## Contents

Abstract  
Resumen  
Resum  
Motivation  
Objectives and structure  

### Chapter 1. Introduction  
12  
1.1 Clinical scenario: Bone and Osteoporosis  
1.1.1 The bone tissue  
1.1.2 Bone development and remodeling  
1.1.3 Osteoporosis  
1.2 Magnetic resonance imaging  
1.2.1 Physical principles  
1.2.2 System architecture  
1.2.3 Pulse sequences  
1.2.4 MR in the study of bone  
1.2.5 Acquisition requirements for trabecular bone characterization  
1.3 Image processing and quantification of trabecular bone  
1.3.1 Image processing in digital radiology. Applications to the study of trabecular bone  
1.3.2 State of the art in trabecular bone characterization. Quantification of trabecular bone from MR images  

### Chapter 2. Methodology  
42  
2.1 Image acquisition  
2.1.1 Region of acquisition  
2.1.2 MR Hardware  
2.1.3 MR pulse sequence  
2.2 Image processing  
2.2.1 Segmentation  
2.2.2 Coil heterogeneities correction  
2.2.3 Sub-voxel processing  
2.2.4 Binarization  
2.3 3D reconstructions of the trabeculae  
2.4 Morphometry analysis  
2.4.1 Morphology  
2.4.2 Complexity