

# 基于四叉树算法的图像边缘检测分析及仿真

## 摘 要

在现今的 21 世纪，科学技术发展迅速。人们在科研方面也有着越来越卓越的成就。在面对研究图像问题时，对图像进行边缘检测已经成为图像处理中不可或缺的部分。图像边缘检测的研究更是现今社会关注的热点。本文主要是进行基于四叉树的边缘检测算法研究,其主要内容如下：

首先针对图像边缘检测的概念做了详细的介绍，其中也包括了边缘检测的研究背景，发展现状和边缘检测的研究意义。

然后介绍了传统的边缘检测方法，这些方法主要是用 Sobel 算子、Prewitt 算子、Log 算子、Roberts 算子和 Canny 算子等来对图像进行边缘的检测的 **Error! Reference source not found.**。并且通 matlab 仿真实验比较了他们异同 **Error! Reference source not found.**。在介绍完这些传统的边缘检测算子后，又把人们在研究中不断提出的那些新的边缘检测方法做了简单的概述。

最后，介绍了基于四叉树算法的图像边缘检测。利用四叉树分裂合并的原理，将图像进行区域分割，最后利用形态学中的腐蚀算法对分割区域进行腐蚀，然后就可以得到我们实验所需要的图像的边缘信息。这种方法很大程度上提高了边缘检测的准确性，得到了比传统边缘检测方法更加理想的边缘检测结果。

**关键词：**边缘检测；Canny 算法；四叉树算法

## Abstract

In the 21st century, science and technology are developing rapidly. People also have more and more outstanding achievements in scientific research. In the face of image research, edge detection has become an indispensable part of image processing. The research of image edge detection is a hot topic in today's society. This paper mainly studies the edge detection algorithm based on quadtree, and its main contents are as follows:

Firstly, the concept of image edge detection is introduced in detail, including the research background, development status and significance of edge detection.

Then it introduces the traditional edge detection methods, which mainly use Sobel operator, Prewitt operator, LOG operator, Roberts operator and Canny operator to detect the edge of the image. And through the MATLAB simulation experiment, the similarities and differences between them are compared [1]. After the introduction of these traditional edge detection operators, the new edge detection methods proposed by people in the research are briefly summarized.

Finally, the image edge detection based on quadtree algorithm is introduced. Based on the principle of quadtree splitting and merging, the image is segmented. At last, the segmented region is corroded by the morphological algorithm. Then we can get the edge information of the image that we need in our experiment. This method improves the accuracy of edge detection to a great extent, and gets more ideal edge detection results than traditional edge detection methods.

**Keywords:** edge detection; Canny algorithm; quadtree algorithm

# 目 录

引 言 .....	错误!未定义书签。
第 1 章 绪论 .....	错误!未定义书签。
1.1 边缘检测研究的背景及意义 .....	3
1.2 边缘检测研究的发展现状 .....	4
1.3 本文的工作和组织结构 .....	4
第 2 章 传统的图像边缘检测算法 .....	6
2.1 经典的边缘检测算子 .....	6
2.1.1 Roberts 算子 .....	7
2.1.2 Prewitt 算子 .....	7
2.1.3 Sobel 算子 .....	8
2.1.4 Log 算子 .....	8
2.1.5 Canny 算子 .....	9
2.2 基于小波变换的边缘检测算法 .....	11
2.3 本章小结 .....	12
第 3 章 基于四叉树的边缘检测算法 .....	13
3.1 四叉树概述 .....	13
3.2 基于数学形态学的腐蚀方法 .....	14
3.3 基于四叉树的图像边缘检测 .....	15
3.3.1 四叉树的区域分裂合并 .....	15
3.3.2 基于腐蚀的图像边缘提取 .....	15
3.4 本章小结 .....	15
第 4 章 实验结果 .....	17
4.1 经典边缘检测算子的仿真结果 .....	17
4.2 基于四叉树算法的边缘检测仿真结果 .....	19
第 5 章 总结与展望 .....	22
5.1 总结 .....	22
5.2 展望 .....	22

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