# 1 Introduction

1.1 Motivation of current project

1.2 Importance of accurate cell segmentation

1.3 Using 3D data to increase contrast

1.4 Thesis outline

# 2 Cell segmentation

2.1 Basics of image manipulation

2.2 Basics of cell segmentation

2.3 Studies that use cell segmentation

# 3 Preparing images for segmentation

3.1 The 3D environment

3.2 Using GFP fluorescence data

3.3 Using Brightfield image data

3.4 Review of study using Brightfield

# 4 Methodology

## 4.1 Definitions and assumptions

## 4.2 Generating zMod

## 4.3 Manual tracking

## 4.4 Generating zEdge for segmentation

## 4.5 Sensitivity analysis of zMod parameters

# 5 Results

## 5.1 Image modification

5.1.1 zMod

5.1.2 zBF

5.1.3 zEdge

## 5.2 Segmentation

5.2.1 GFP segmentation

5.2.2 Brightfield variance segmentation

5.2.3 zEdge segmentation

# 6 Discussion

## 6.1 zMod sensitivity to parameters and the effects on zBF

## 6.2 zEdge

## 6.3 Comparison of Brightfield variance and zEdge segmentation

# 7 Conclusion

## 7.1 Conclusion

## 7.2 Further work

7.2.3 Edge completion