

# Automated corneal endothelium image segmentation in the presence of cornea guttata via convolutional neural networks

## Abstract

Automated cell counting in in-vivo specular microscopy images is challenging, especially in situations where single-cell segmentation methods fail due to pathological conditions. This work aims to obtain reliable cell segmentation from specular microscopy images of both healthy and pathological corneas. We cast the problem of cell segmentation as a supervised multi-class segmentation problem. The goal is to learn a mapping relation between an input specular microscopy image and its labeled counterpart, indicating healthy (cells) and pathological regions (e.g., guttae). We trained a U-net model by extracting 96×96 pixel patches from corneal endothelial cell images and the corresponding manual segmentation by a physician. Encouraging results show that the proposed method can deliver reliable feature segmentation enabling more accurate cell density estimations for assessing the state of the cornea.