Automated Segmentation and Motion Correction of the Fetal Brain
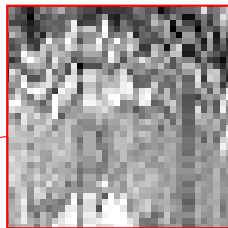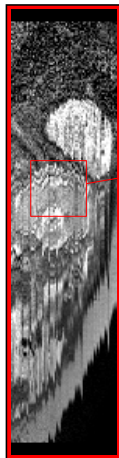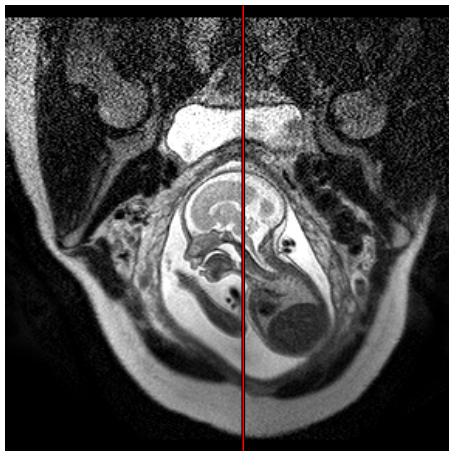
Kevin Keraudren

Imperial College London

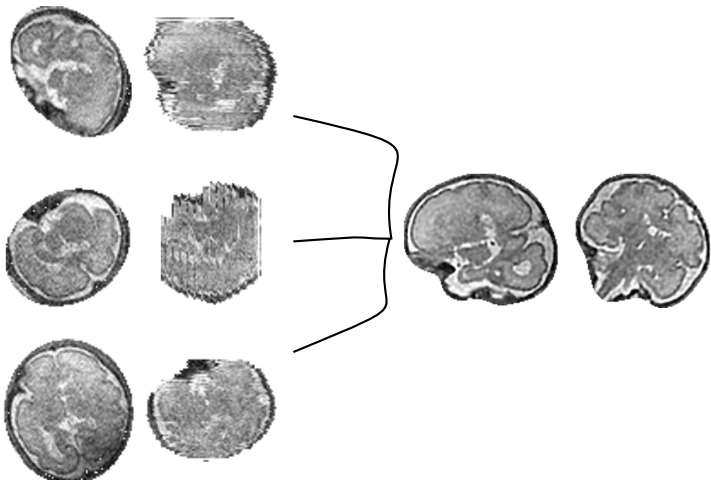December 6th, 2013

PROBLEM

AS THE FETUSE MOVES

THE DATA IS ACQUIRED AS STACKS OF MISALIGNED 2D SLICES

PROBLEM

ORTHOGONAL STACKS OF 2D SLICES → 3D VOLUME

DEFINITIONS

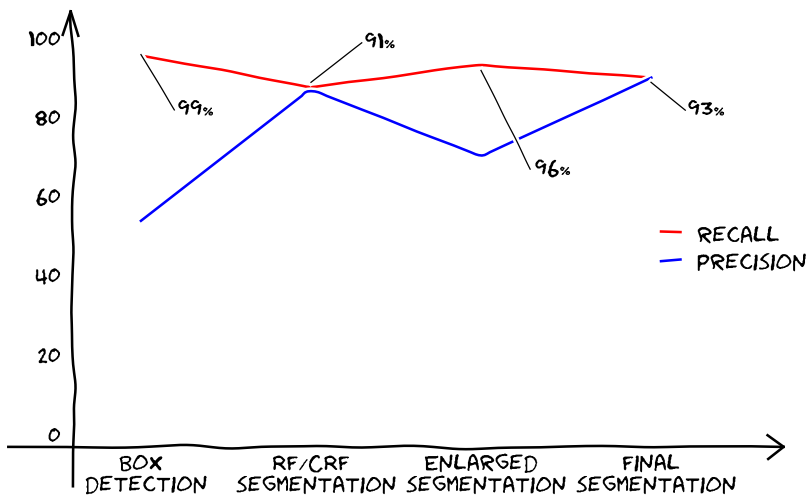$$\text{RECALL} = \frac{\text{VOLUME OF CORRECTLY CLASSIFIED VOXELS}}{\text{GROUND TRUTH VOLUME OF THE BRAIN}}$$
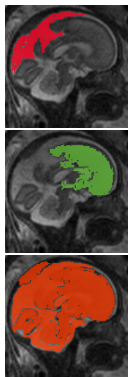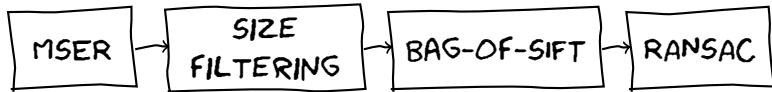
$$\text{RECALL} = \frac{TP}{TP + FN}$$

$$\text{PRECISION} = \frac{\text{VOLUME OF CORRECTLY CLASSIFIED VOXELS}}{\text{DETECTED VOLUME OF THE BRAIN}}$$

$$\text{PRECISION} = \frac{TP}{TP + FP}$$

IDEA

BOX DETECTION
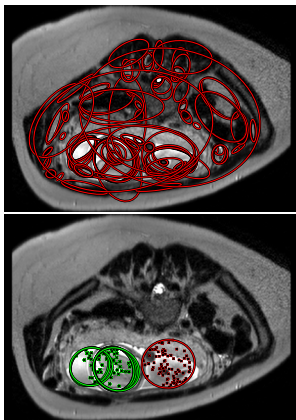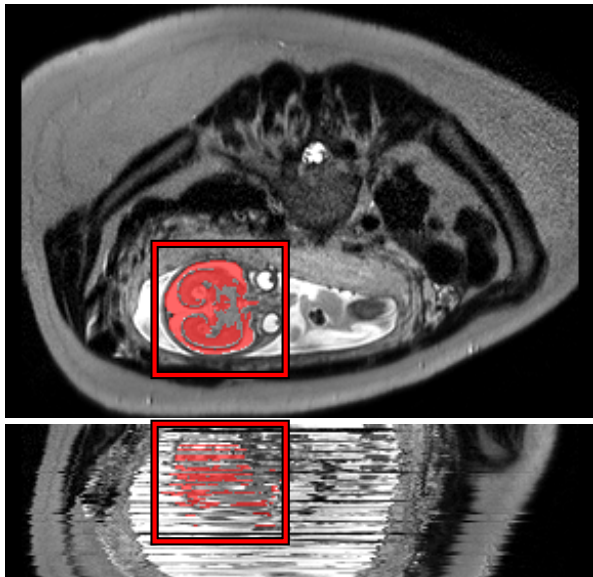
MSER → SIZE FILTERING → BAG-OF-SIFT → RANSAC
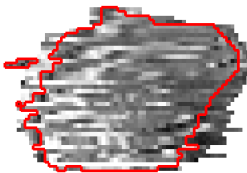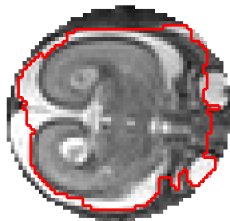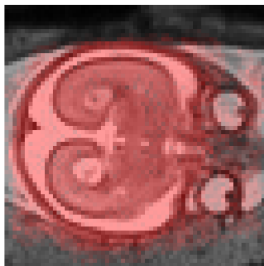

MSER REGIONS

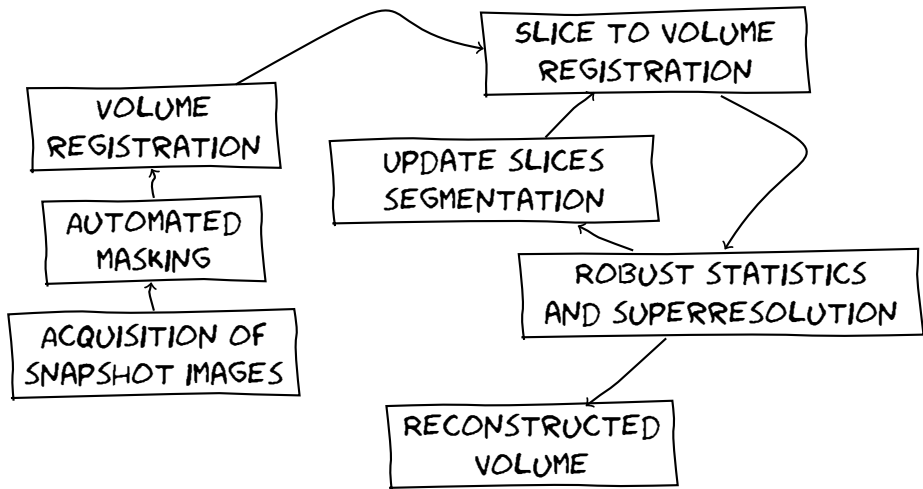FILTERING BY SIZE AND
BAG-OF-WORDS

BOX DETECTION
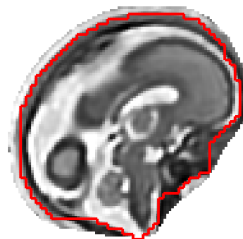
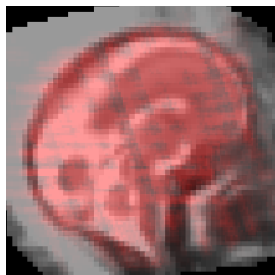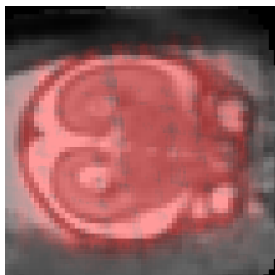# BRAIN EXTRACTION

RANDOM FOREST CLASSIFIER

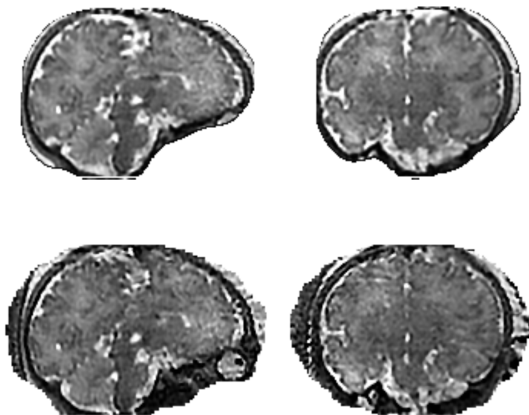## AND CONDITIONAL RANDOM FIELD

MOTION CORRECTION

MOTION CORRECTION

CONDITIONAL RANDOM FIELD

RESULT

TIGHTER MASK, LESS ARTIFACTS
AND BRAIN ALREADY EXTRACTED

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- COLLABORATORS:
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  BUCHNER, PERCUSSE

WWW.DOC.IC.AC.UK/~KPK09/