Introduction to Neural Networks for Natural Language Processing

Introduction to Neural Networks

Introduction to Neural Networks

- Recap: Points and Planes.
- Limitations of a plane.
- Going non-linear.
- Notebook introduction: Neural Networks with Keras.

Recap: Points and Planes

- The previous lesson gave us an **intuition of our machinery**: points are arrays of numbers, all of the same length.
- If take the values that make up a point, weight them and add a bias component **we can separate it from others**!
- The weight and the bias **define a ‘plane’ that can tell us if something is in front of it or behind it**.

Limitations of a plane

- Planes are flat so a single plane is not enough for **separating points that don’t fall in a straight line**!

- Furthermore, **we have no idea of how ‘correct’ a guess is by looking at the sign**: a point can only be in the back or in the front.

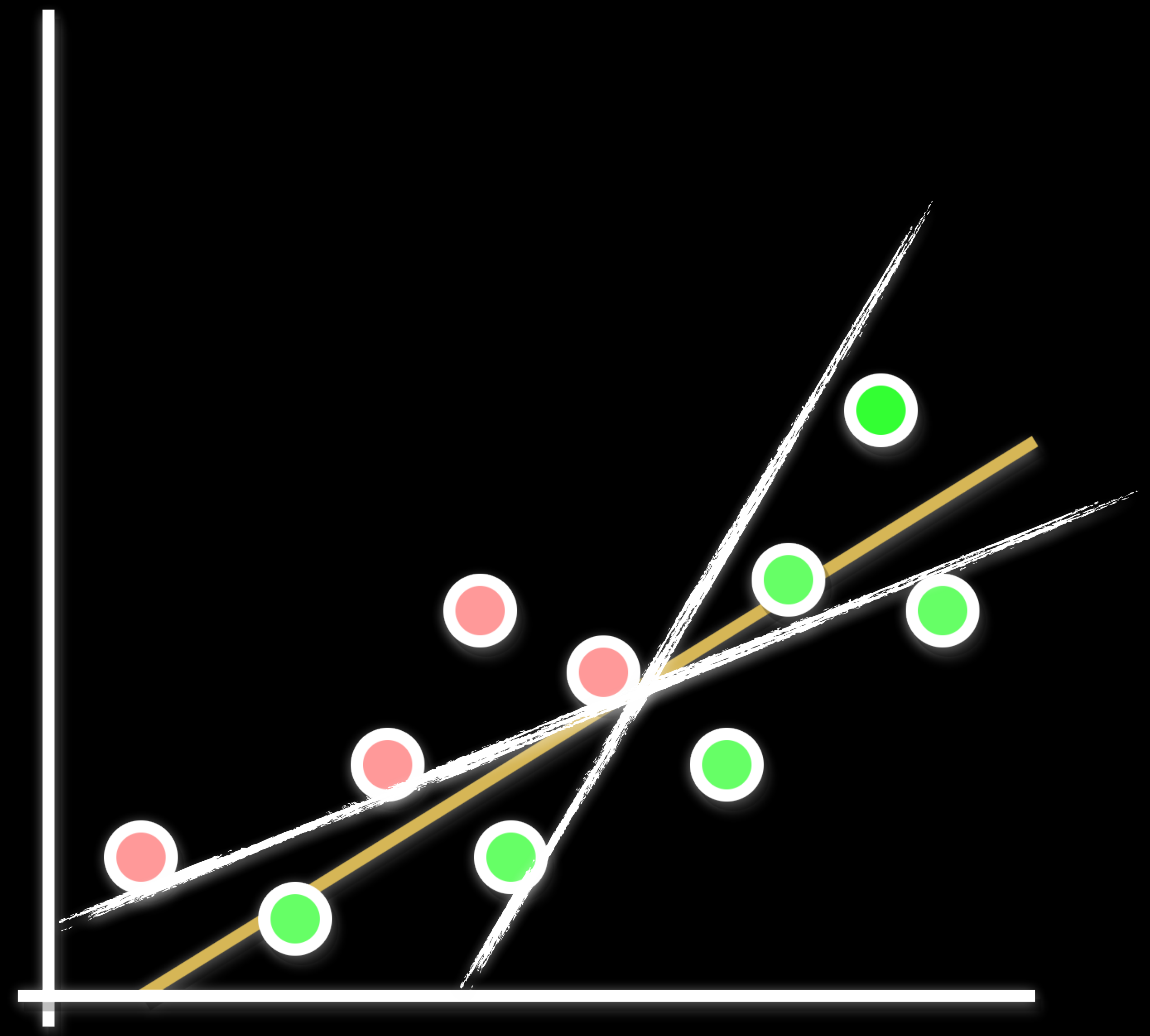
- Finally, the very artificial process of finding the weights and biases by hand is **far from being Artificial Intelligence**!

Limitations of a plane

- Looking back at one of our first examples shows us these limitations.

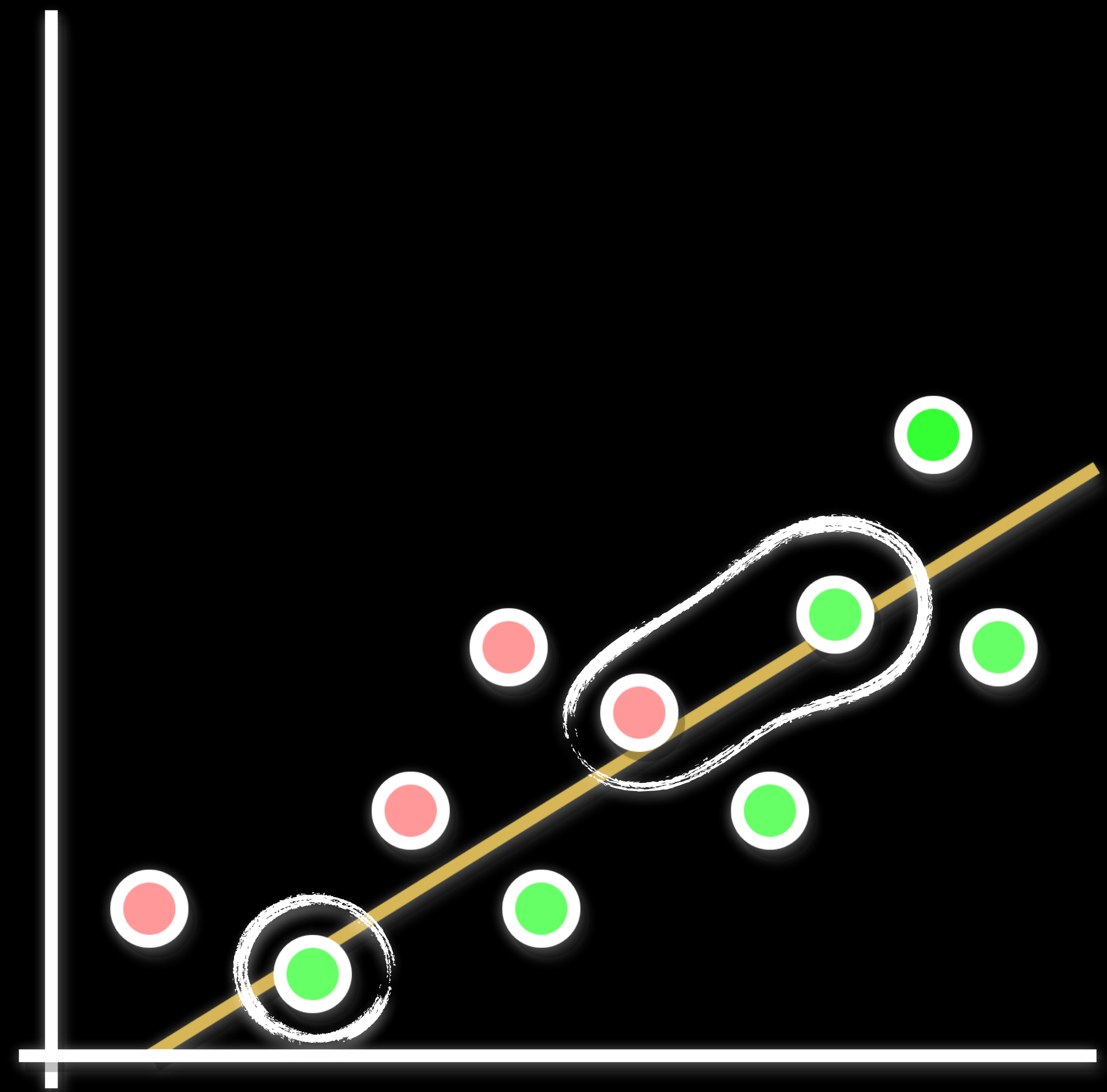
- Because of how they lie in space, **we can't separate the red and green points with a single plane**!

- To describe this, we say **our groups are not linearly separable.**



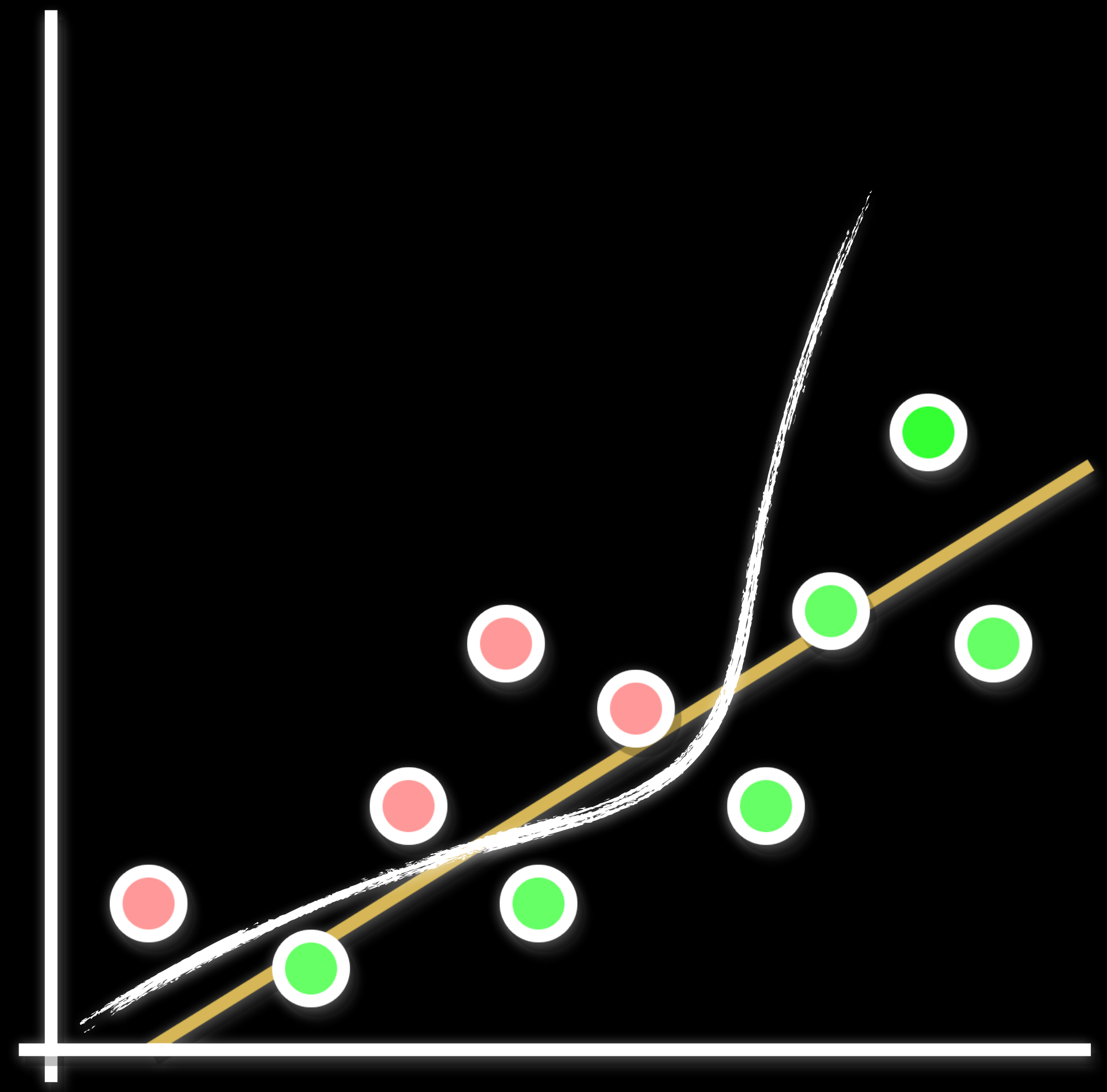
Limitations of a plane

- Looking back at one of our first examples shows us these limitations.
- Some points **should be more certainly classified** than others.
- We would expect **points closer to the boundary are more uncertainly classified**:



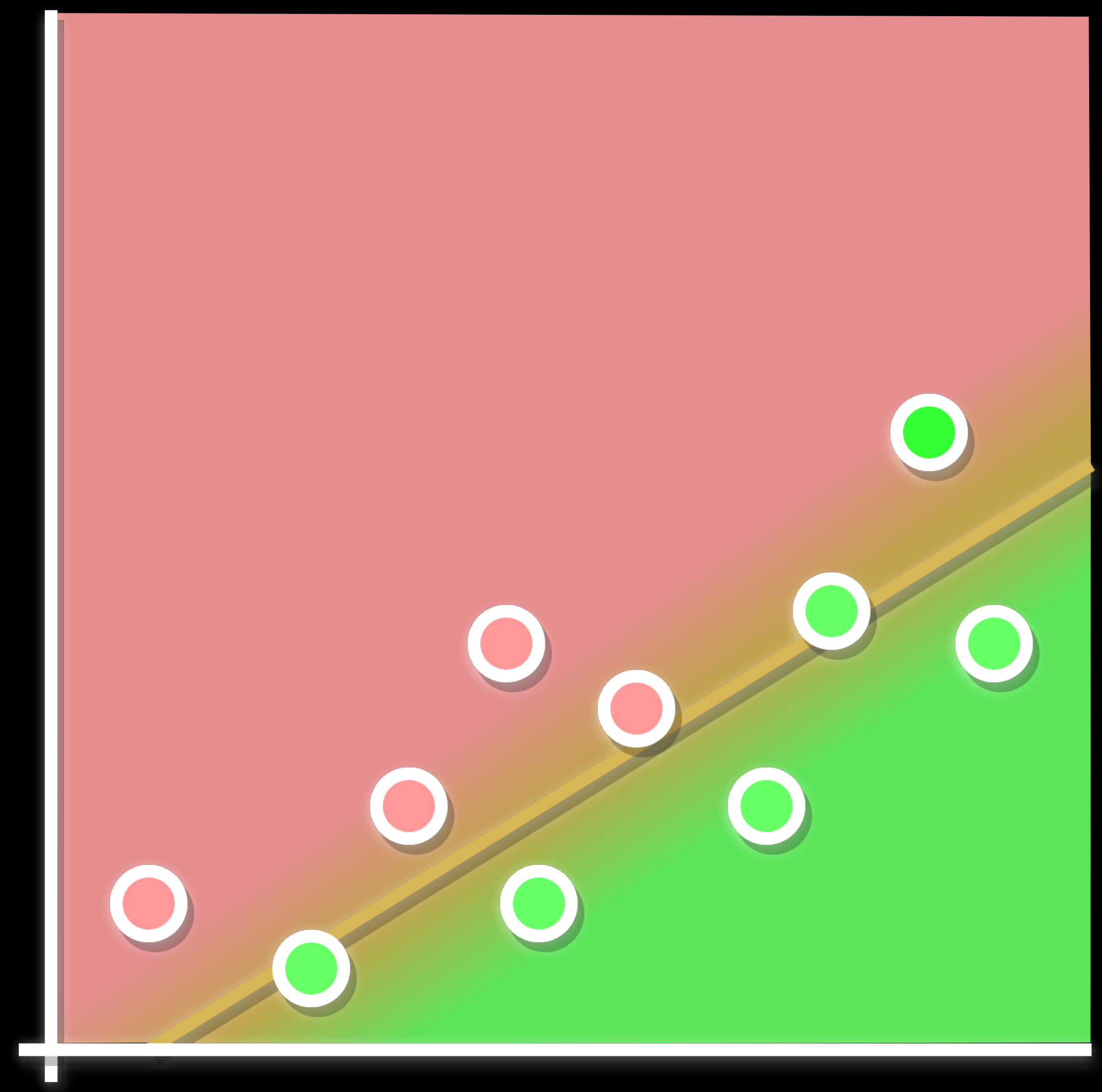
Going non-linear

- Our problem is that the world is fuzzier than what plain old lines can separate.
- Non-linear problems need… **non-linear solutions**!
- This means having regions defined by shapes **with different underlying functions.**



Going non-linear

- Our problem is that the world is fuzzier than what plain old lines can separate.
- Non-linear problems need… **non-linear solutions**!
- This means **defining smooth regions to accommodate uncertainty** on points near the edges.



Notebook introduction: Neural Networks with Keras

- We have equipped ourselves with **the intuitions we need to build neural networks**.
- Our networks must be able to **tackle uncertainty** and **represent non-linear problems**, learning **automatically**!
- This is exactly what we will be covering in our second course notebook: **using Keras**, a Python library, **to discover and understand neural networks**… **Let's go!**

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