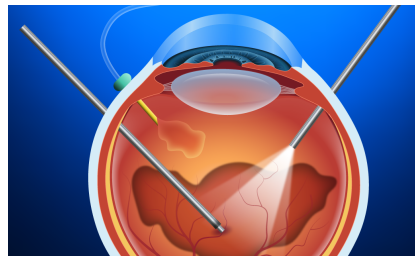
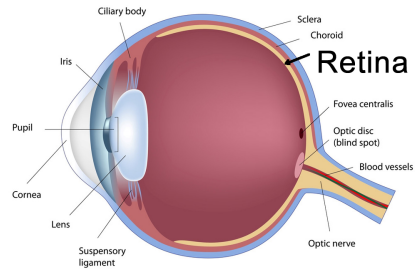


Estimation of Light Exposure in Vitreoretinal Eye Surgery

Inside the eye of vertebrates is the retina which is a layer of light sensitive tissue responsible for converting light rays into neural impulses. During certain kinds of eye surgeries, surgeons need to observe the eye through a surgical microscope under external or internal illumination. Lengthy procedures may result in extended high intensity light exposure to parts of the retina, which has the potential to temporarily or permanently damage vision.

Problem: Extended high intensity surgical light exposure may cause retina damage.



1 600.456/656 CIS2 Spring 2021

Engineering Research Center for Computer Integrated Surgical Systems and Technology

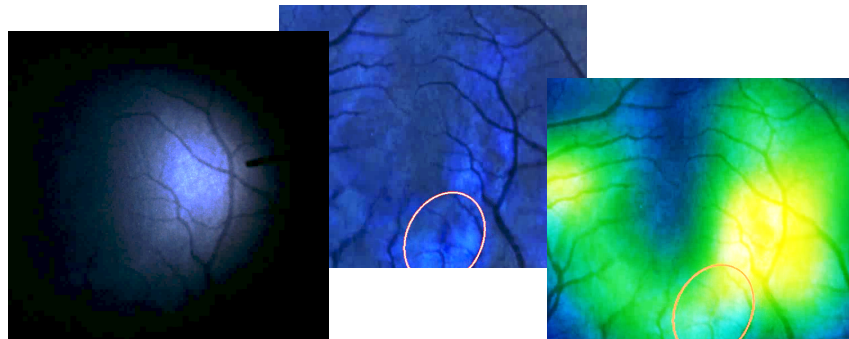


1

Estimation of Light Exposure in Vitreoretinal Eye Surgery

Objective:

Given video recordings of the view of the surgical microscope, calculate the light exposure map (heat map) of the retina using computer vision methods.



2 600.456/656 CIS2 Spring 2021

Engineering Research Center for Computer Integrated Surgical Systems and Technology



2

Estimation of Light Exposure in Vitreoretinal Eye Surgery

- **What Students Will Do:**
 - Create an algorithm that processes surgical video recordings to produce a light exposure map of the retina.
- **Deliverables:**
 - Develop software that implements the following methods:
 - Loading video files
 - Locating illuminated area within the pupil on video frames
 - Registering video frames to each other (mosaicking)
 - Calculating light exposure map on the mosaic
 - Registering mosaic and light exposure map to retina image
- **Size group:** 2-3
- **Skills:** Computer Vision, Registration, Segmentation, Matlab or OpenCV
- **Mentors:** Balazs Vagvolgyi (balazs@jhu.edu); Christopher Toomey, MD (ctoomey3@jhmi.edu); James Handa, MD (jthanda@jhmi.edu)

