



UNIVERSIDADE DE SÃO PAULO
ESCOLA SUPERIOR DE AGRICULTURA
“LUIZ DE QUEIROZ”
DEPARTAMENTO DE GENÉTICA
LGN5831 Tópicos Especiais de Genética e Melhoramento



Image analysis: single shots

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Piracicaba, September 25, 2017

From simple to complex

- The extraction of meaningful data from images



barcode

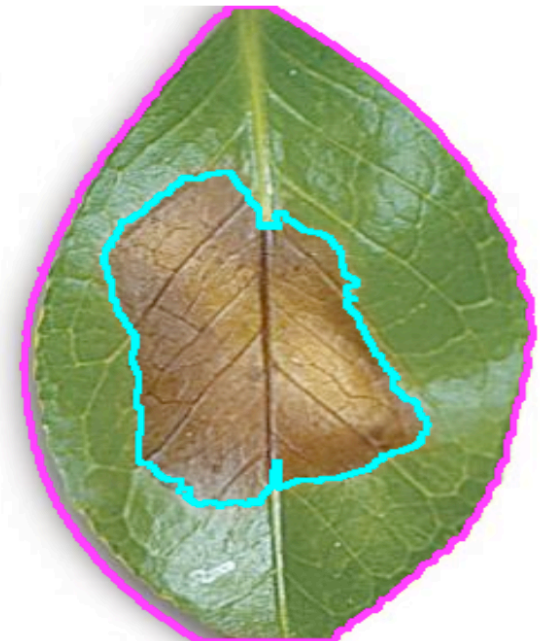


real time face recognition

Why image analysis

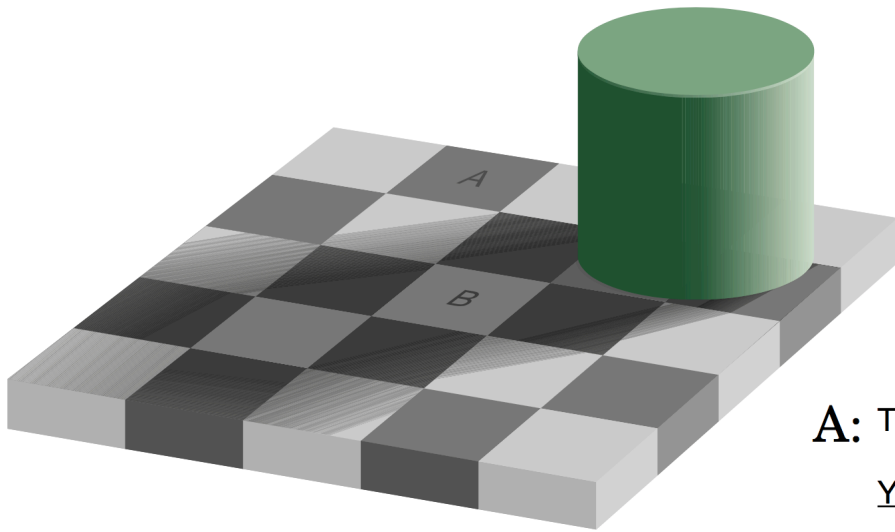
- **Accuracy**
- **What % of leaf is diseased?**

A: Total leaf area = 63300
Diseased area = 18830
% disease = 29.75%

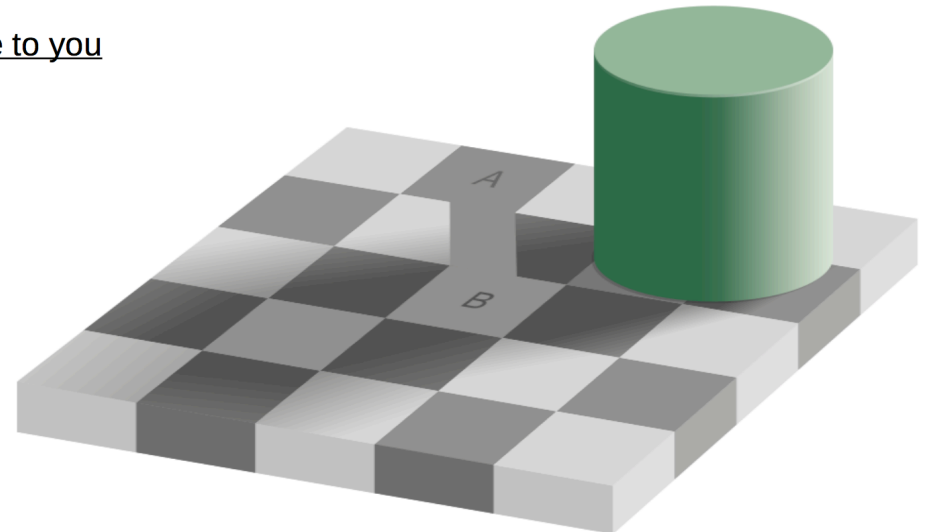
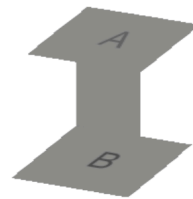


Why image analysis

- **Accuracy**
- **Which is darker, A or B?**

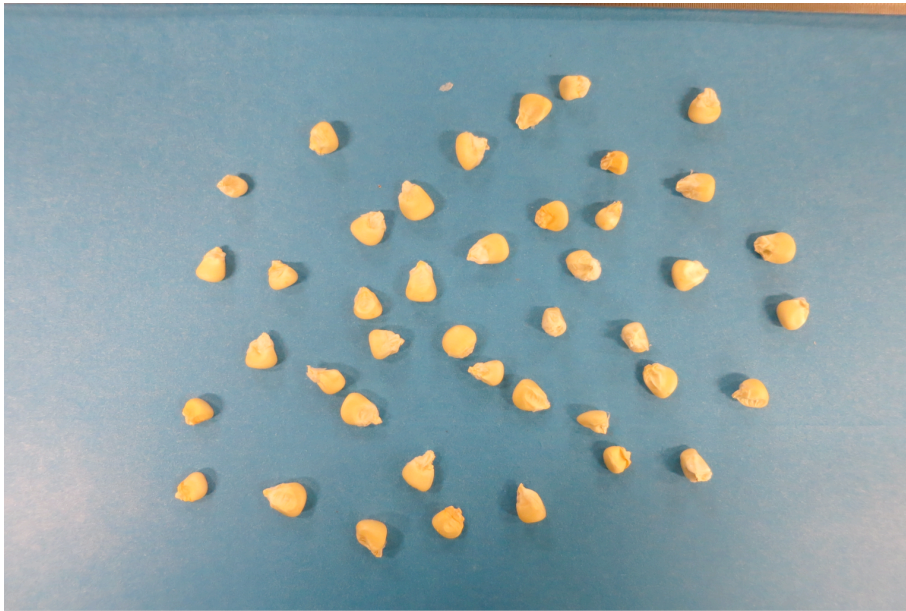


A: They are both the same
Your eyes lie to you



Why image analysis

- **Throughput**
- **How many corn seeds?**



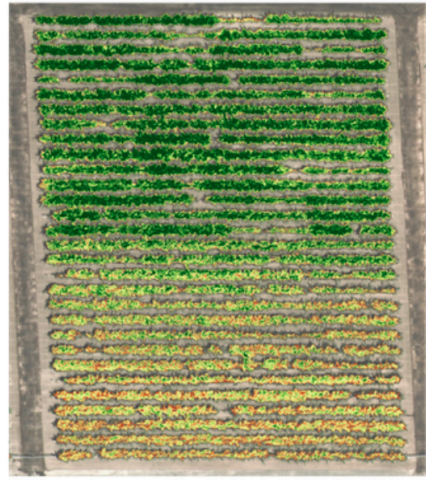
```
start = getTime();  
run("macro.ijm");  
print((getTime() - start) / 1000);  
  
$ n= 42  
$ time= 0.641
```

Why image analysis

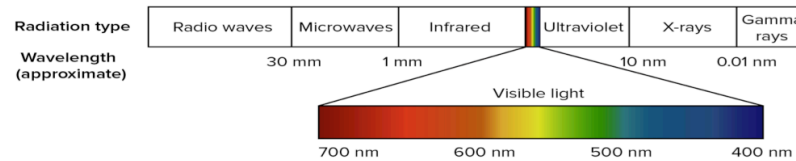
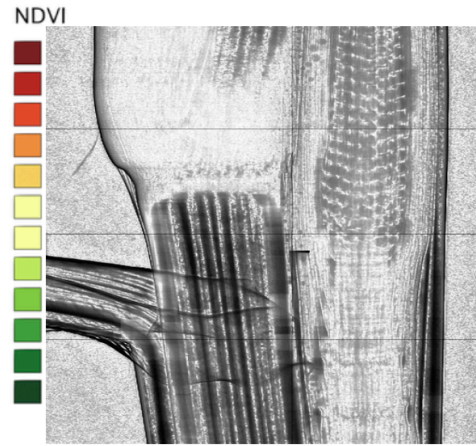
- **Some stuff you can't see**



Color



NDVI



What is an image?

- **It is just a grid of numbers**

0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0
0	0	0	1	1	0	0	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
0	0	0	1	1	0	0	0
0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	0

This is a visual representation of this



Binary Image.
0 = white | 1 = black
8 x 8 pixels

R
red

255, 0, 0

G
green

0, 255, 0

B
blue

0, 0, 255

Any colour can be represented by the proportion of red, green and blue.

255, 255, 0

255, 255, 0

Peach Puff = 255, 218, 185

Aqua Marine = 127, 255, 212

255, 255, 255

0, 0, 0

Cornflower = 100, 149, 237

What is an image?

- **Colour images are made up of 3 channels**

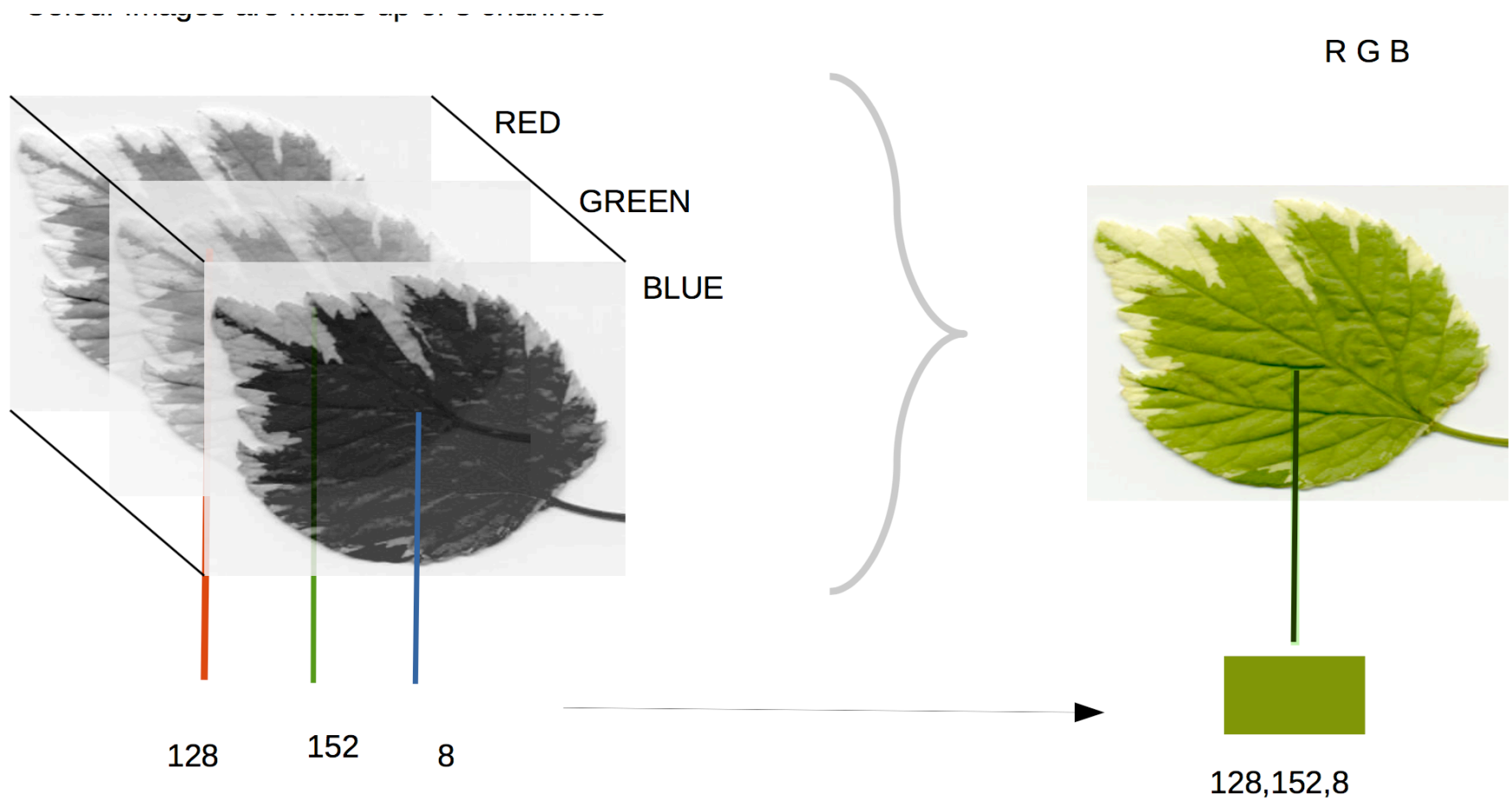


Image for science

- High contrast between object of interest and background
- Plain background
- Even illumination
- Object of known dimensions include in image
- Large file size (.tif)
- QRcode

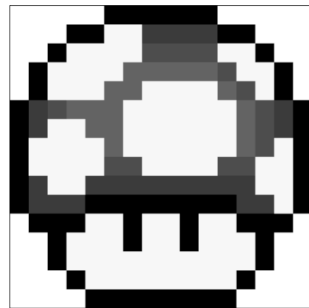
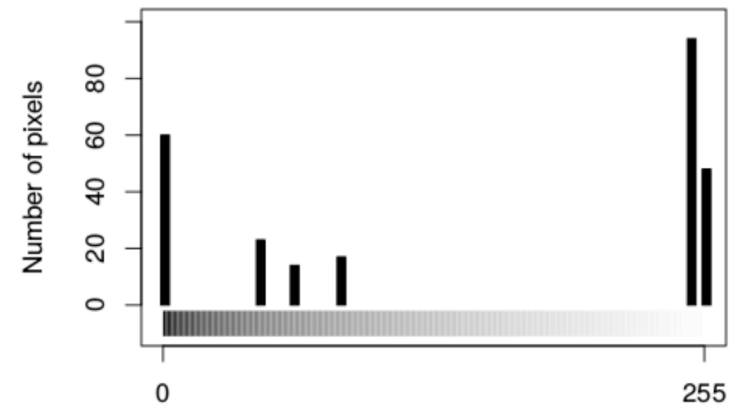


Image size – 16 x 16
Total number of pixels – 256
Max = 255
Min = 0
Mean = 151.77
Mode = 248



Number of pixels < 255 = 206

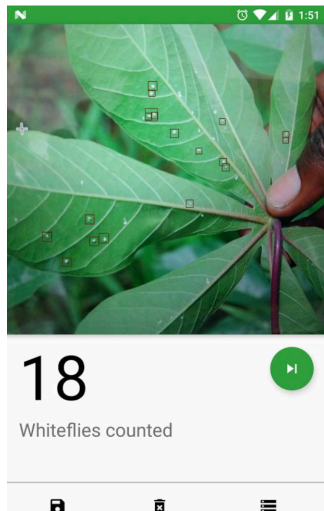
Mushroom area = 206 pixels²

Pheno apps

- <http://phenoapps.org/>

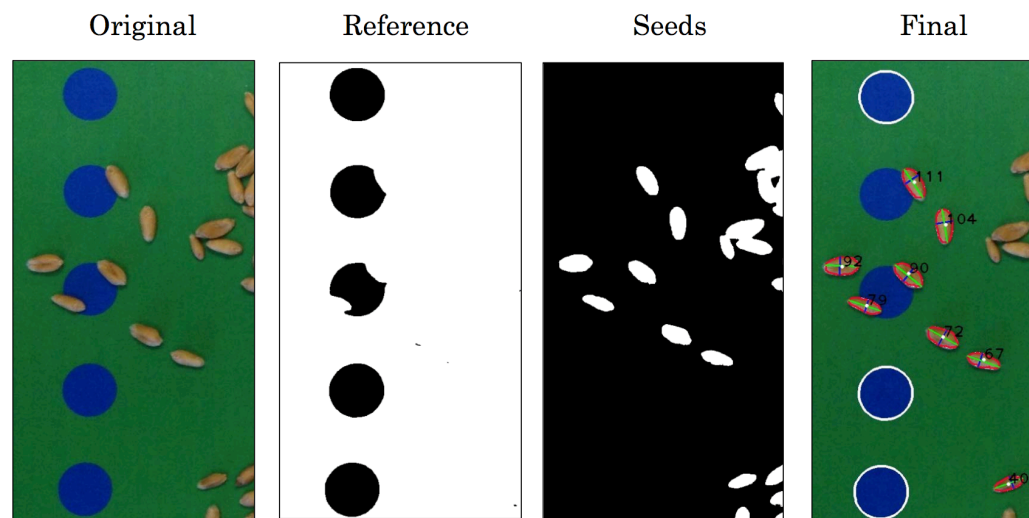


Whitefly Count



OneKK

ImageJ
Image Processing and Analysis in Java



<https://youtu.be/i3614N3bMzI>