Multimodal Imaging of the Heart Muscle- Segmentation and Registration of PET - MRI Cardiac Images

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INTRODUCTION

Positron Emission Tomography (PET) - Metabolic Imaging

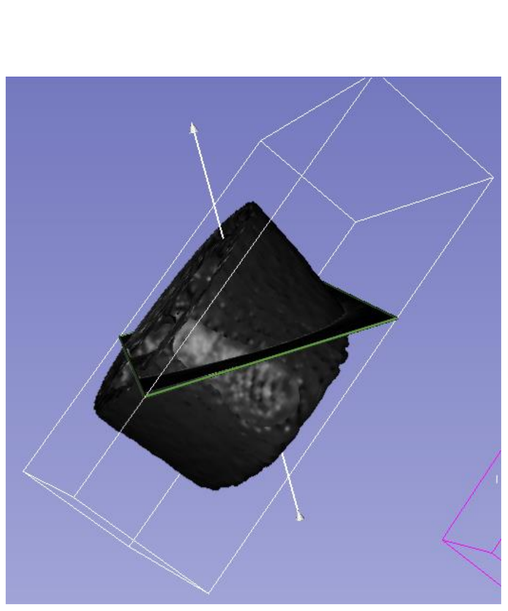
Magnetic Resonance Imaging (MRI) - Anatomical and Functional Imaging

Difference	PET	MRI
Dimension	3D	2D
Coordinate	Different coordinate system, MRI orientation is known	
Patient position	Arm along the body	Arm over the head
Quality	Very low contrast	Good contrast
Moment	Sum	One image

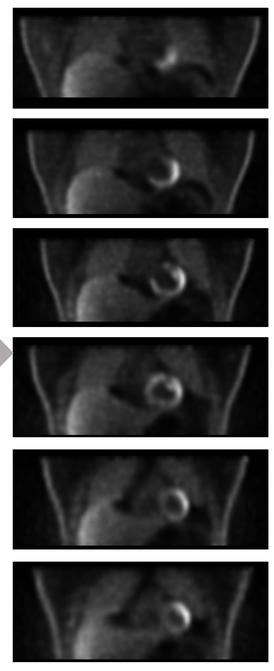
PET+MRI

-Better visualization
-Better monitoring
-Evaluation of the new therapies
-Early diagnosis
-Classification of the cells

METHODS



PET and MRI in 3D



Otsu Segmentation

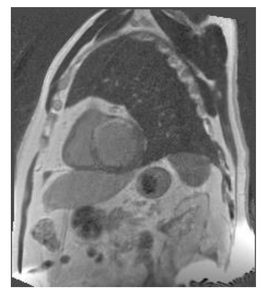
PET Segmentation

Mattes Mutual Information

2D PET-MRI Registration

The best metric value

Registered images



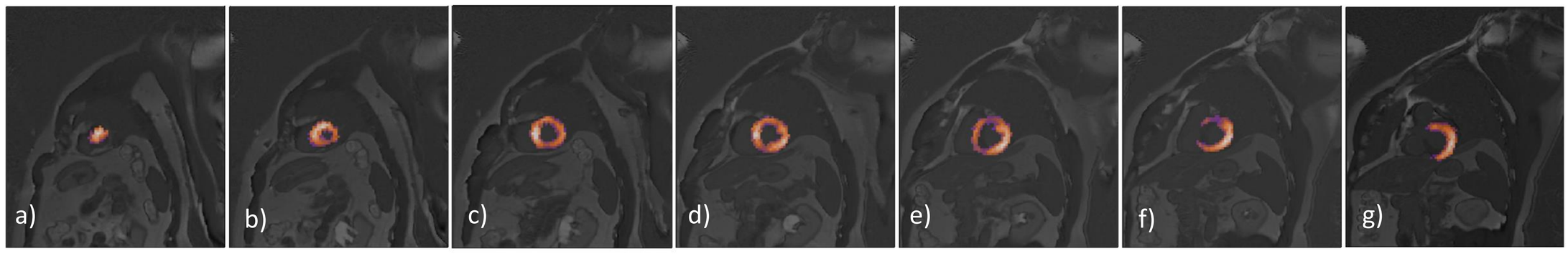
2D MRI

MRI Segmentation

Watershed with shape priors

RESULTS

- 15 images from 2 patients
- All patients underwent DE-MR in 1.5T magnet and FDG PET
- Results were compare with manually alignment images
- Measure Parameters: Angle, Translation X and Y, Distance



PARAMETERS	ANGLE	TRANSLATION X	TRANSLATION Y	DISTANCE
VALUE	0,51±0,52mm	2,37±1,38mm	1,66±1,28mm	4,03±2,66mm

CONCLUSION AND PERSPECTIVES

- The calculated parameters indicate a good performace of the method
- The segmentation, as a pre-treatement, simplifies and improves the performance of the registration
- Evaluation of the registration by measuring the distance between landmarks on the MRI and CT images
- Testing the method on simulated images