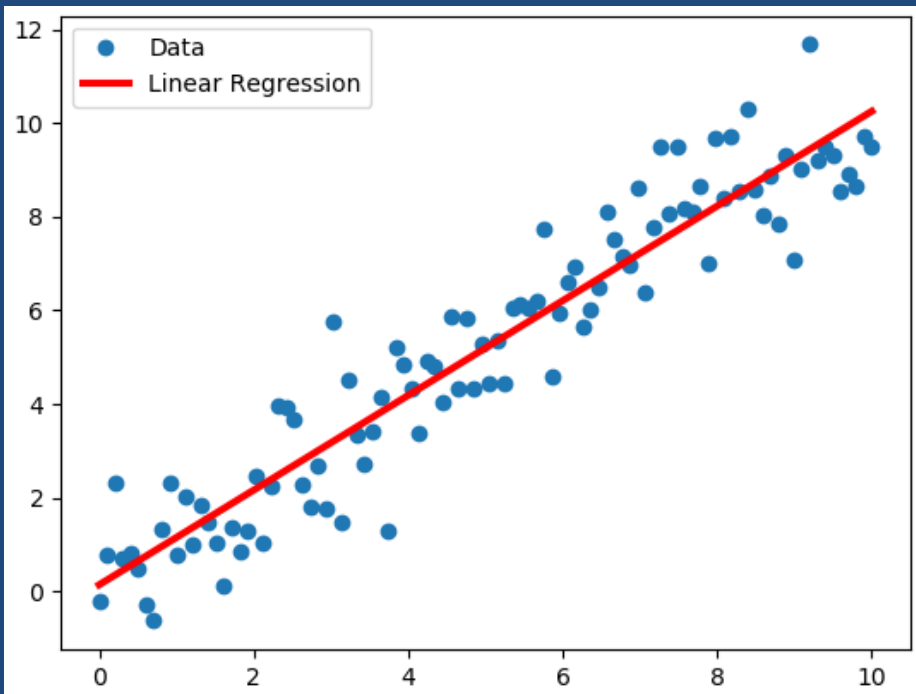


## Machine Learning using Ilastik (Chris Gell)



# What is ML?

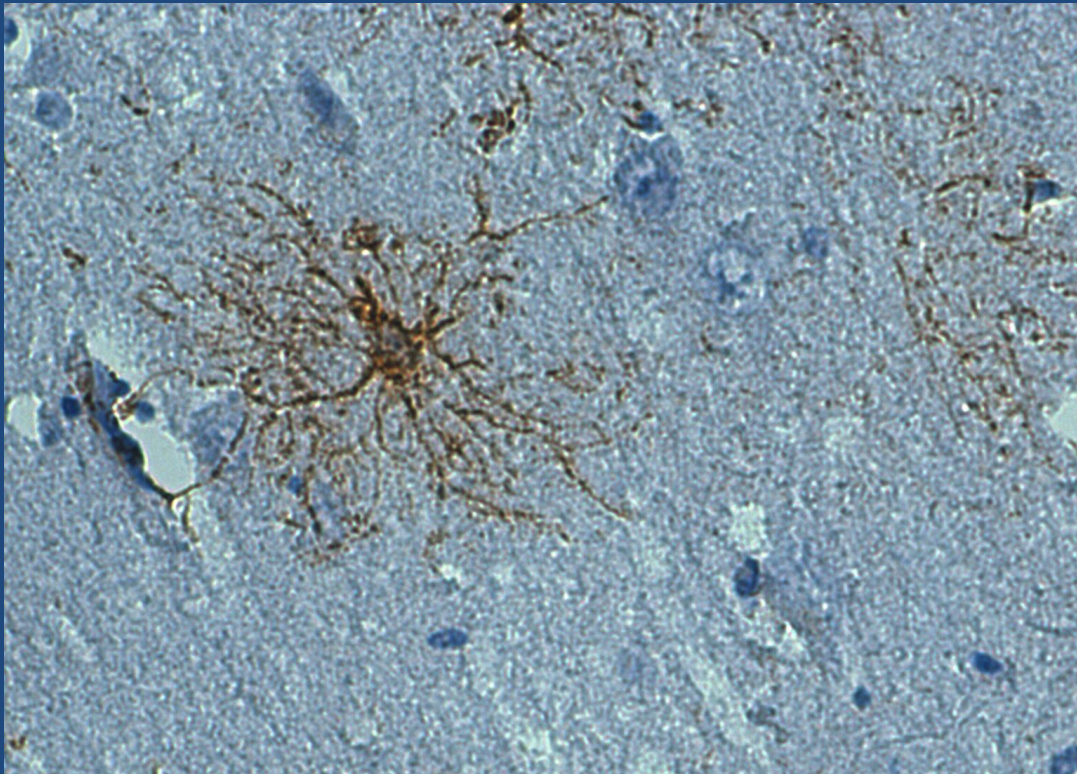
ML is nothing new, you've probably all used ML methods!



- want to characterise a phenomenon (relationship)
- have an equation (feature)
- have input (data)
- have a training algorithm (often least squares)
- output is the relationship between variables

# ML in image analysis

## DAB staining



- colour
- texture
- edges



# Ilastik can introduce ML into your workflow now.

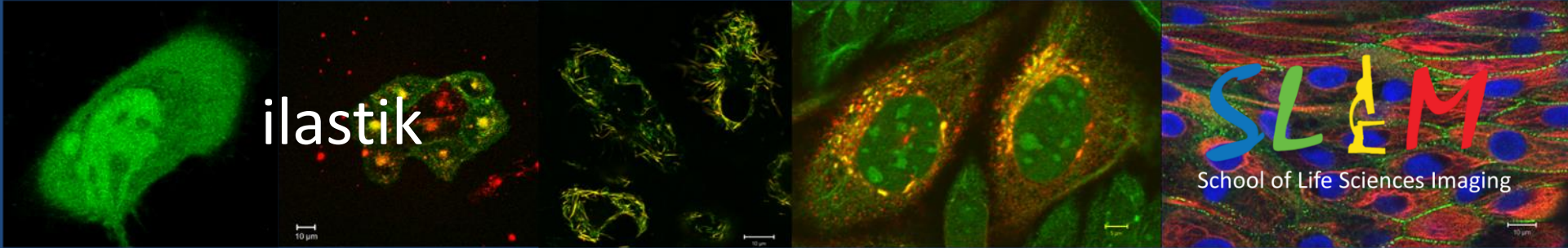
The screenshot displays the Ilastik software interface. A 'Features' dialog box is open, showing a table of feature selection options. The table includes columns for different sigma values and rows for Color/Intensity, Edge, and Texture features. The 'Color/Intensity' row has all checkboxes checked. The 'Edge' row has checkboxes for sigma\_4, sigma\_5, and sigma\_6 checked. The 'Texture' row has all checkboxes checked. The main window shows a histology image with blue and yellow segmentation masks. The left sidebar contains the 'Project Settings View' panel with sections for Input Data, Feature Selection, Training, Prediction Export, and Batch Processing. The bottom status bar shows 'X 342 Y 328' and 'Crosshairs'.

	$\sigma_0$	$\sigma_1$	$\sigma_2$	$\sigma_3$	$\sigma_4$	$\sigma_5$	$\sigma_6$	$\sigma_7$
Sigma	0.30	0.70	1.00	1.60	3.50	5.00	10.00	add
Color/Intensity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Texture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

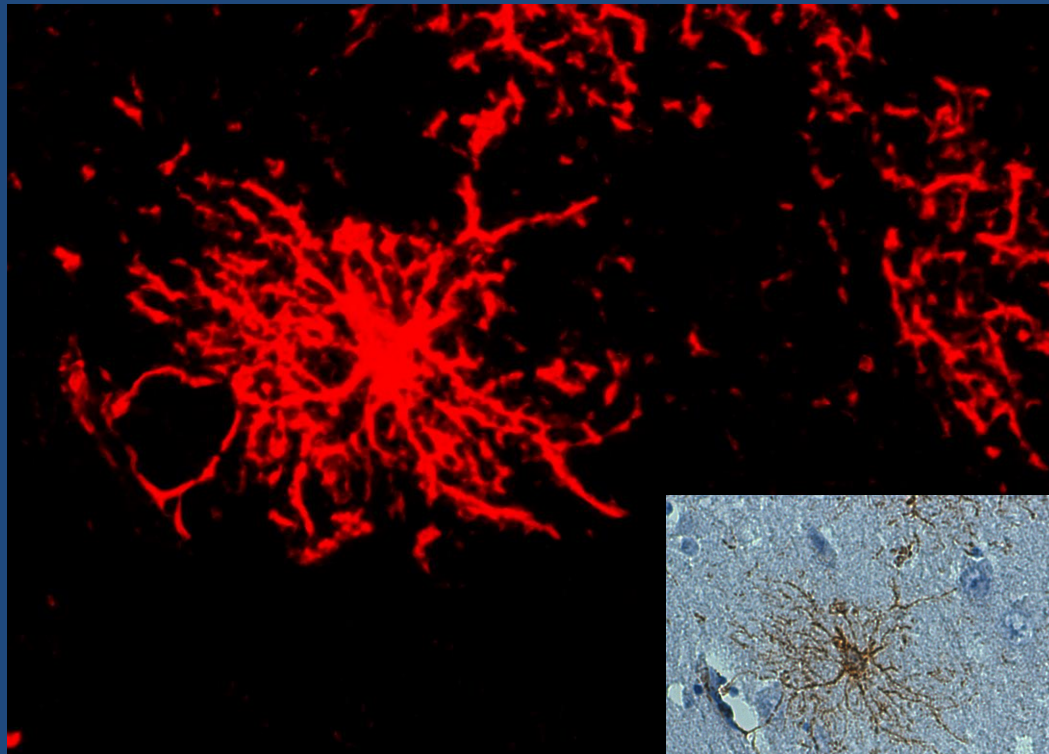
43 %

X 342 Y 328

Active Requests: 0 | Cached Data: 14.1 MB



probability map of pixel classification → passed to (e.g.) Fiji, CP etc.







# Why use ilastik

## Pros

- Simplify existing workflows
- Intuitive interface
- Implement ML now – it's trendy!
- Open up new and faster analysis
- Fiji integration

### *Ready for:*

- pixel classification
- object classification
- tracking
- 3D

## Cons

- Need decent hardware
- Conceptually challenging (?)
- Training time
- Fiji (or other dependant)
- Checks with a ground truth (especially as conditions vary)



Ilastik more information



<http://ilastik.org/>

<https://forum.image.sc/>

A poster for the SLIM Training Workshop. The background is a dark image of a cell with blue and yellow fluorescence. The text on the poster includes the University of Nottingham logo and name, the SLIM logo, the title 'SLIM Training Workshop', a list of topics: 'Introduction to SLIM', 'Using FIJI', 'By Seema Rajani &amp; Chris Gell', and 'Tues 20th - Weds 21st'. A white diagonal banner with the text '+ ilastik' is overlaid on the poster. At the bottom, it says 'Register at: https://www.eventbrite.com/o/seema-rajani-and-chris-gell-16468631064', 'IMPORTANT: 15 places only', a Twitter handle '@SLIM\_nottingham', and a website URL 'nottingham.ac.uk/life-sciences/facilities/slim/index.aspx'.