

# Lecture 4 Point Operators

COMP3204 & COMP6223 Computer Vision

**How many different operators are there which operate on image points?**



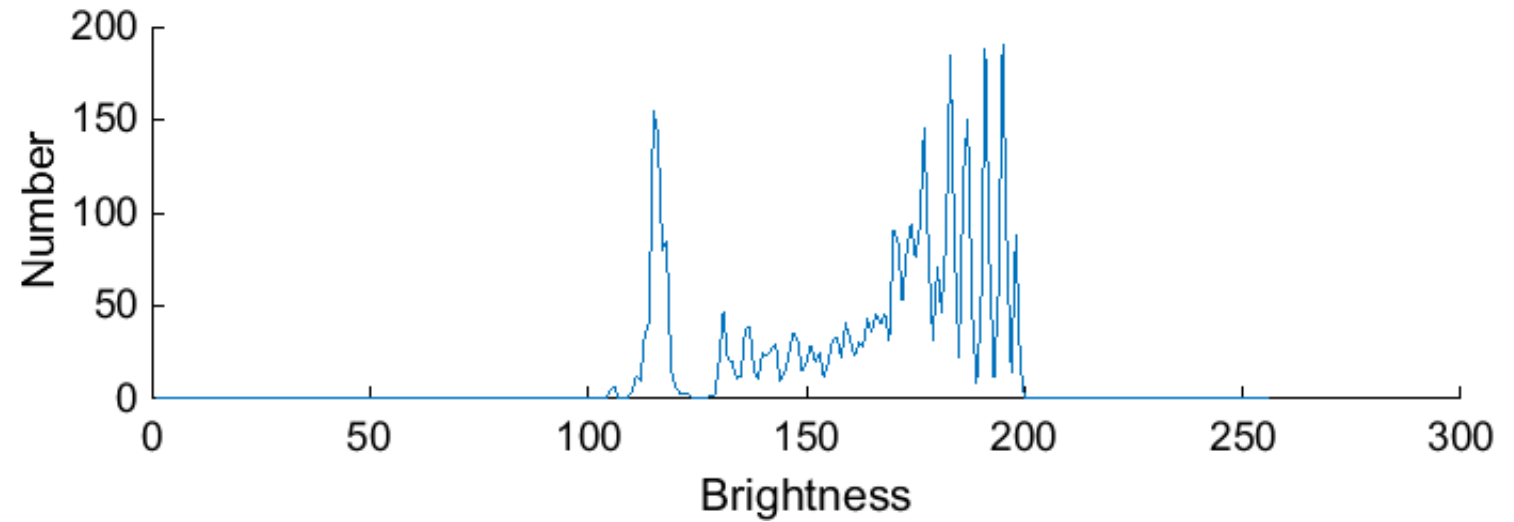
Book  
pp  
85-98

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**Southampton**  
School of Electronics  
and Computer Science



**(a)** image of an eye

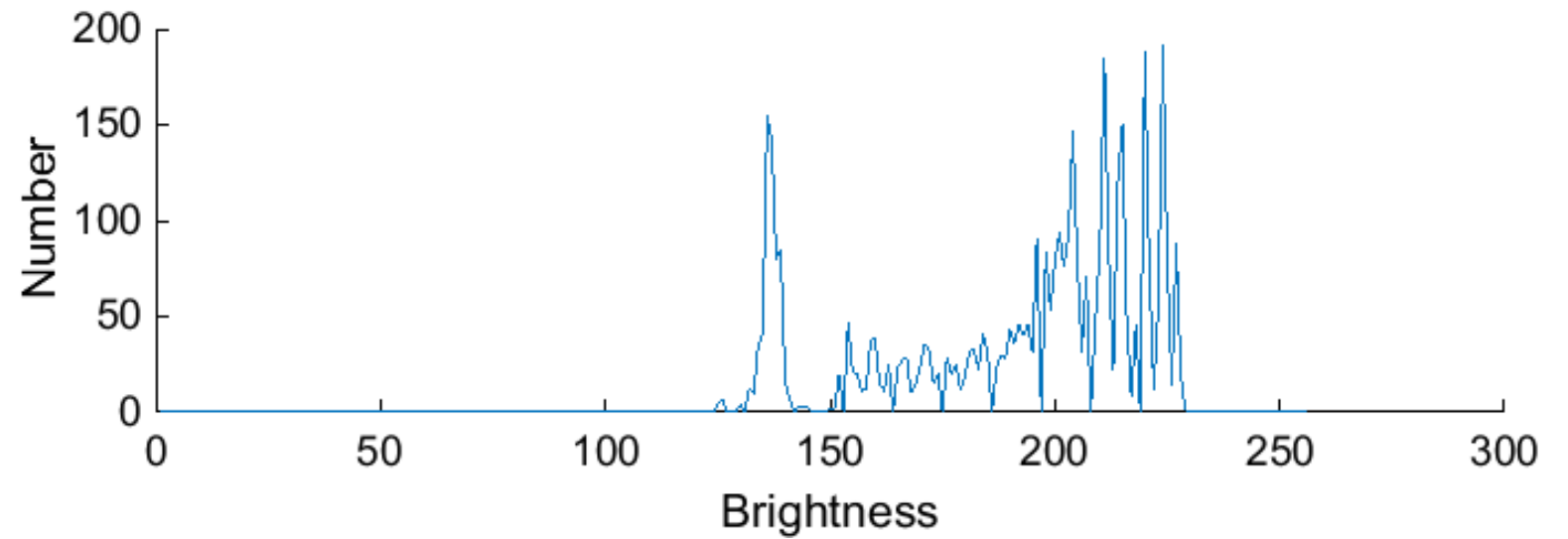


**(b)** histogram of eye image

## **An Image and its Histogram**

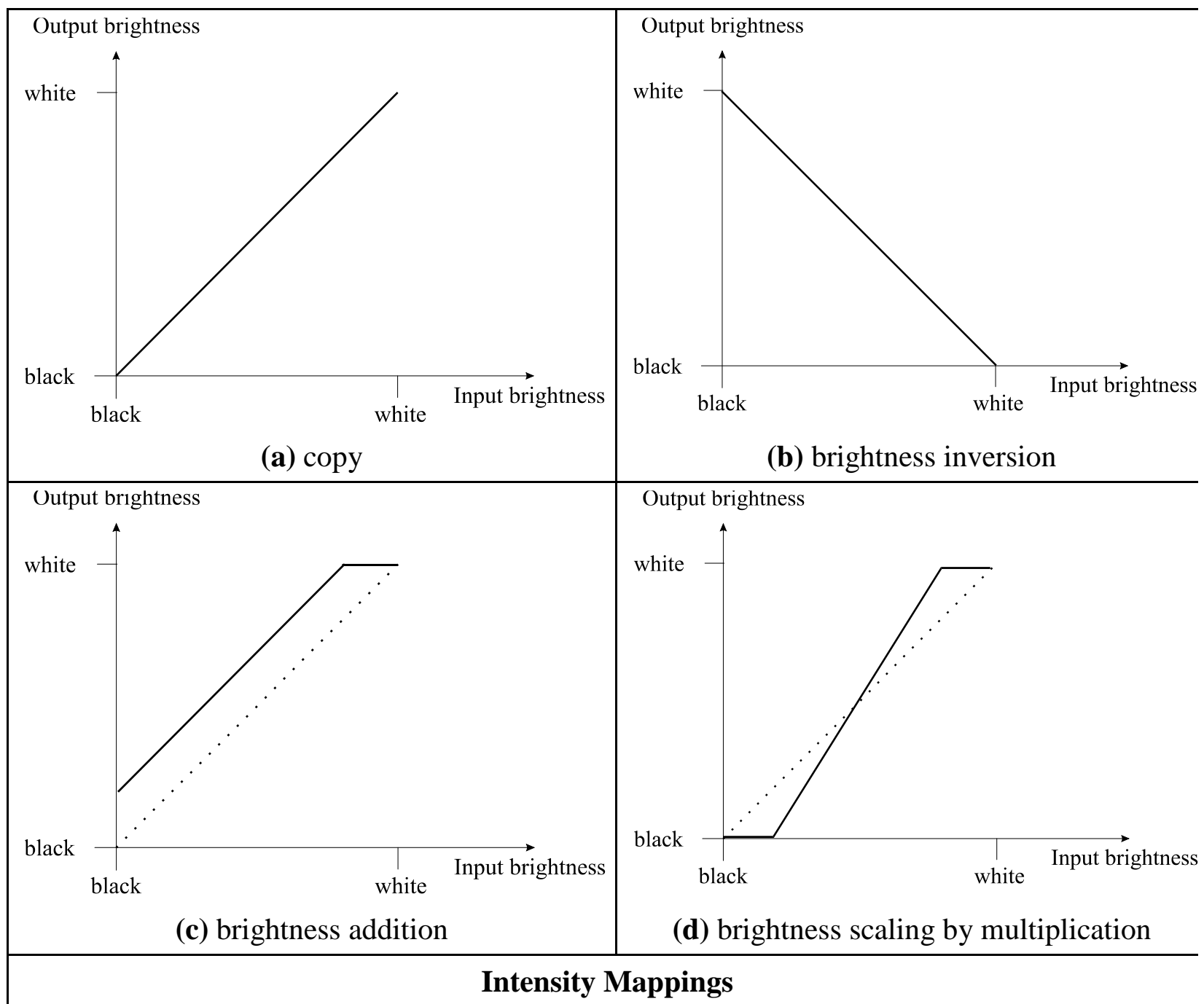


**(a)** image of brighter eye



**(b)** histogram of brighter eye

**Brightening an Image**





**(a)** logarithmic compression

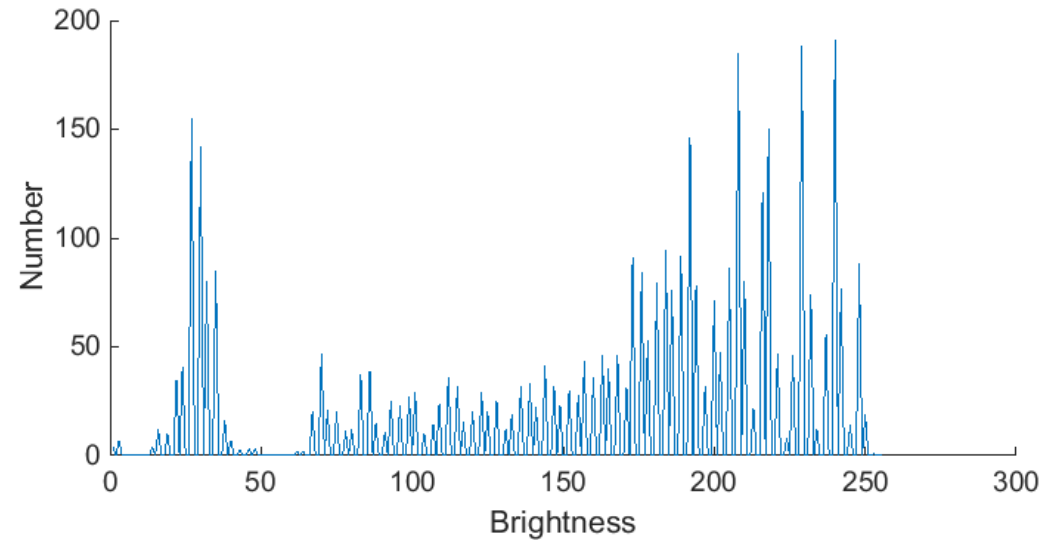


**(b)** exponential expansion

**Applying Exponential and Logarithmic Point Operators**



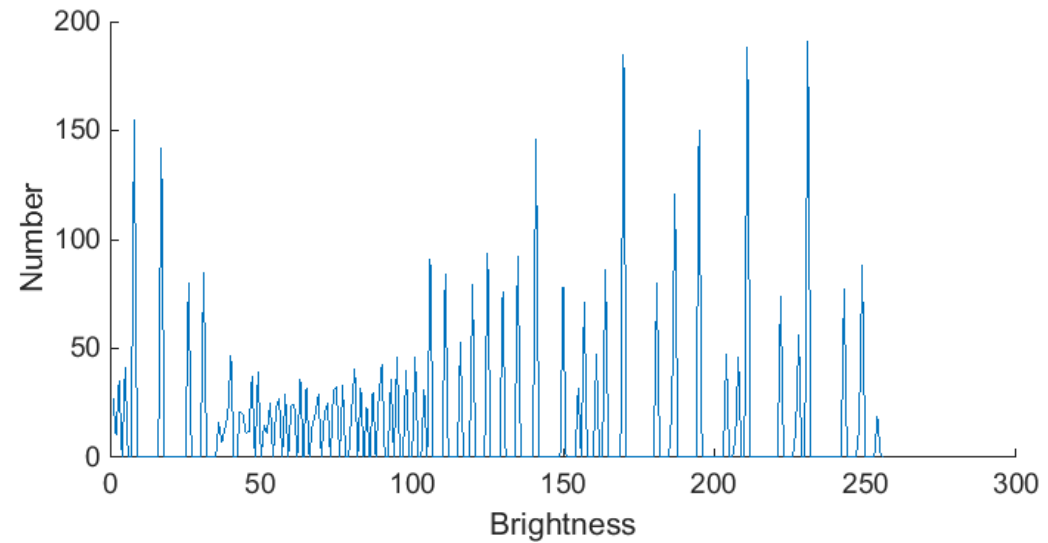
**(a)** intensity normalised eye



**(b)** histogram of intensity normalised eye

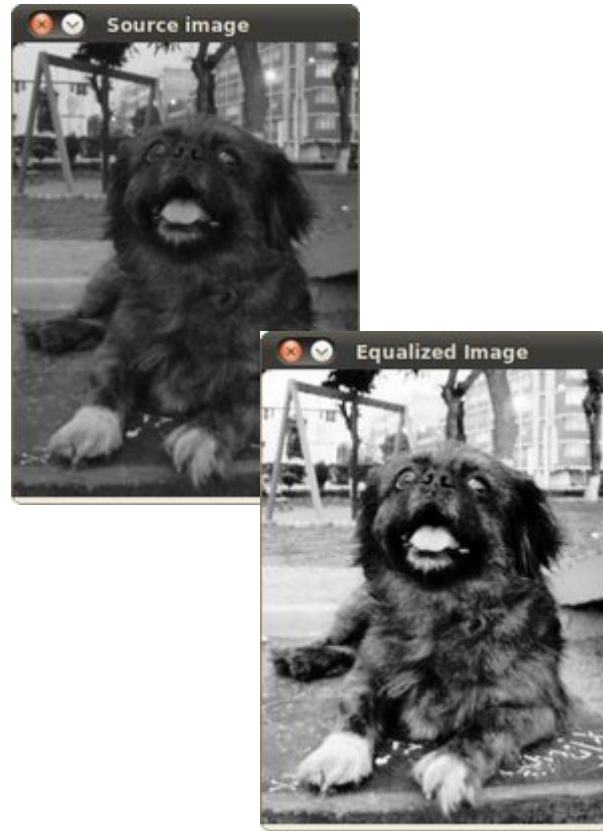
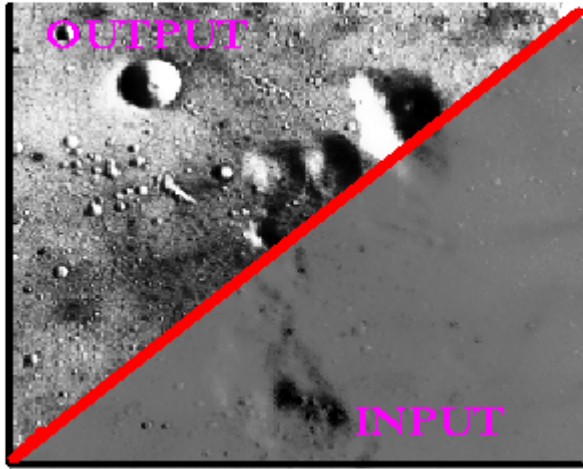


**(c)** histogram equalised eye



**(d)** histogram of histogram equalised eye

**Illustrating Intensity Normalisation and Histogram Equalisation**



<http://homepages.inf.ed.ac.uk/rbf/HIPR2/histeq.htm>;

[http://docs.opencv.org/doc/tutorials/imgproc/histograms/histogram\\_equalization/histogram\\_equalization.html](http://docs.opencv.org/doc/tutorials/imgproc/histograms/histogram_equalization/histogram_equalization.html) ;

<http://www.softpedia.com/get/Multimedia/Video/Other-VIDEO-Tools/Easy-Histogram-Equalization.shtml>



**Thresholding the Eye Image**



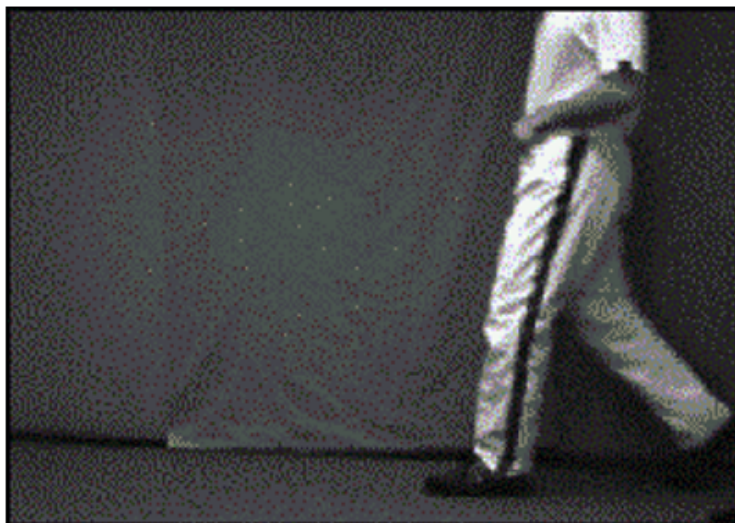


(a) thresholding at level 160



(b) thresholding by Otsu (level = 127)

**Thresholding the Eye Image: Manual and Automatic**



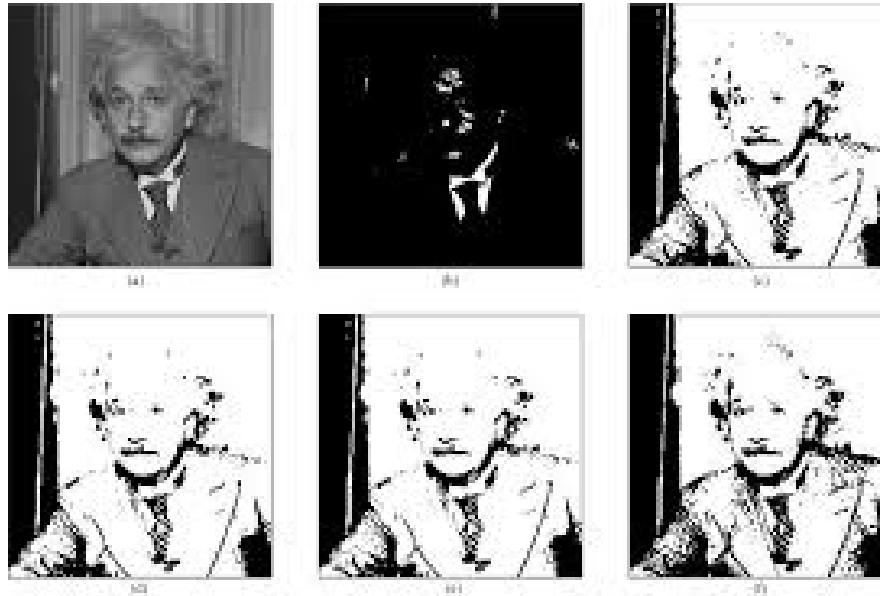
(a) walking subject



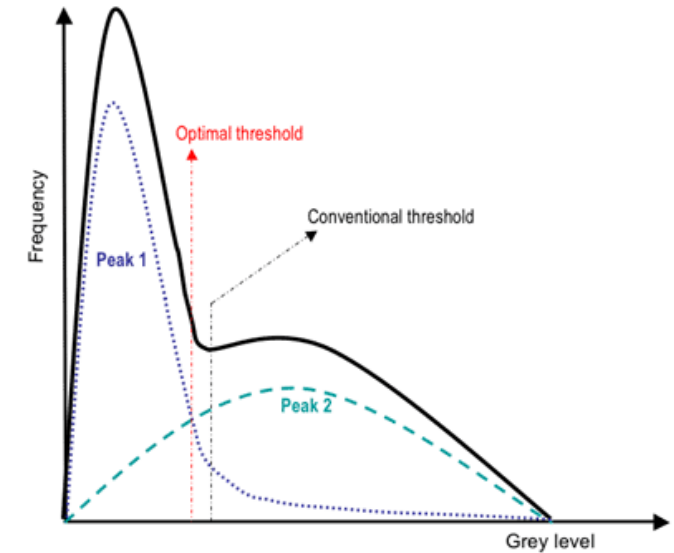
(b) automatic thresholding by Otsu

**Thresholding an Image of a Walking Subject**

Entropic  
thresholding  
(2010)



Optimal  
thresholding



<http://opticalengineering.spiedigitallibrary.org/article.aspx?articleid=1096546;>

<https://www.cs.auckland.ac.nz/courses/compsci773s1c/lectures/ImageProcessing-html/topic3.htm>