



Neural Networks: An Overview and Case Study.

Presented on: August 25, 2020.

Presented by: Basant Mounir - Big Data Intern - Marketing Department.

*Case Study sneak peak!

*What Inspired Neural
Nets?

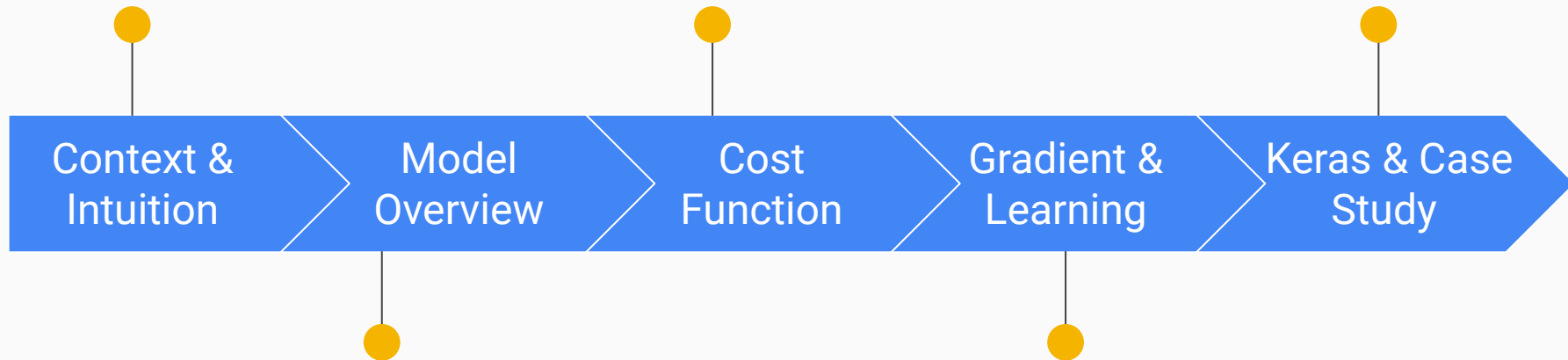
*Describe the problem.

*Derive a cost function for the
neuron.

*Gradient descent concept.

*Introduce Keras,
hyperparameters, and
some techniques.

*Explain the code and
results.



*Describe neural net model
notation.

*Abstract the learning process.

*Derive the gradient of the
cost function.

*Neural **Network** Learning
Process.

I: Set The Context of Interest



What if...

```
df_churn.head()
```

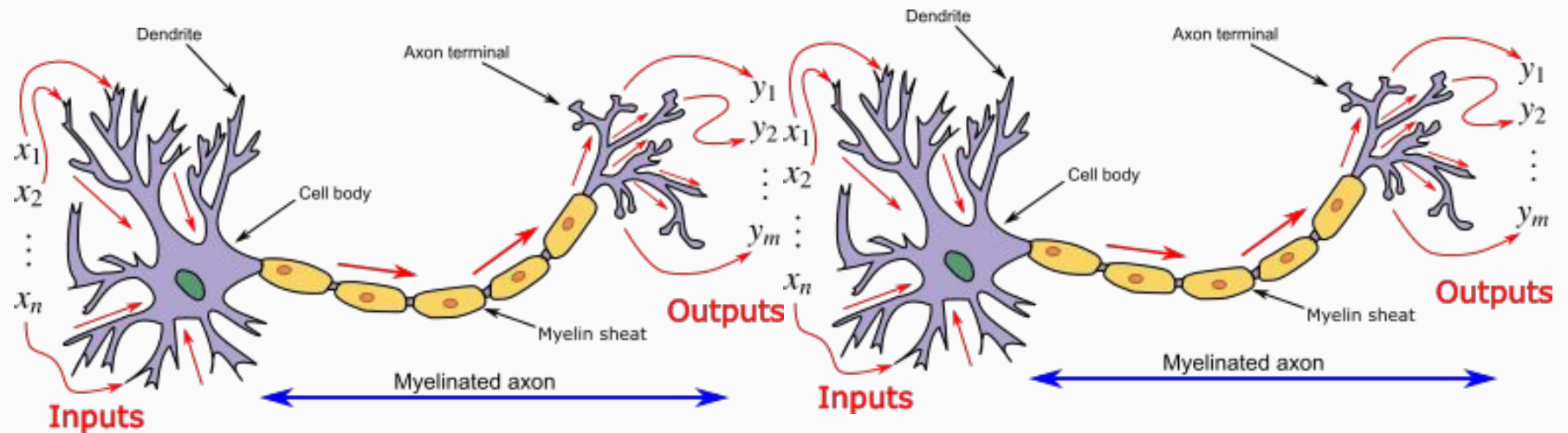
	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	619	France	Female	42	2	0.00	1	1	1	101348.88	1
1	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
2	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
3	699	France	Female	39	1	0.00	2	0	0	93826.63	0
4	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0

SVM inaccurate. Decision Tree
Inaccurate. Maybe even
ensembling fails! We're stuck.
Why?

The background is a dark, abstract composition featuring a dense network of thin, glowing blue lines that resemble neural connections or a complex web. Scattered throughout are small, bright blue particles and larger, soft blue spheres, creating a sense of depth and movement. The overall color palette is dark blue and black, with the glowing elements providing a high-contrast focal point.

II: Building Intuition For The Model

The Neuron: Its Workings.

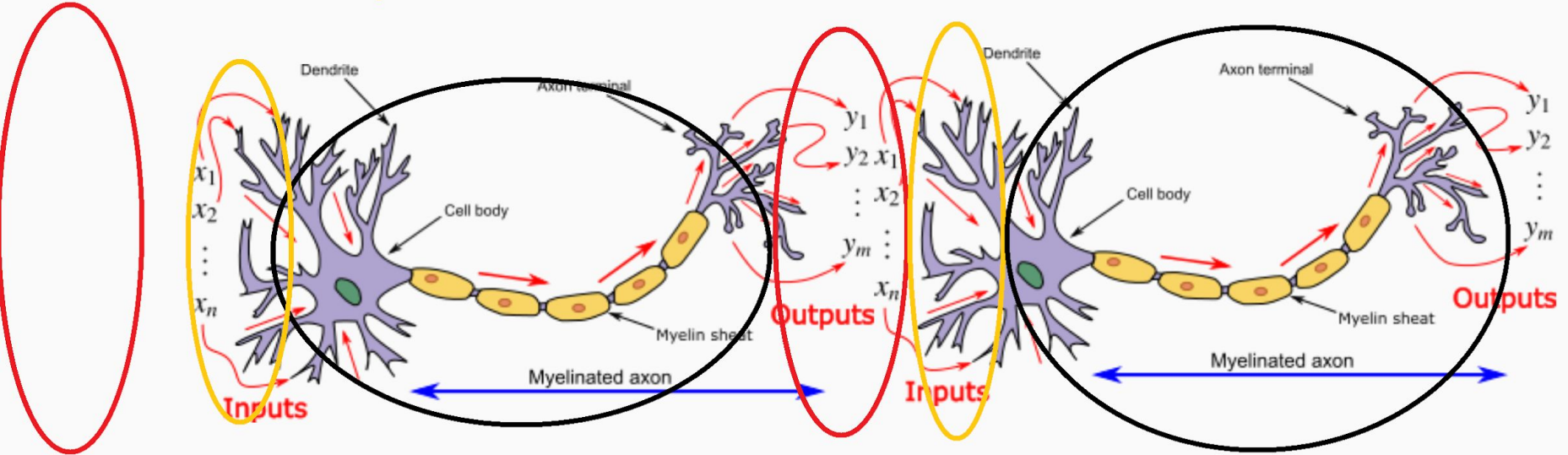


The background is a dark, textured field of thin, glowing blue lines that resemble tangled fibers or neural pathways. Scattered throughout are numerous small, bright blue particles, some of which are larger and more prominent, creating a sense of depth and movement. The overall color palette is dark blue and black, with the glowing elements providing a high-contrast, ethereal light.

Let's abstract it!

input:
pressure

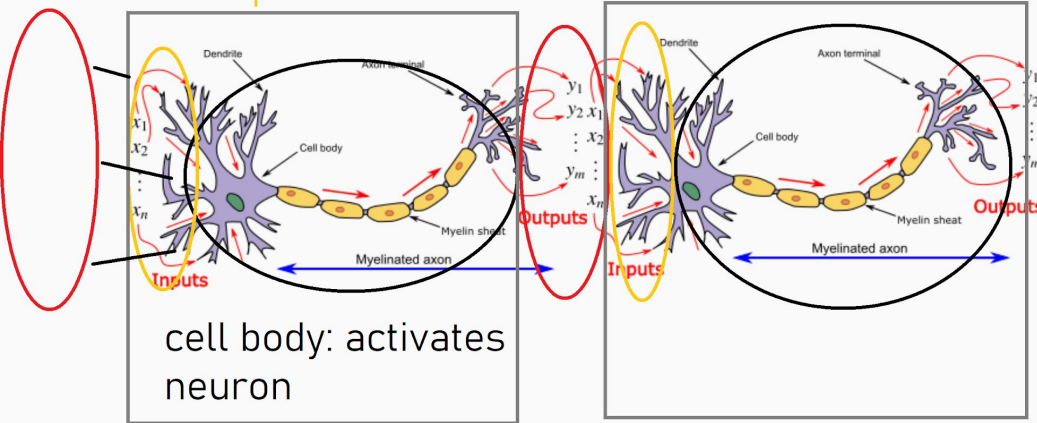
dendrites: weight the
input information



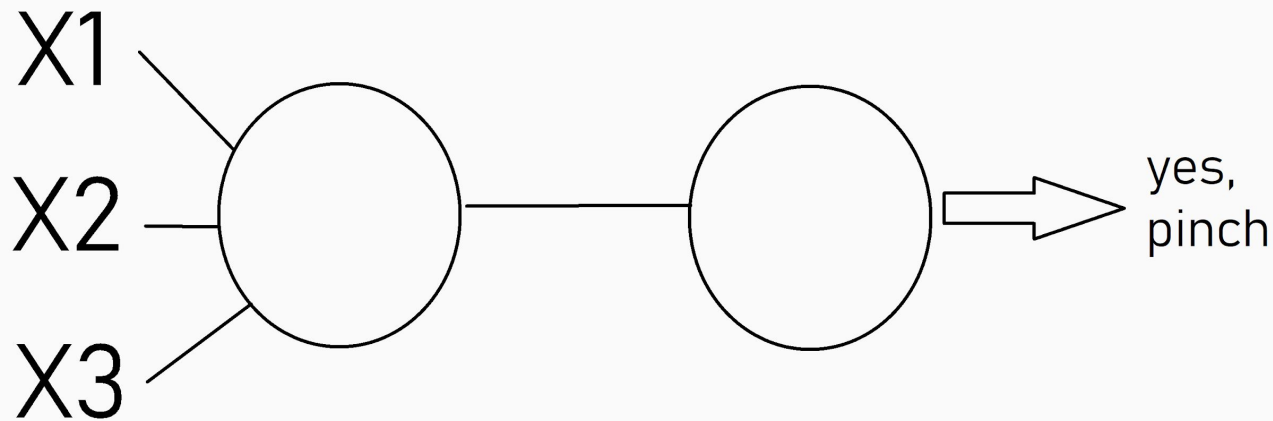
cell body: activates
neuron

input:
pressure

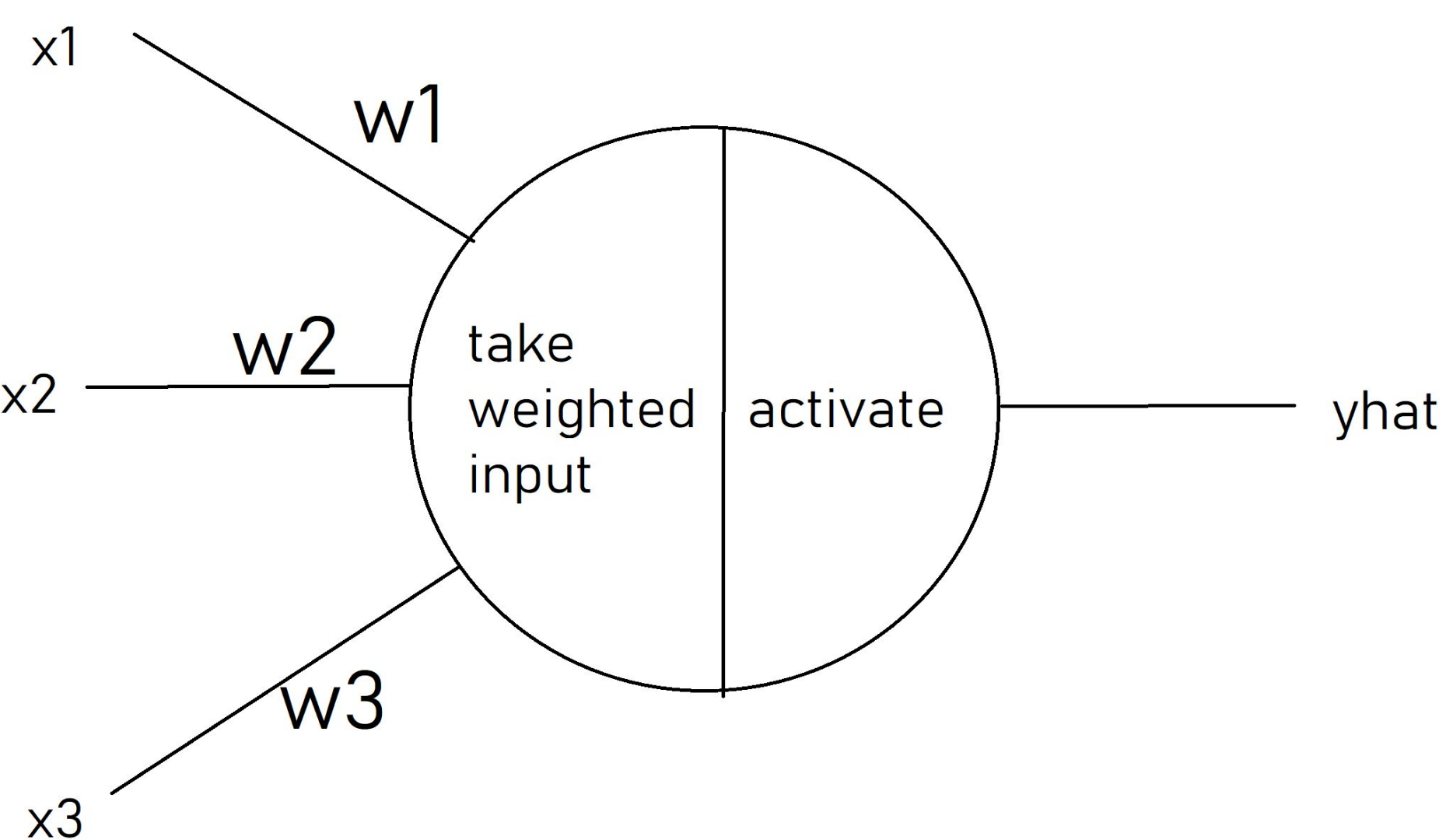
dendrites: weight the
input information

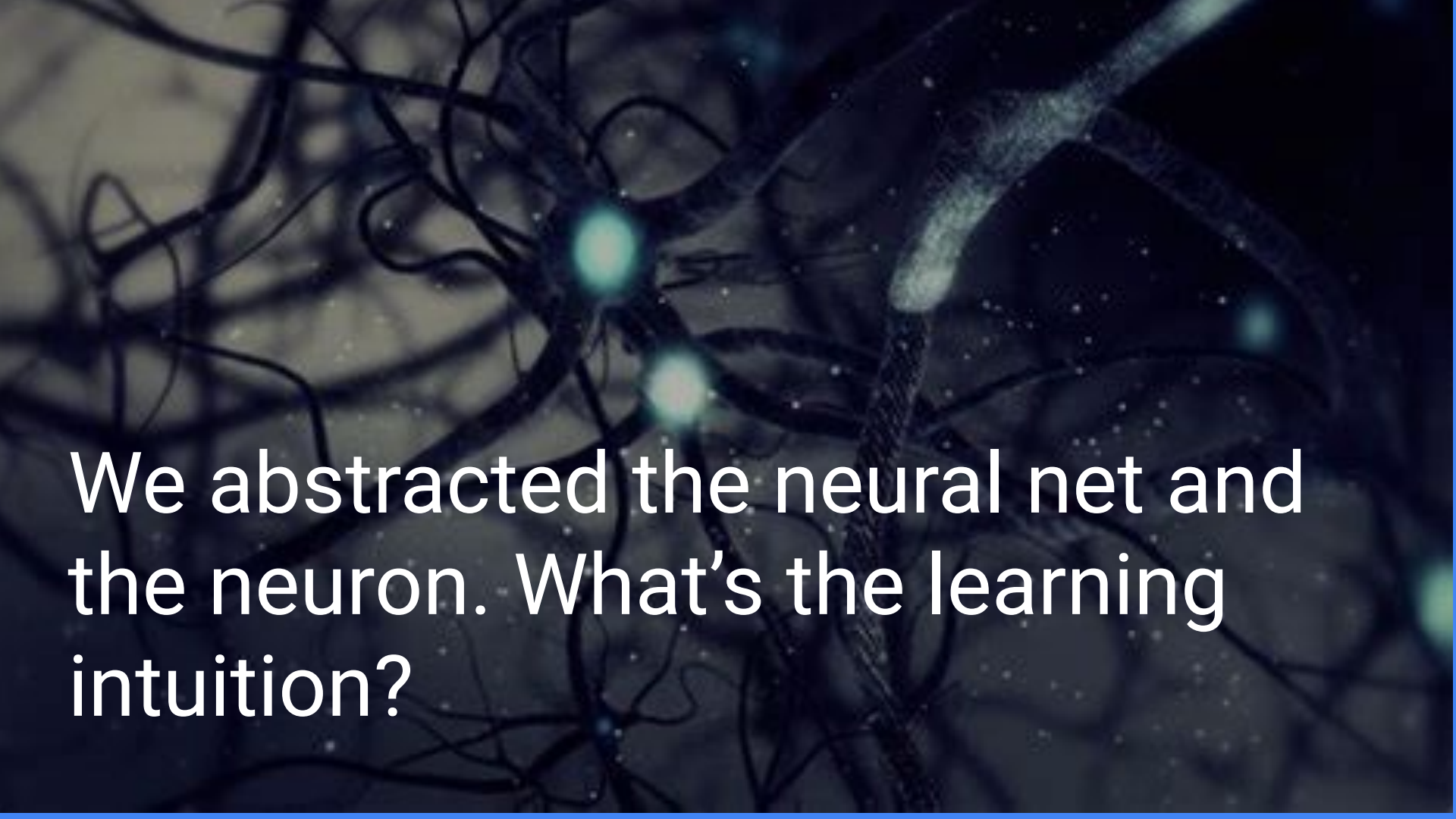


pinch!



- Neurotransmitters -> Inputs
- Dendrites -> Weights
- Cell Body -> activation
- Axon terminal -> Output





We abstracted the neural net and the neuron. What's the learning intuition?

How Neural Circuits 'Sharpen' for a Skill



Early Practice

Many neurons activate to perform the skill, even ones that aren't needed.



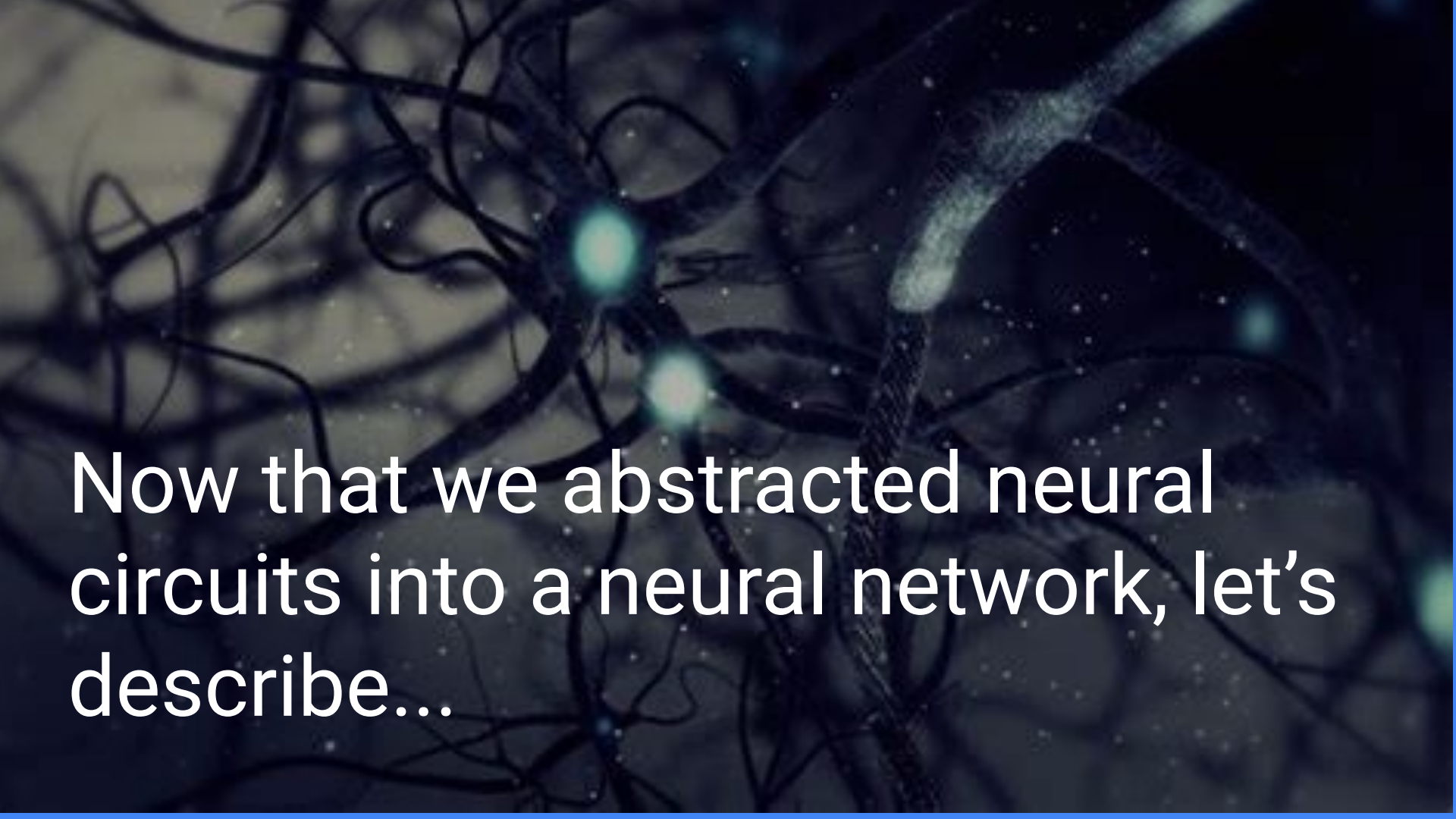
Sleep

The key cells needed for skill are reinforced.

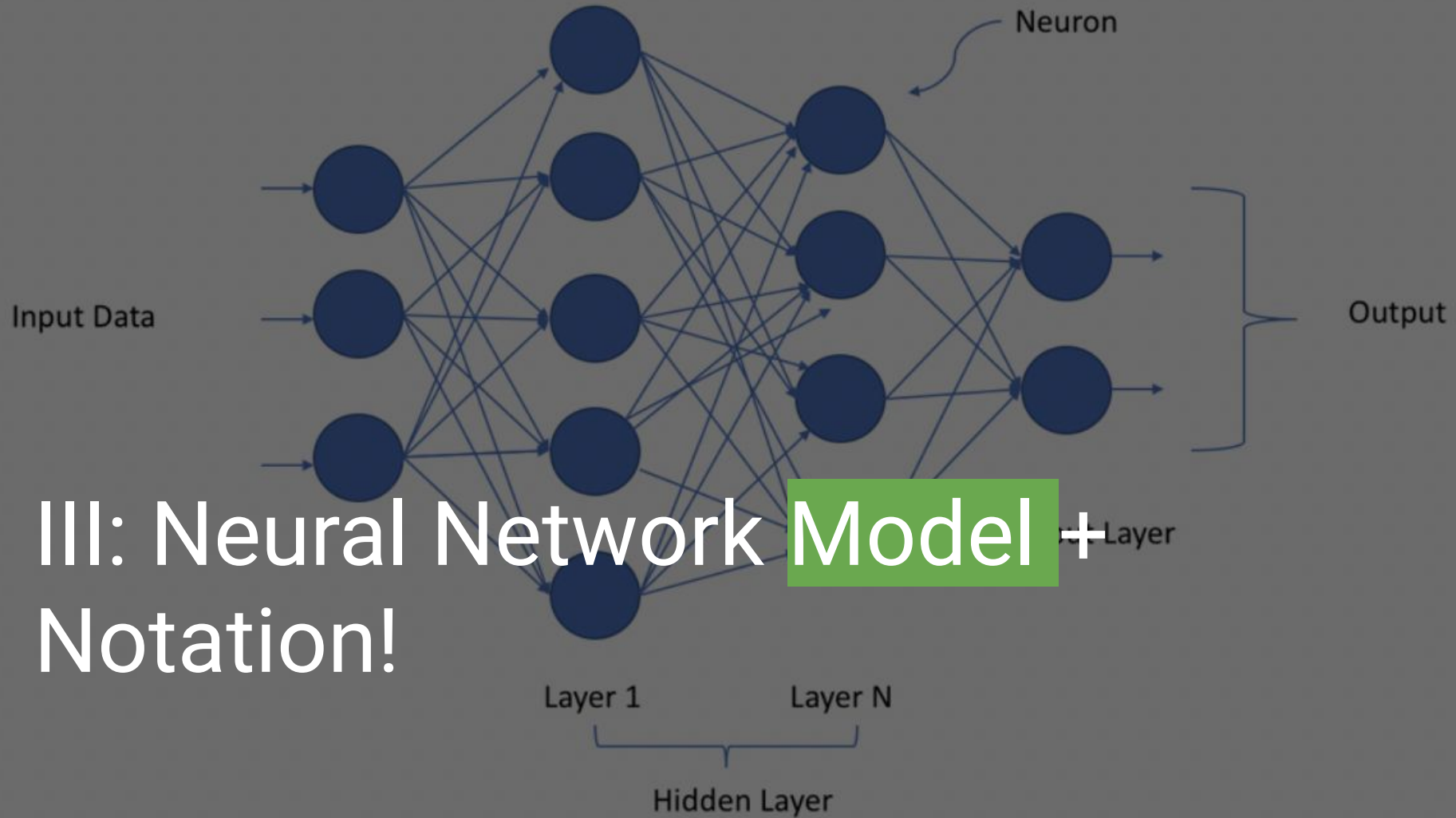


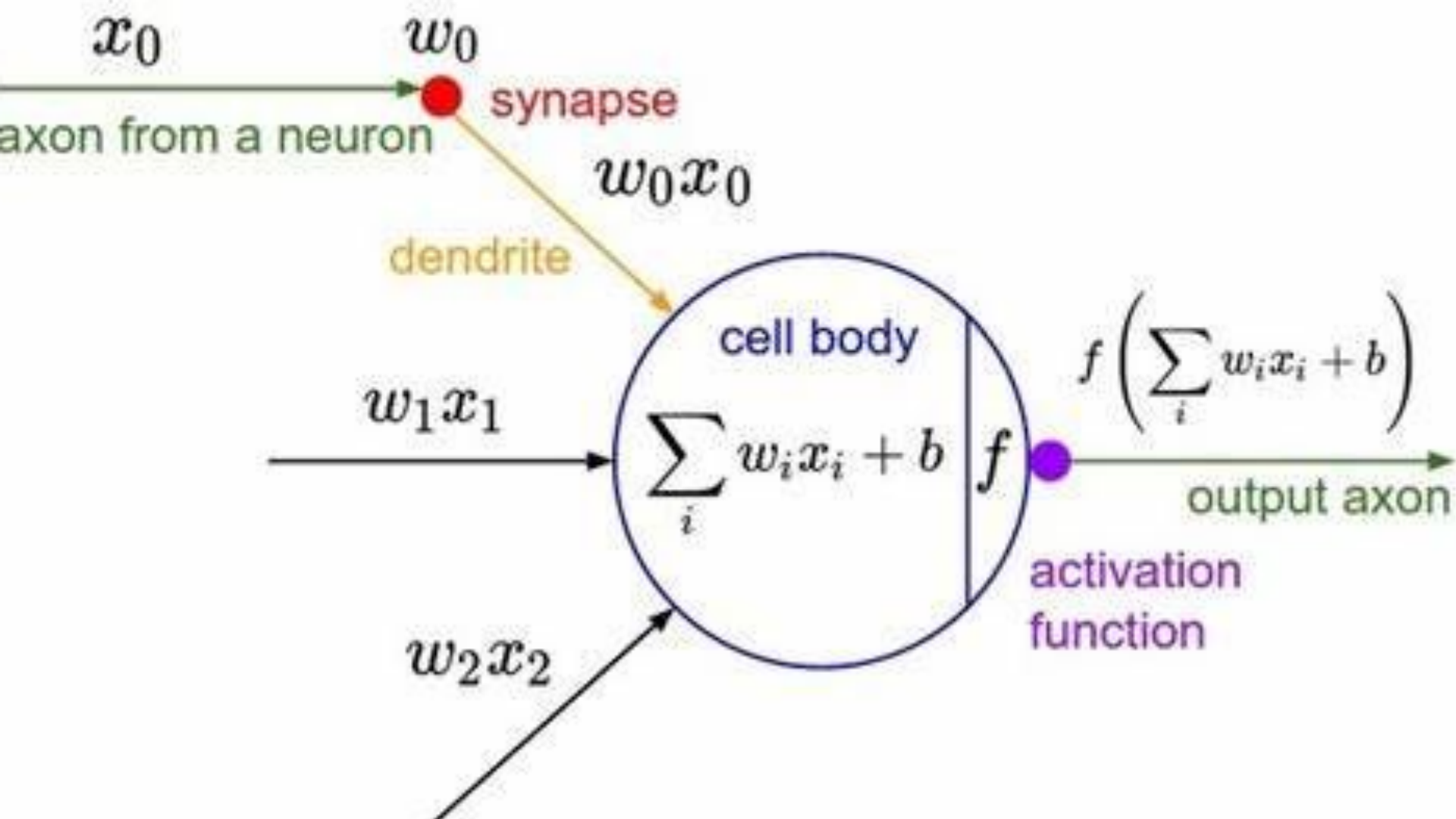
Skill Mastered

Only vital neurons fire.

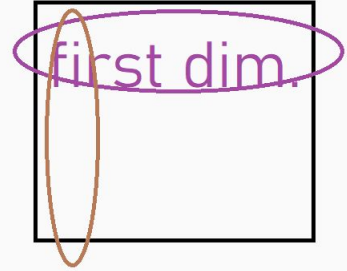
The background of the slide is a dark, abstract visualization of a neural network. It features a dense web of thin, dark, branching lines that resemble neural axons or dendrites. Several bright, glowing blue and green nodes are scattered throughout the network, representing active neurons or synaptic connections. The overall aesthetic is futuristic and scientific, with a focus on the complex, interconnected nature of neural circuits.

Now that we abstracted neural
circuits into a neural network, let's
describe...

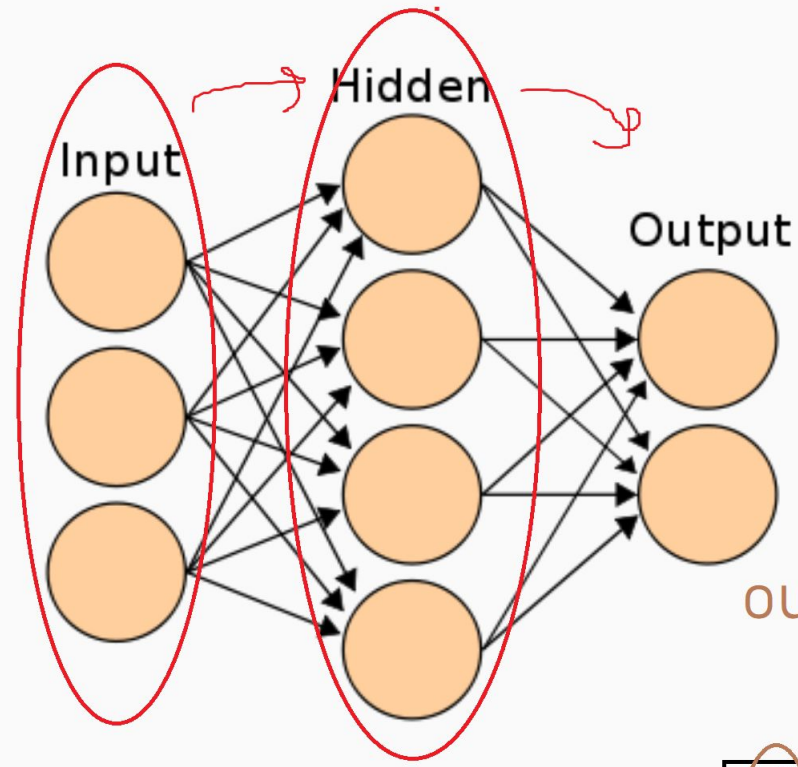




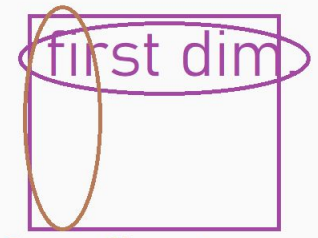
$X: (n \text{ [features]}, m \text{ [examples]})$



first example
 $i = 1$

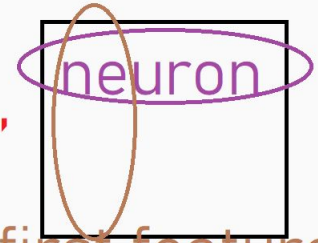


$Y: (k \text{ [output/neuron]}, m \text{ [examples]})$



output for first example

$W: (k \text{ [neurons]}, n \text{ [features]})$



first feature weight

Input Data

Neuron

Output

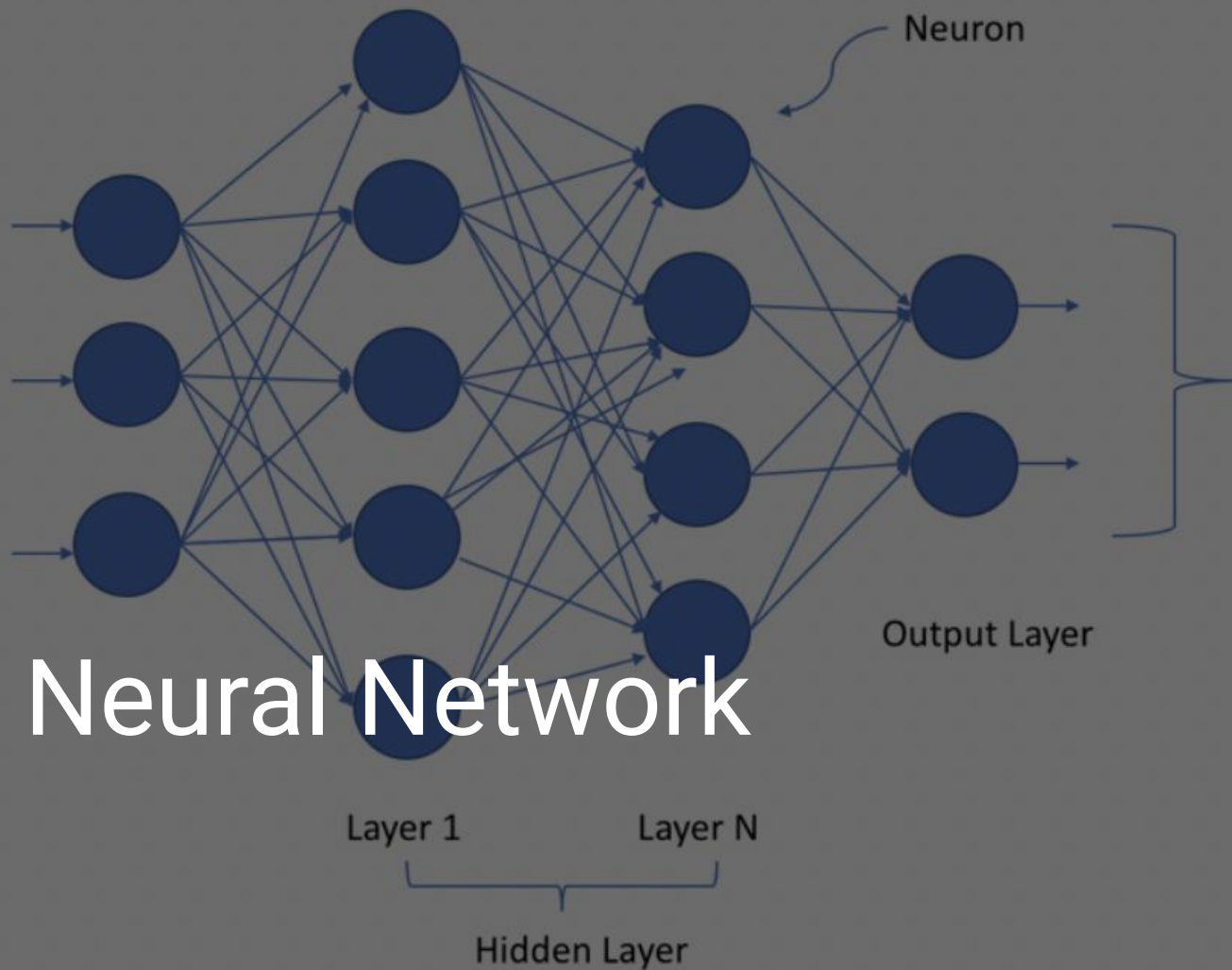
Output Layer

Deep Neural Network

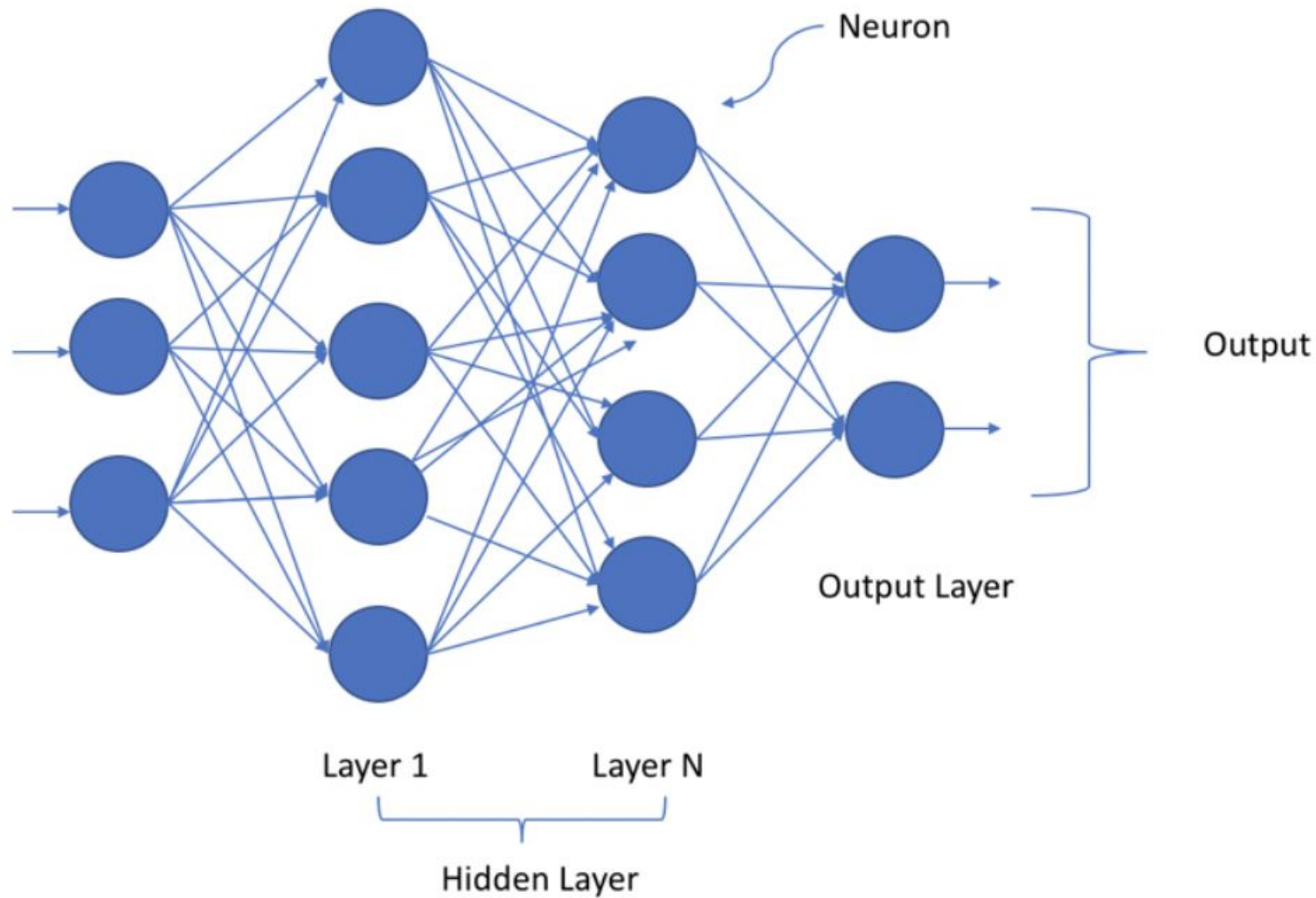
Layer 1

Layer N

Hidden Layer

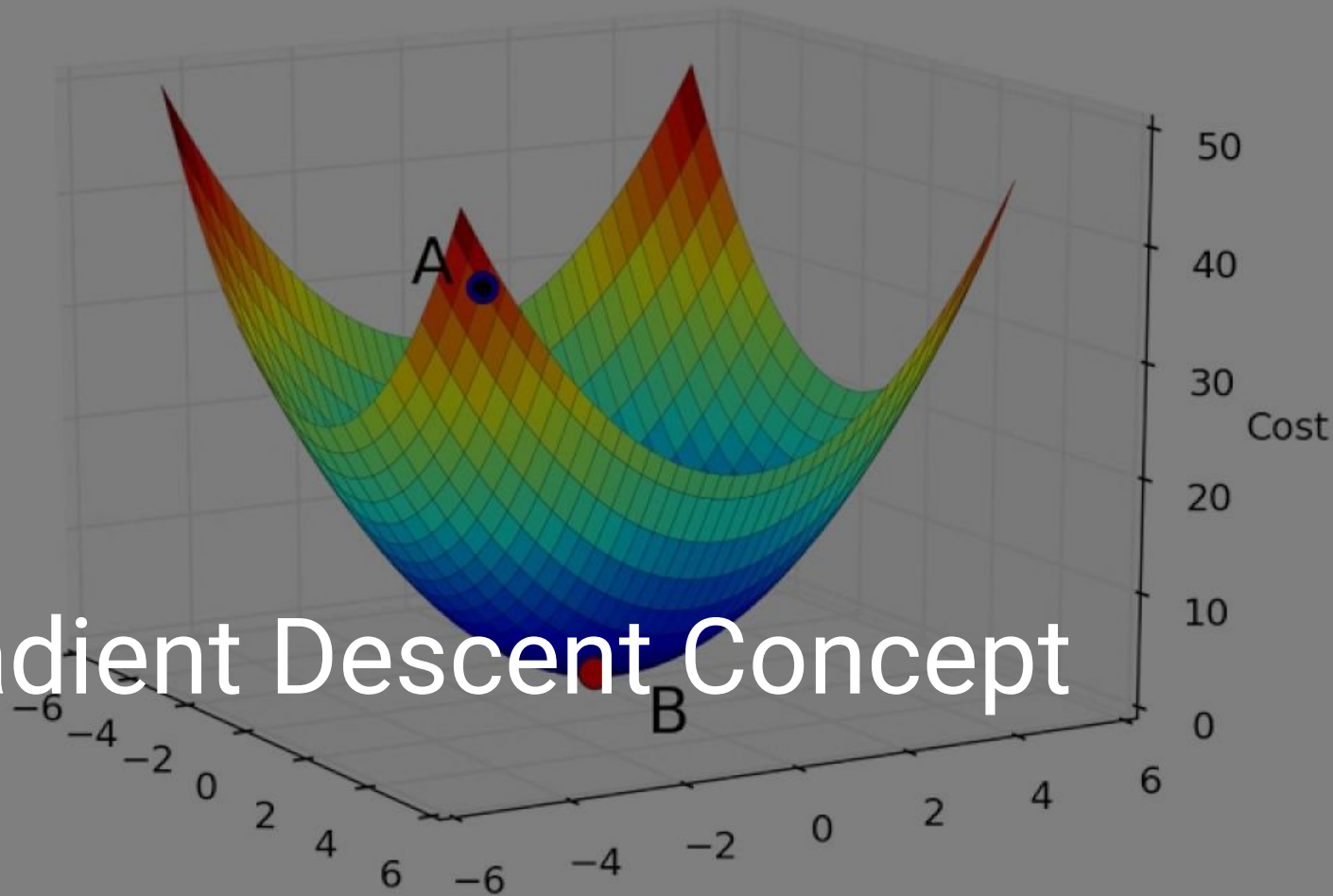


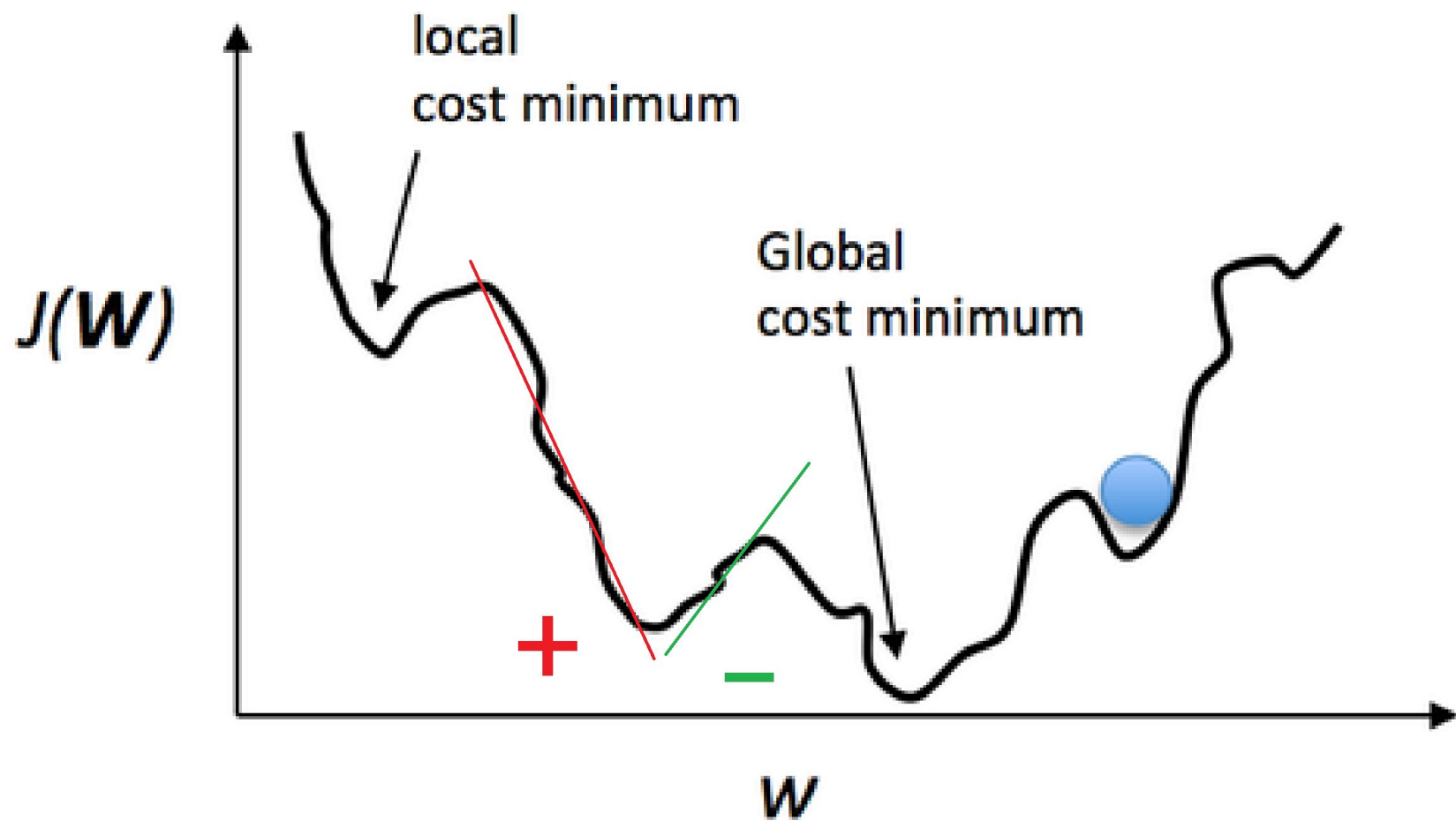
Input Data



IV: From Problem Statement to Cost Function [NOTEBOOK]

V: Gradient Descent Concept





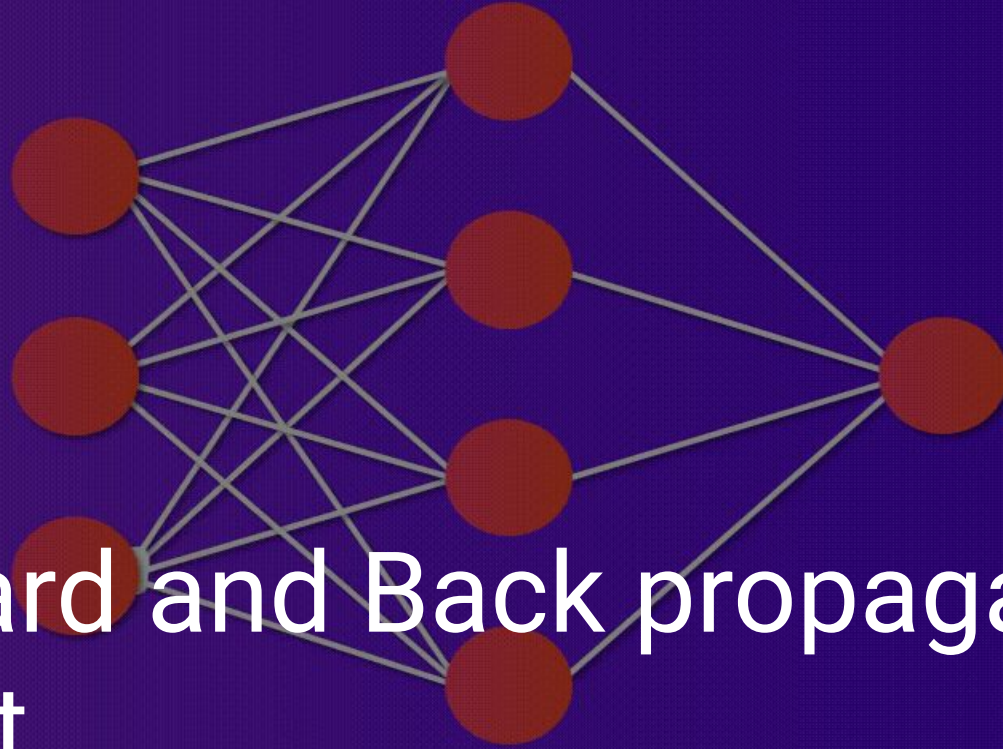
Repeat until convergence {

$$\theta_j \leftarrow \theta_j - \alpha \frac{\partial}{\partial \theta_j} J(\theta)$$

find initialize tune

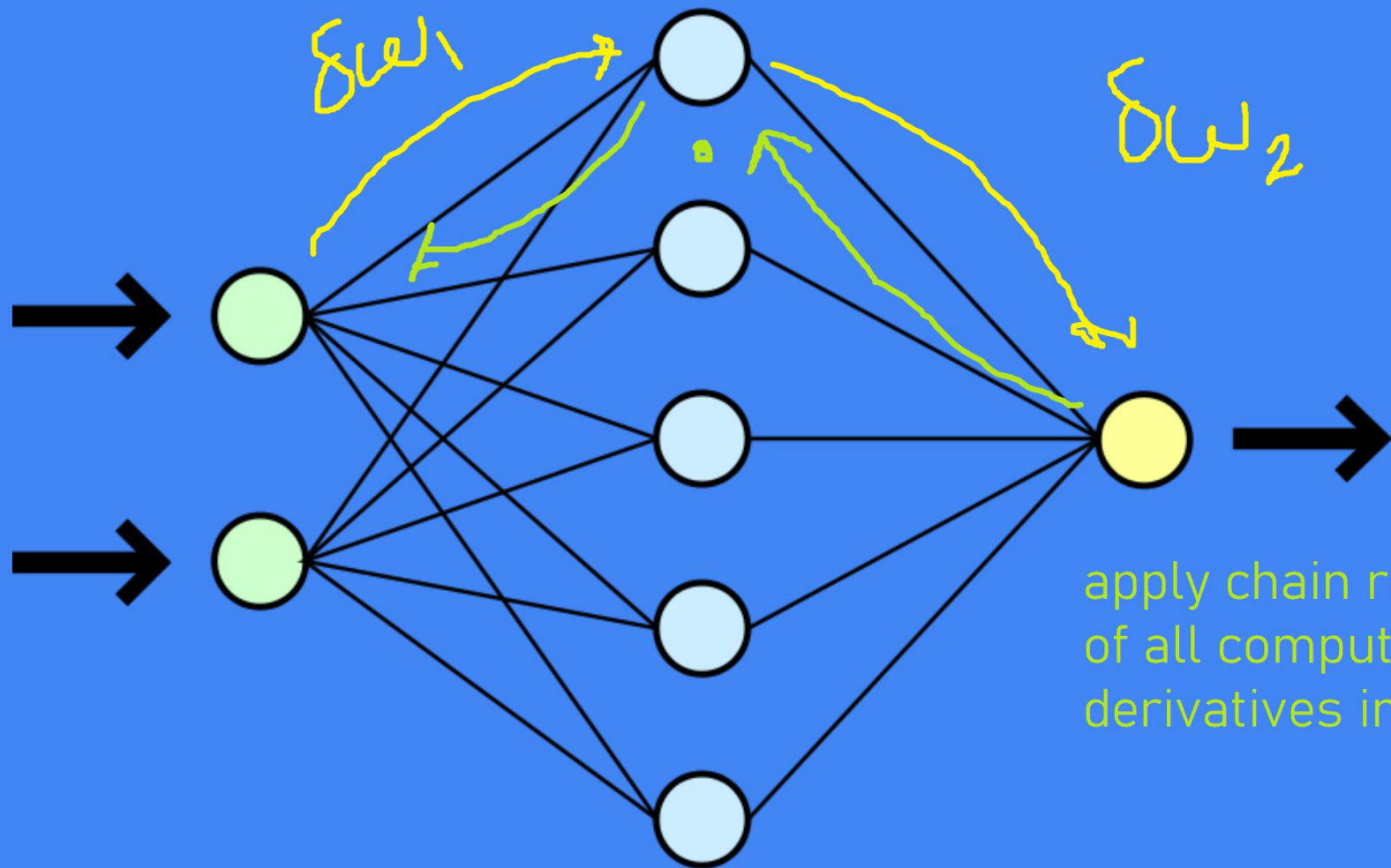
...to NOTEBOOK!
Target 3.

}



VI: Forward and Back propagation

- Concept



apply chain rule
of all computed
derivatives in

To KERAS & CASE STUDY
[NOTEBOOK]!