The colourful life of a biometrician
MacMario from Perth (≈32S, ≈116E), Western Australia

Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

1. Introduction

I am part of a meat science project that is looking at comparing meat colour stability with various experiments using photographs or JPEG files. This work is not available for publication yet but I would like to describe the problem using an alternative scenario.

Below in Figure 1 is a colourful 'representation' of the Apple Isle of Tasmania. It also shows another location also called 'Perth'. Figure 2 shows the old Perth Post Office in Tasmania.

One of our statistical problems is similar to the estimation of the height or thickness of say the purple band (row 5 in Figure 1 below).

The size (in pixels) of the JPEG picture in Figure 1 is 436 (horizontal) by 480 (vertical) with 72dpi (dots-per-inch).

The colour of an object can be a very subjective issue and difficult to score especially when the colours do not have a simple and clear cut boundaries. Can we find a more objective way that is more accurate and reliable compared to observers who can vary in their colour perception?

2. Statistical issues and approach to scoring the colour

With any new problem or project this always the learning curve of the jargon and terminology.

➢ The first issue is what colour space to think about? There are quite a few such as 'RGB' and 'Lab'.

➢ The meat scientist prefers 'Lab' where 'L' is the intensity from 0 to 100 with 100 being white and 0 being black. The other 2 dimensions measures the contrast between red/green for 'a', and blue/yellow for 'b'.

➢ We have a lot of JPEG files to read so nice to develop a computationally efficient approach in R Statistical System.

➢ Take a vertical transect through the middle of the JPEG file in Figure 1. The manual way is to measure with a ruler or instrument the height of the band in the centre and a point on either side of the middle of the JPEG file (i.e. 3 replicates and take the average).

➢ There are 10 possible subsets of colour in Figure 1 including the white background. We can find the number of pixels and convert to centimetres using the dots-per-inch.
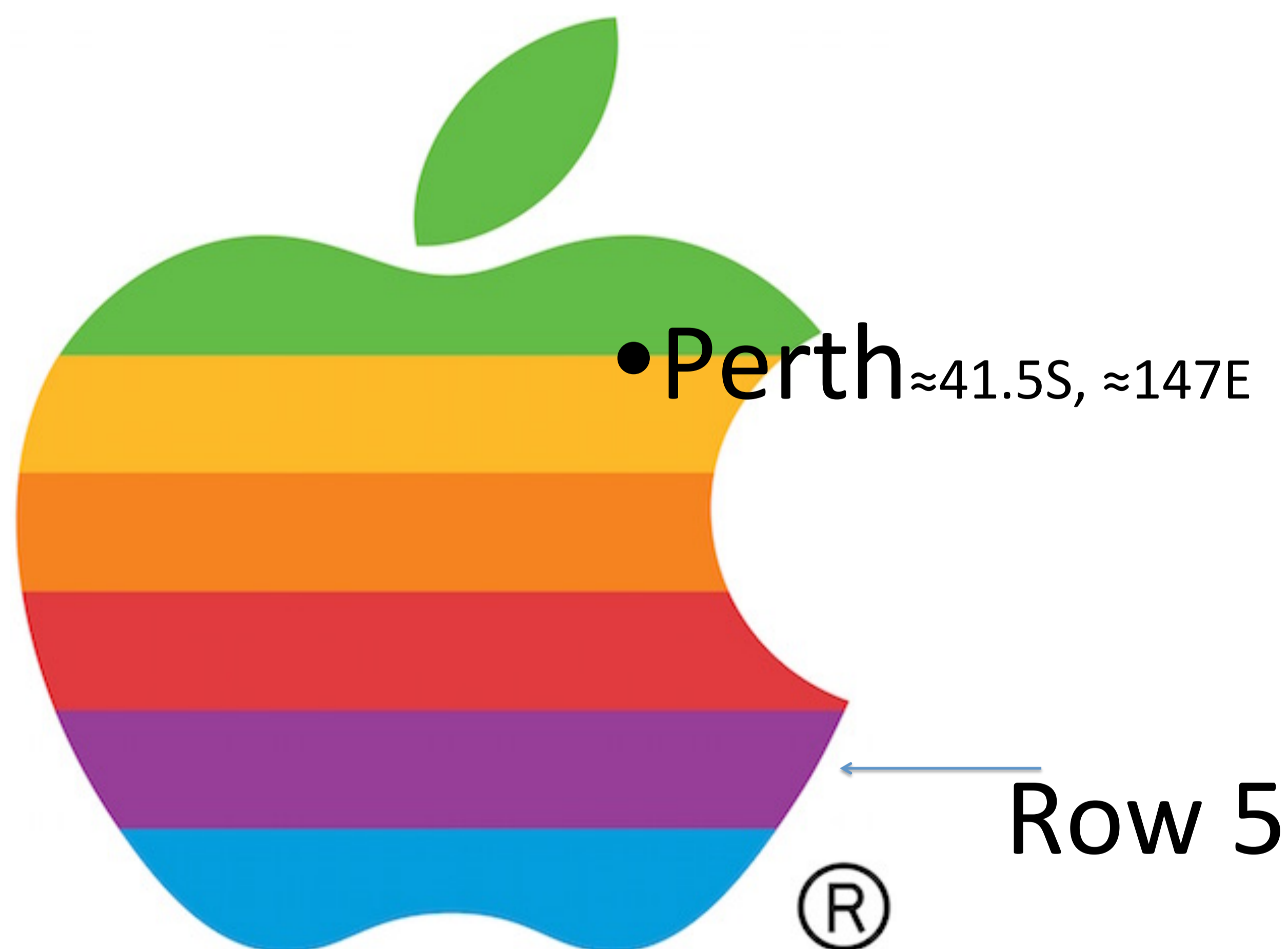

Figure 2: Post office in Perth, Tasmania (courtesy of Wikipedia)

•Perth ≈41.5S, ≈147E

Row 5

®

Figure 1: A colourful representation of the Apple Isle or Tasmania, (courtesy of Apple Inc.)

3. Some results and conclusions …

➢ This is a simple bench test approach.

➢ Figure 3 shows the 10 possible sets of colour from top to bottom (notice the edge effects).

➢ So what is the colour of the fifth row (or the 8th set) in the apple? Is it violet or purple?

➢ By ruler, the height is about 2.1cm, by simple pixel count =60, which converts to 2.12 = 60*2.54/72

➢ So centered at about the band (Row=400), L=65.19, a=36,47, b= -24.61

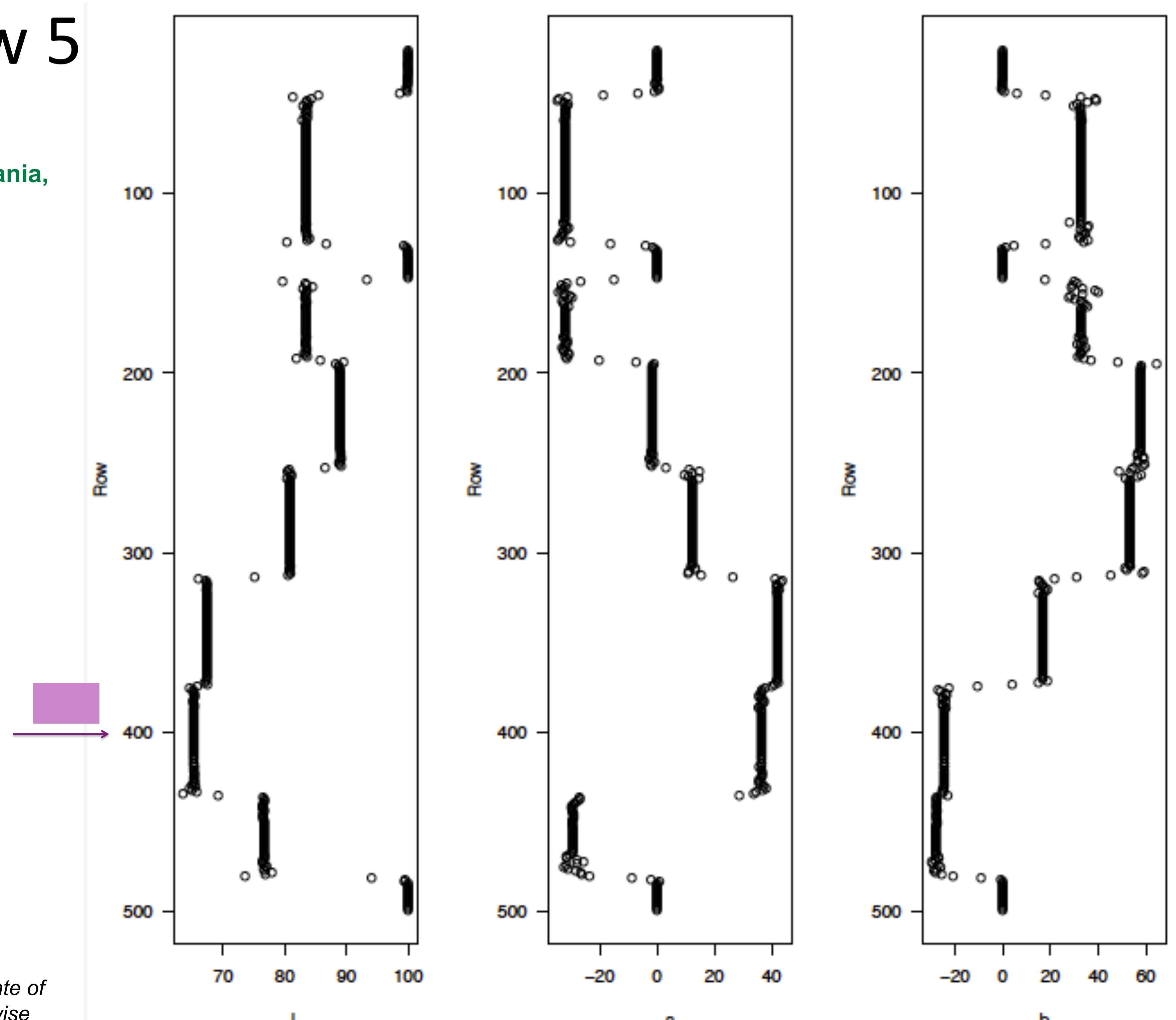➢ We have to now to apply the procedure to the real case study with many JPEG files

Figure 3: Plots of the Lab scores from the vertical transect through the middle of the apple (column 240).