

UNIVERSITI TEKNOLOGI MARA

**COMPARISON BETWEEN SOBEL, CANNY AND
SHEN & CASTAN EDGE DETECTION APPLIED
ON BONE JOINTS**

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ABSTRACT

Edge detection techniques are frequently used to find complex object boundaries by marking potential edge points corresponding to places in an image where rapid changes in brightness occur. Edge detection operators are based on the ideas that edge information in an image is found by looking at the relationship of neighborhood pixels. The edge is defined by a discontinuity in gray-level values. X-ray images generally show the location, size and structural changes such as cracks or fracture in bones. Many fine structural changes in bone x-ray images escape detection even by experienced radiologists due to the slight gray level changes in the images. This is due to the nature of x-ray images which are often fuzzy. Because of this radiologists or surgeons usually recommend the patients to go for MRI and CT scan for further investigation in suspicious cases. But MRI and CT scan are more expensive than x-ray images. However by implementing appropriate image enhancement techniques on the low cost digitized x-ray films, the cortical (bone wall) outline of the bone can be seen clearer. In this research three edge detection methods, namely Sobel, Canny and Shen & Castan were implemented on bone joints to enhance the edges of the bone cortical outline of bone joint images. A prototype system was developed based on the three methods. Results obtained are compared by using Single Line Histogram Method (SLHM) and comparison of the Operator Performance to determine the best method most suitable to enhance edges of the joints in the x-ray images.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Digital image processing has expanded in wide areas. The advancement of computer technology of computer processors and mass storage devices in recent years has made automatic processing of images more appealing. Image processing algorithms have been designed and applied for various kinds of applications such as medicine, film and video production, photography, remote sensing, and security monitoring. Fields which traditionally used analog imaging are now switching to digital systems, for their flexibility and affordability. This digital format would provide the opportunity to improve the image through the application of various processing algorithms ([Torsten Seeman, 2002](#)).

In recent years there has been an increasing demand for developing image processing techniques for medical applications. This digital format would provide the opportunity to improve the image through the application of various processing algorithms. Since then digital imaging has become more important in daily radiology practices ([Craig Huston, 2004](#)).

This chapter provides the background and rationale for [this research](#). It also gives the significance of edge detection, the issues and the problems that led to the research.

1.1 Background

Digital image processing is concerned primarily with extracting useful information from images. Ideally, this is done by computers, with little or no human intervention. The image processing algorithms may be placed at three levels (Gonzales, 1992). At the