Detection

Curve Parameters Estimation

Outliers Elimination

Vertebra Centers Detection

Vertebra Orientation Estimation

Final Model Localization

Generic Shape Model

Digitized Shapes

Pedro Patron

Automatic Initialization Approach

Fleute's method

YOU !!!

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