



AI in Digital Health Python Programming Course

UoN
MedTech



Overview of the Course

Overview of the Course

Weeks 1 & 2

- Focused on learning the basics of Python

Week 3

- Data analysis
- Real world health dataset

Week 4

- Introduction to Machine Learning and Deep learning

Weeks 5

- Deep Learning
- Computer Vision
- Natural Language Processing

Week 6

- Deep Learning (contd.)
- NLP with Transformers
- GPT
- Reinforcement Learning

Graduation Hackathon
15th March

Attendance and Certificates

There will be Attendance + Feedback QR codes at the end of each session

- Feedback is optional

Certificates will be given based on completion of these forms:

- Certificate of Participation : Must attend 3 sessions excluding 1st session
- Certificate of Achievement : Must participate in the Hackathon



Whatsapp Group QR

Support and Resources

Support

- **Weekly weekend Q&A sessions are available, or make use of the troubleshooting whatsapp group for questions**

Resources

- **Each week resources released**
 - Slides
 - Collab answers

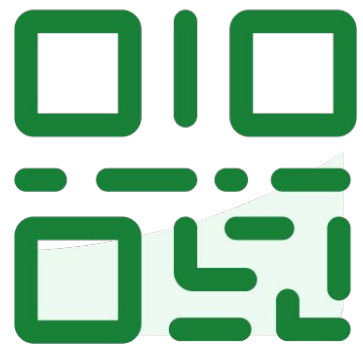


Graduation Hackathon

Saturday 15th May

- A full-day event
- Teams come together to generate AI-driven healthcare ideas
- The goal is to create at least a UI mockup (or prototype if possible)
- At the end of the day, judges will review the projects and select the best ideas based on innovation, feasibility, and impact.





Join at **slido.com**
#4036777



Week 4 - Introduction to Machine Learning and Deep learning



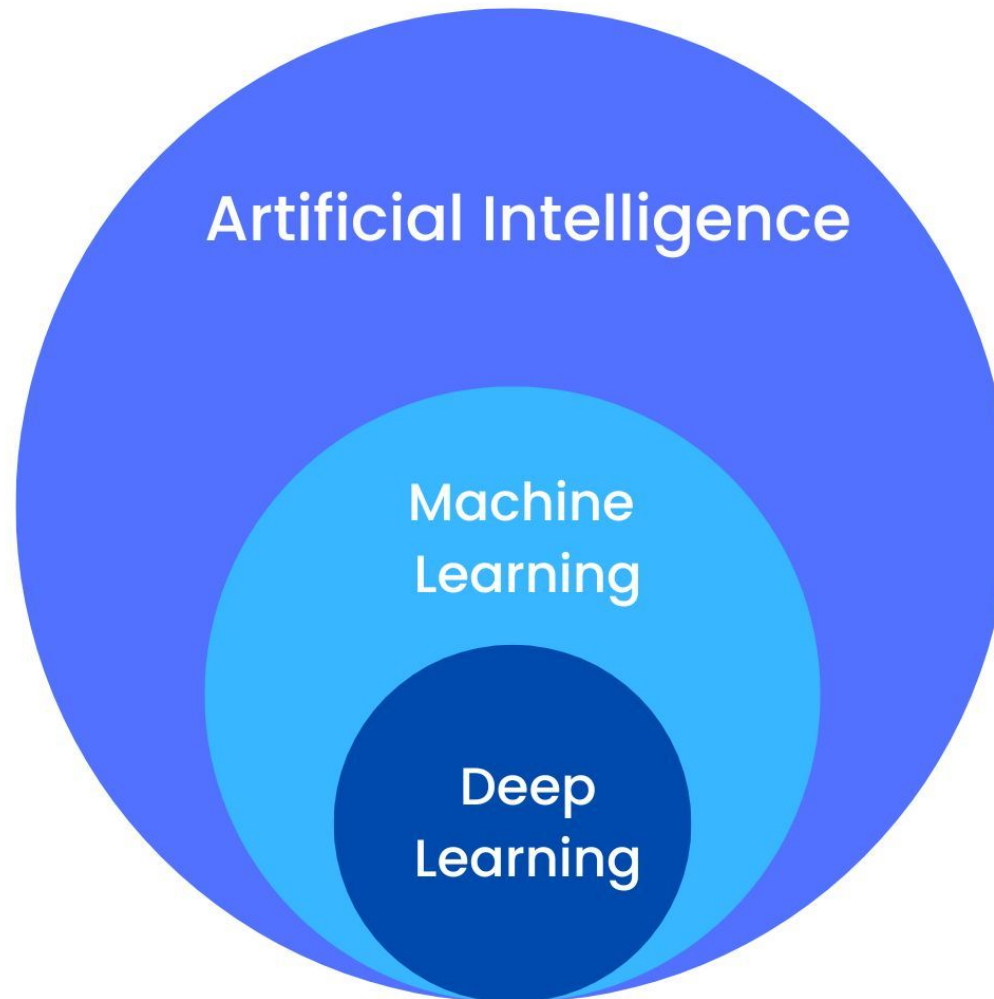
What is AI?

What is AI?

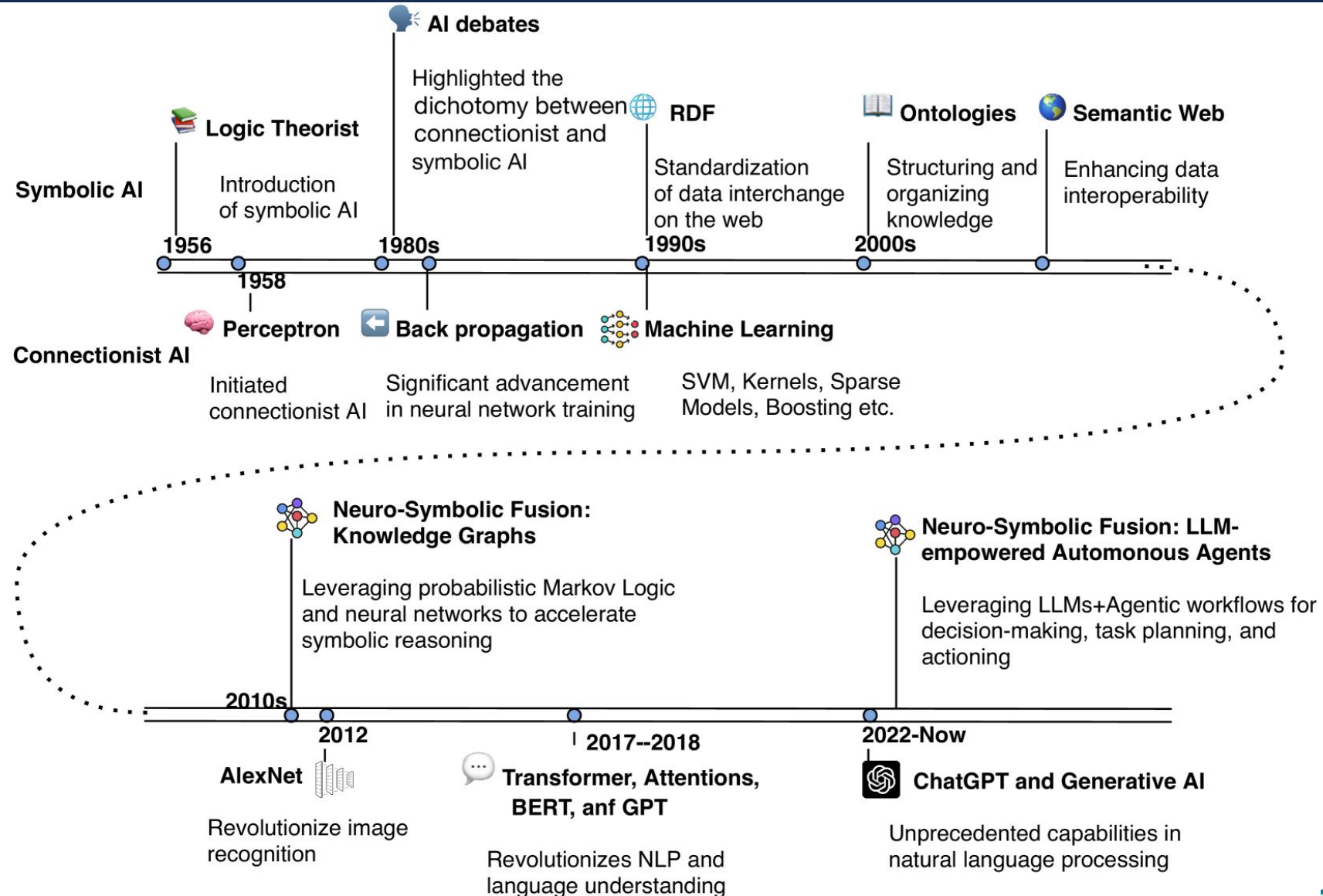
“using machines to do things that would normally require human intelligence”








AI, ML & DL



Symbolic AI

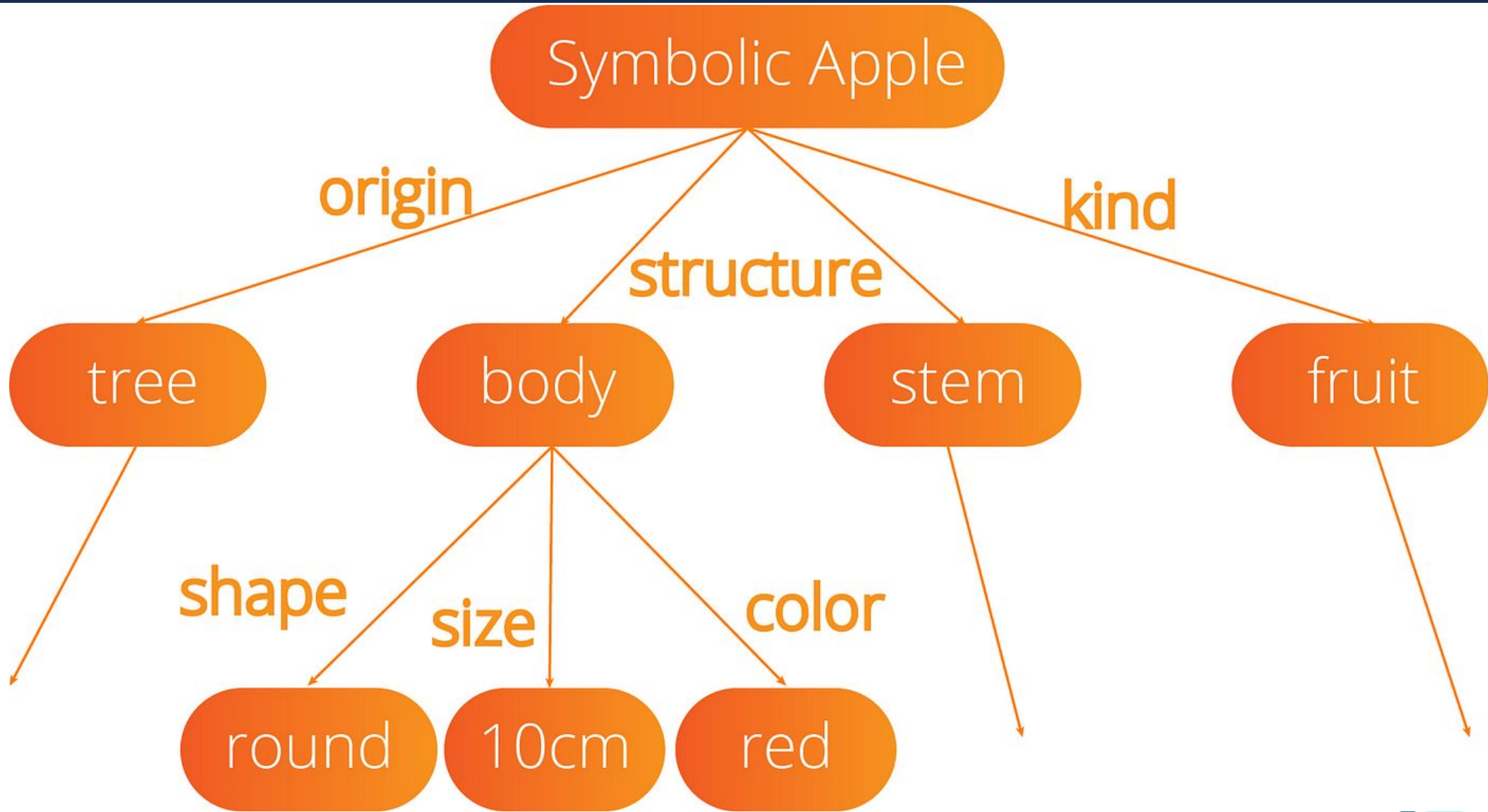


Symbolic AI

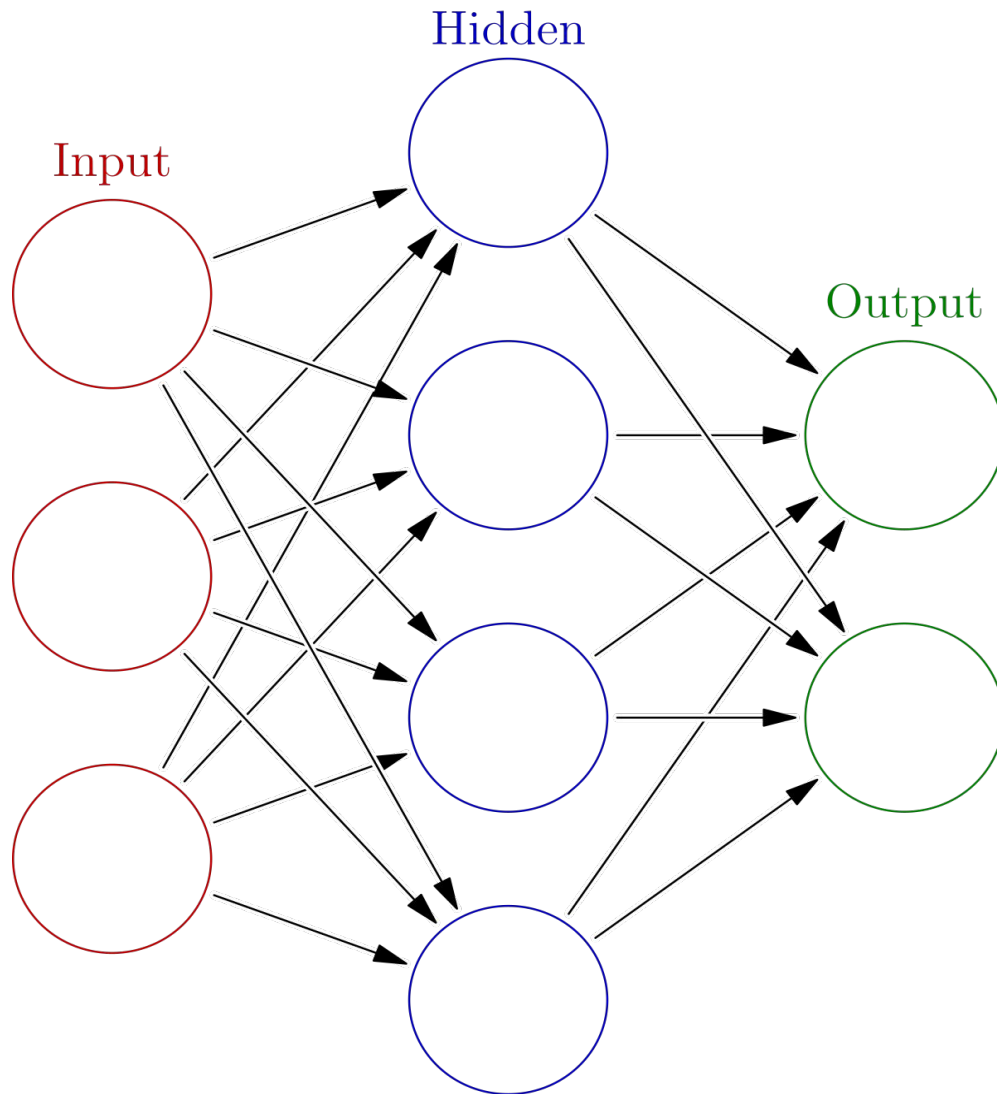
						
						
						
						
					DESIGN WORK PLAN.COM	
						
						



Symbolic AI

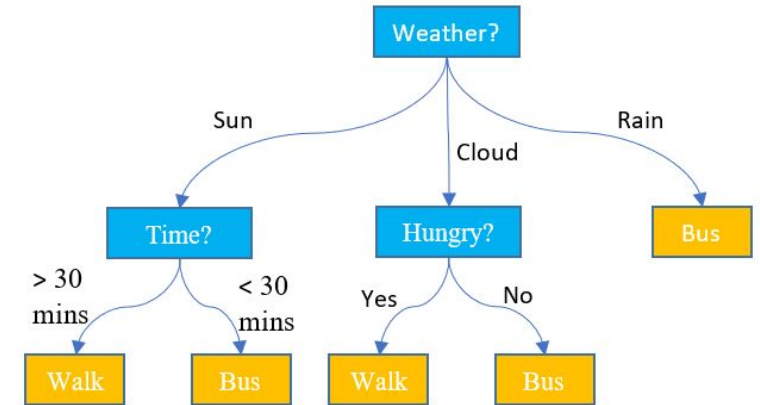
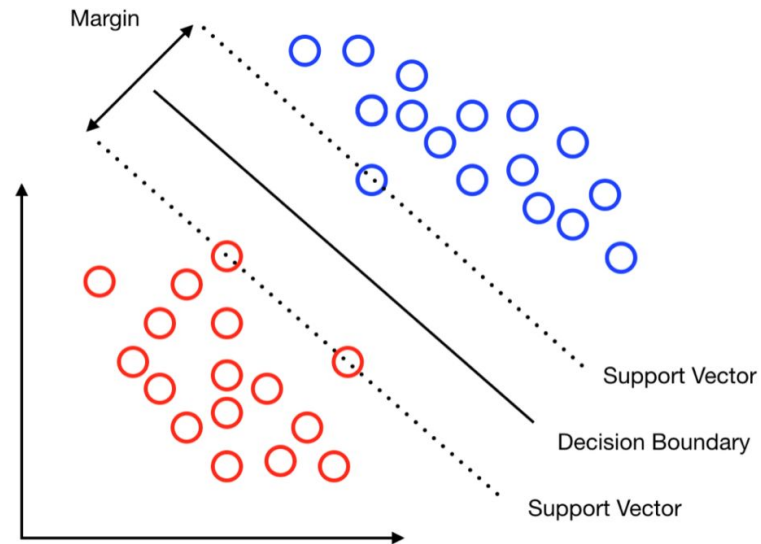
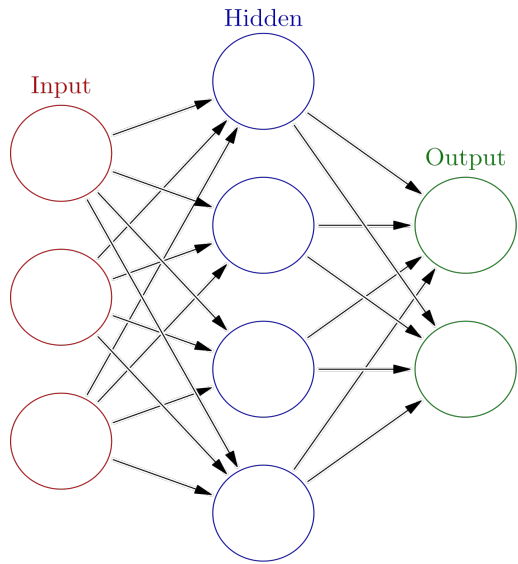


Connectionist AI - a type of non-symbolic AI

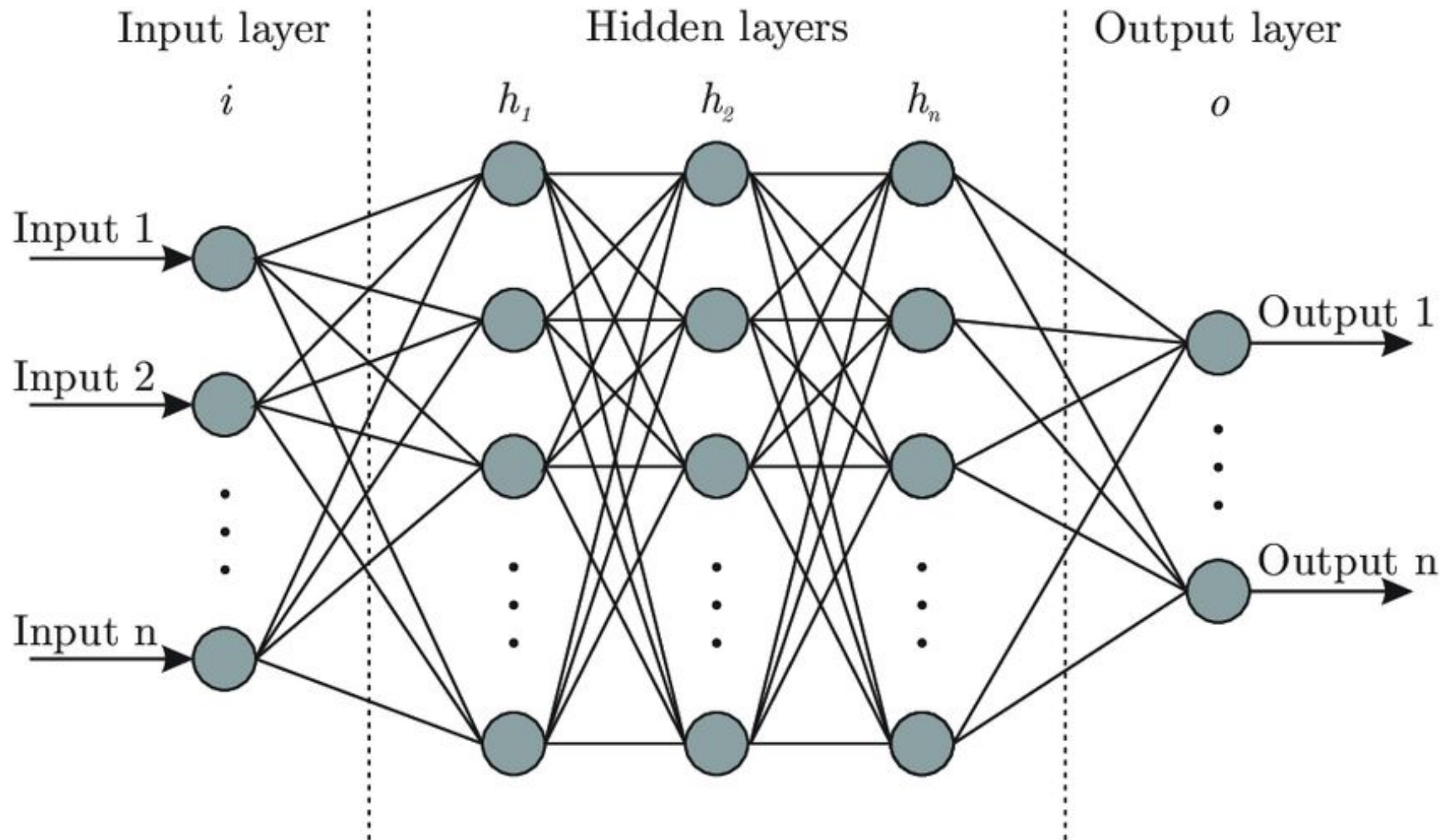


- "Connectionist" = networks of connected artificial neurons
- Learning = adjusting connection strengths (weights)
- No explicit symbols or rules
- Examples: Image recognition, language models, AlphaGo

Machine Learning

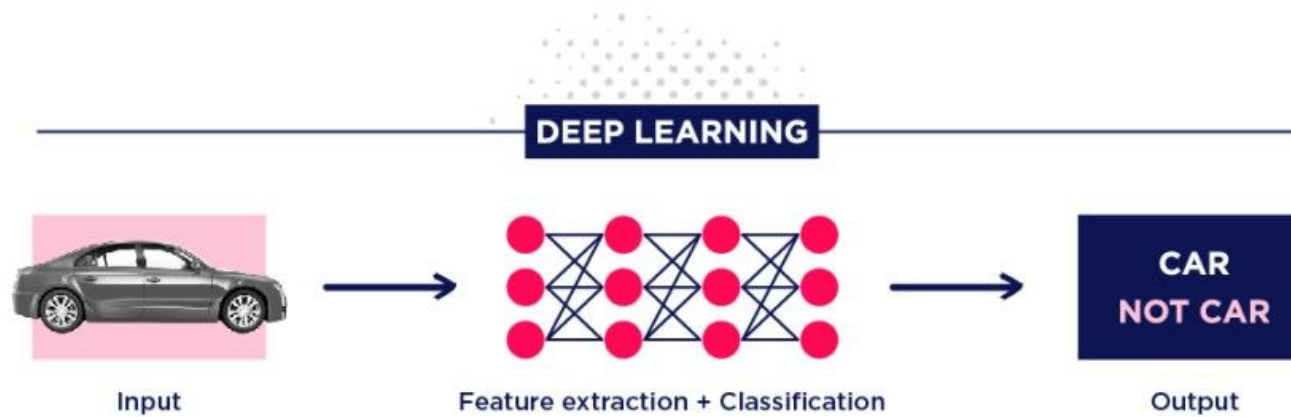
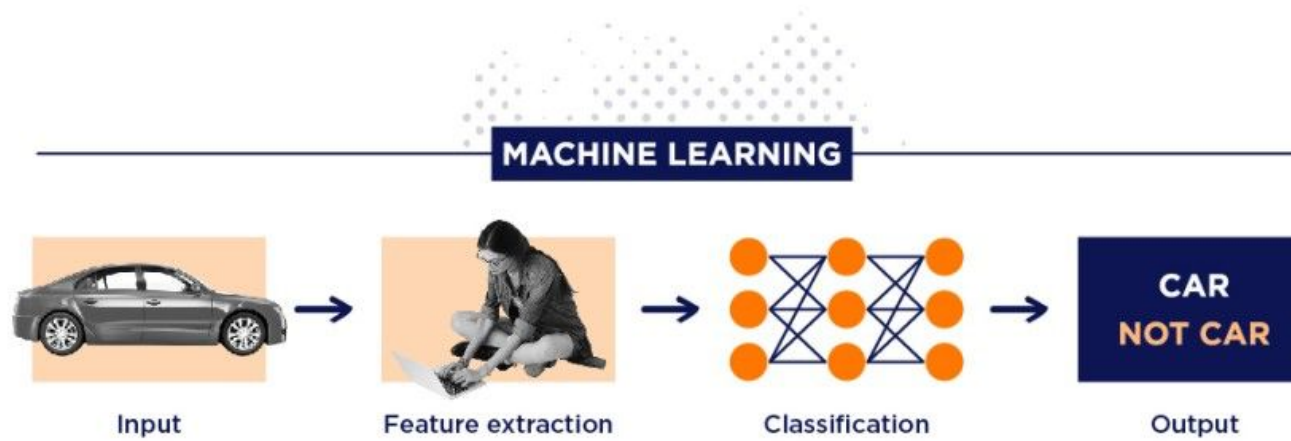


Deep Learning



Deep Learning =
neural
networks
with many
layers

Deep Learning



Some fundamental concepts

“Garbage in, garbage out”



Your analysis is as good as your data.

Feature (x) and Target (y) variables in ML

Feature Matrix (X)

n_features \rightarrow

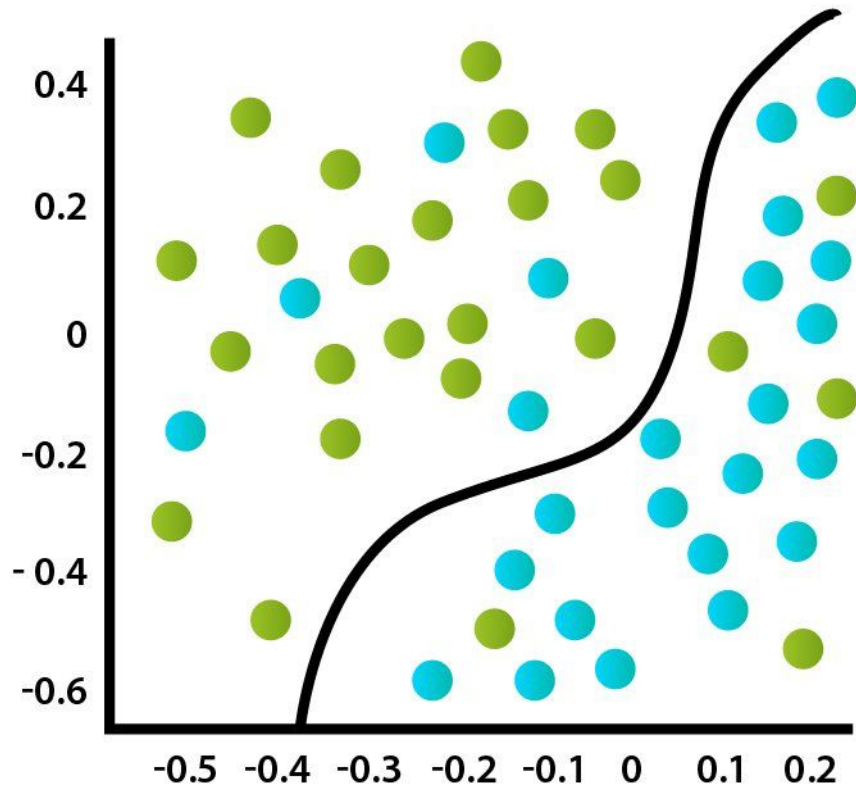
[illegible]

Target Vector (y)

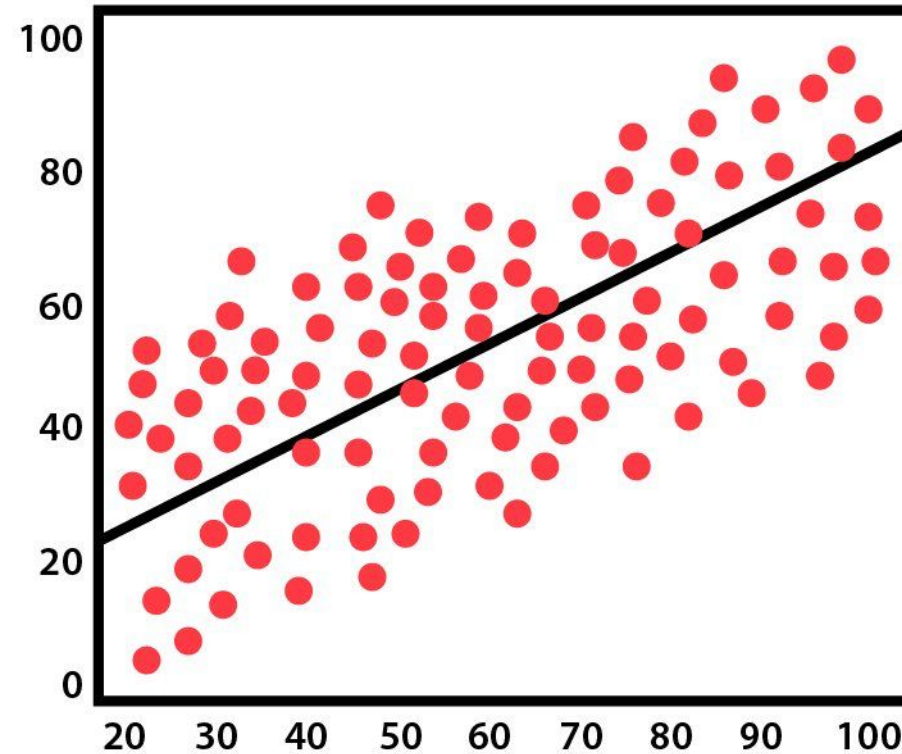
← n_samples

[illegible]

Classification vs Regression

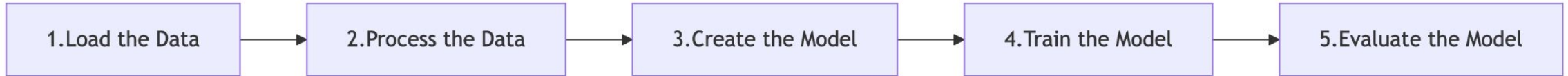


CLASSIFICATION

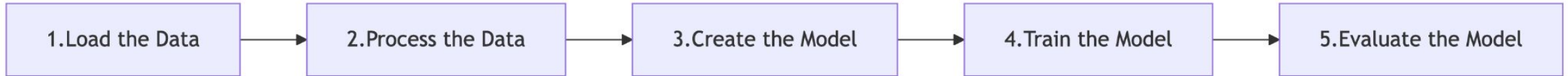


REGRESSION

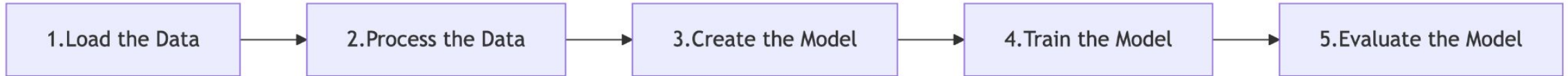
Stages of an ML Project



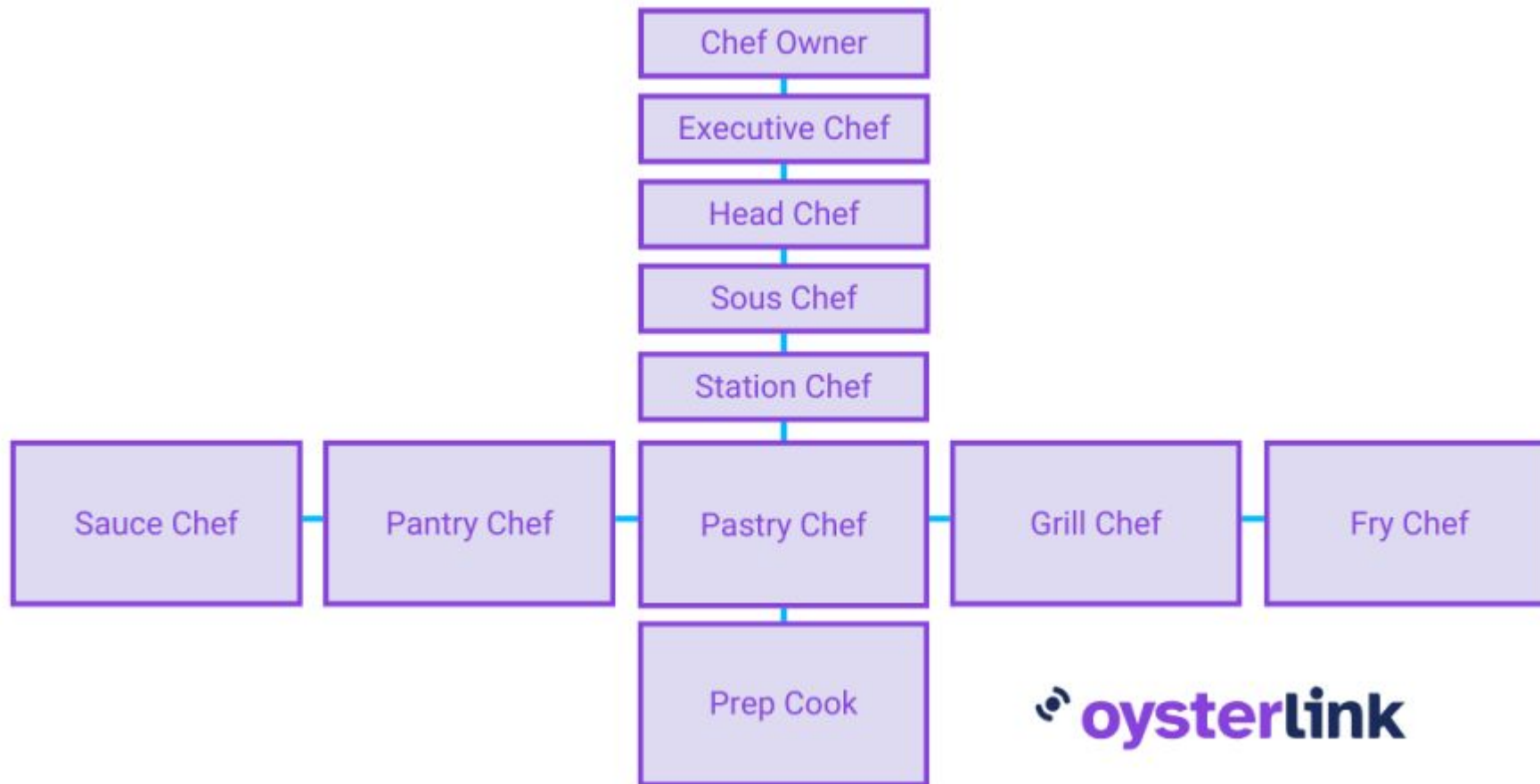
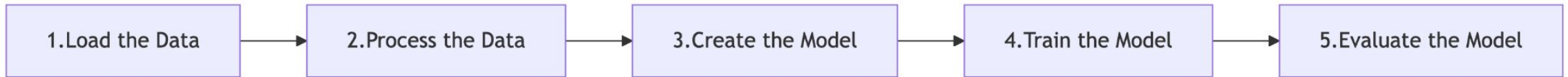
Stages of an ML Project - Loading Data



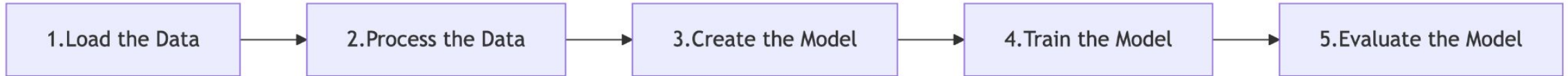
Stages of an ML Project - Processing Data



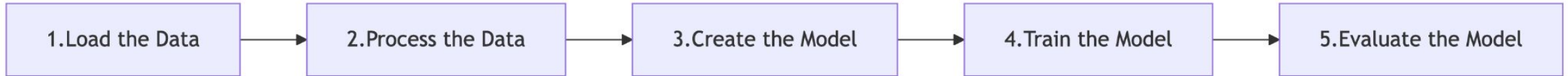
Stages of an ML Project - Create Model



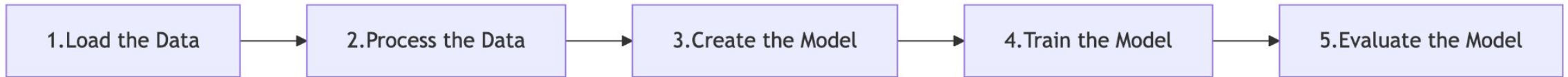
Stages of an ML Project - Train Model



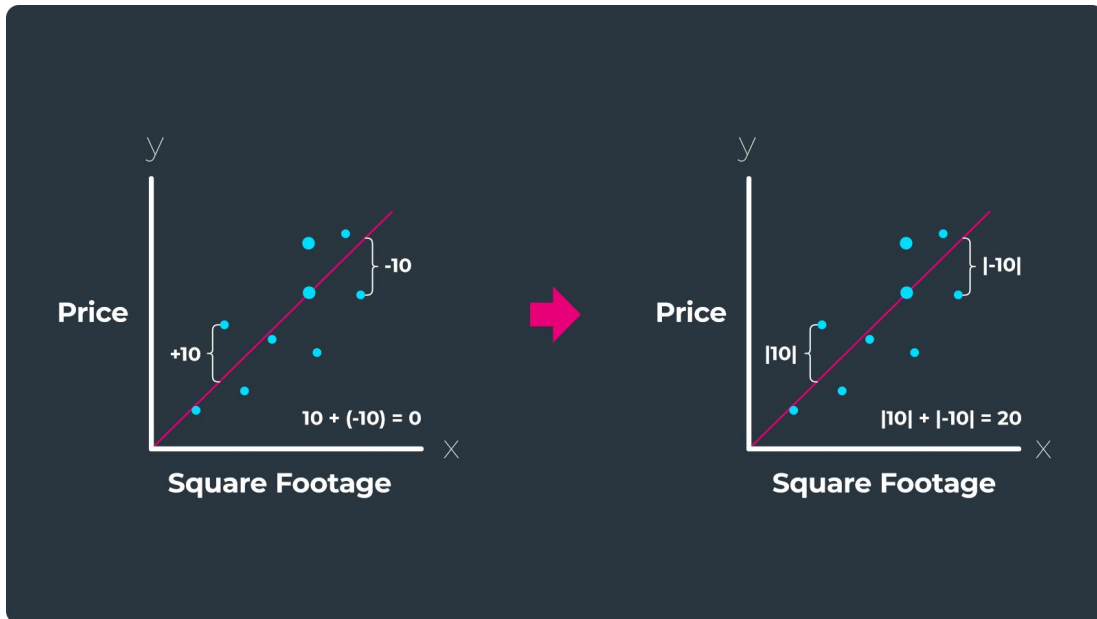
Stages of an ML Project - Evaluate Model



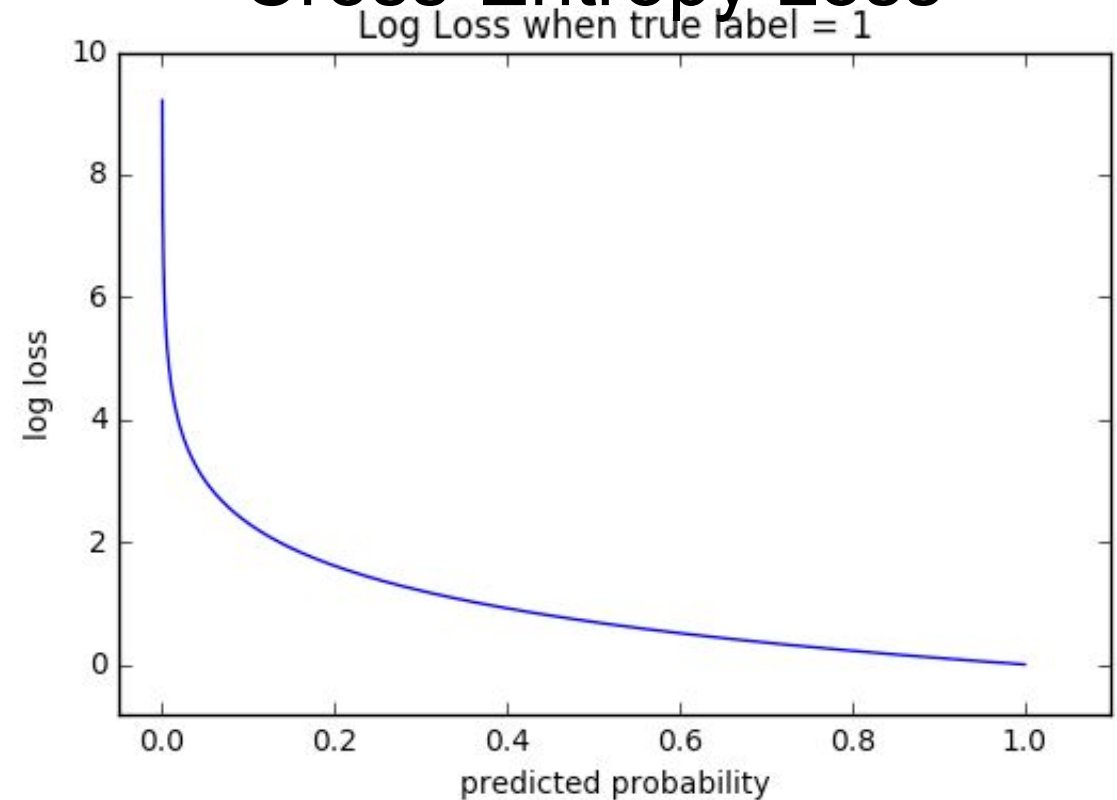
Stages of an ML Project - Evaluate Model



MSE



Cross-Entropy Loss



Stages of an ML Project - Evaluate Model

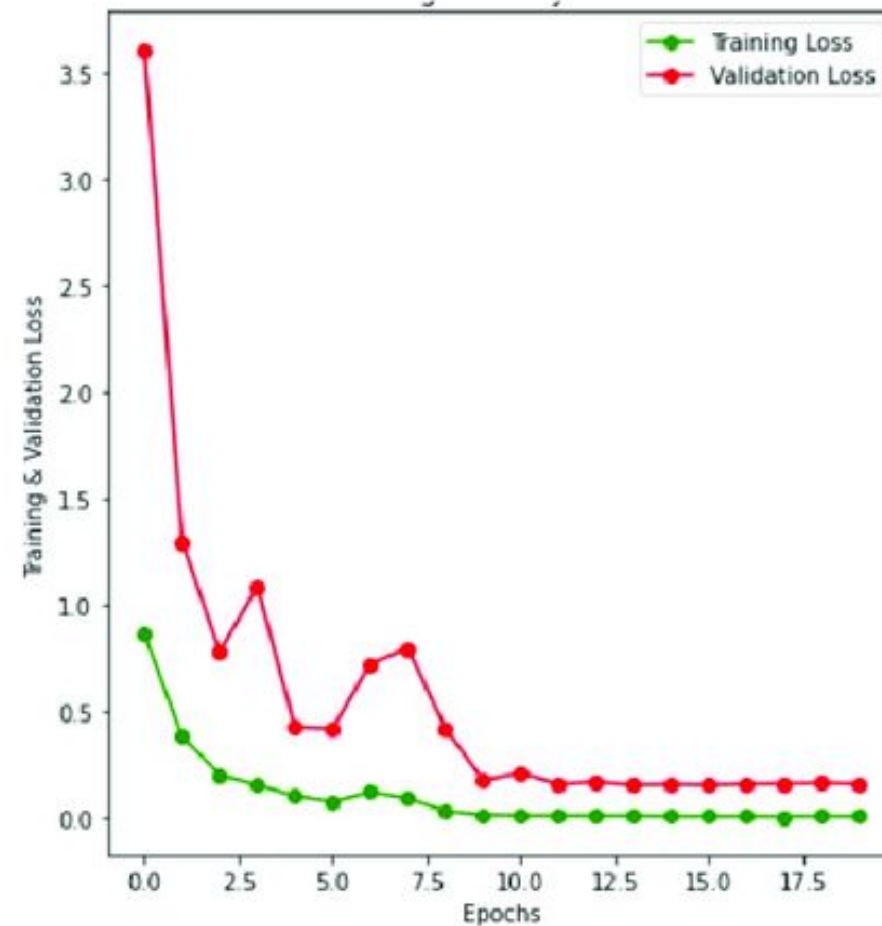
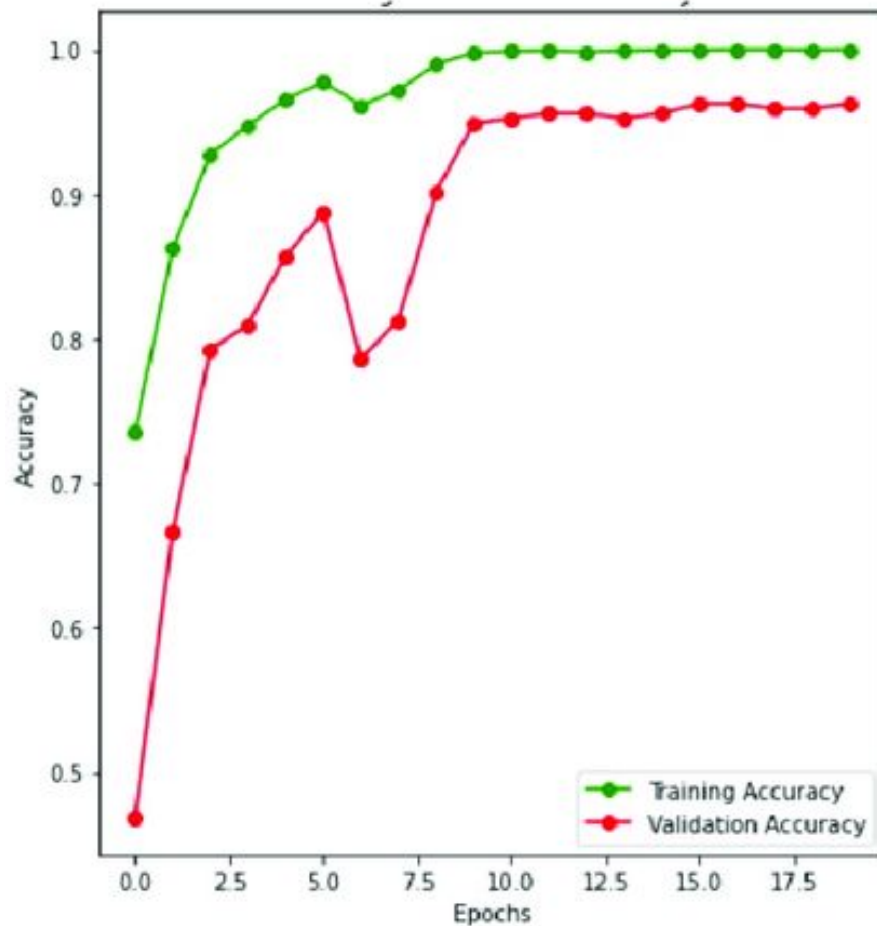
1. Load the Data

2. Process the Data

3. Create the Model

4. Train the Model

5. Evaluate the Model



Stages of an ML Project - Evaluate Model

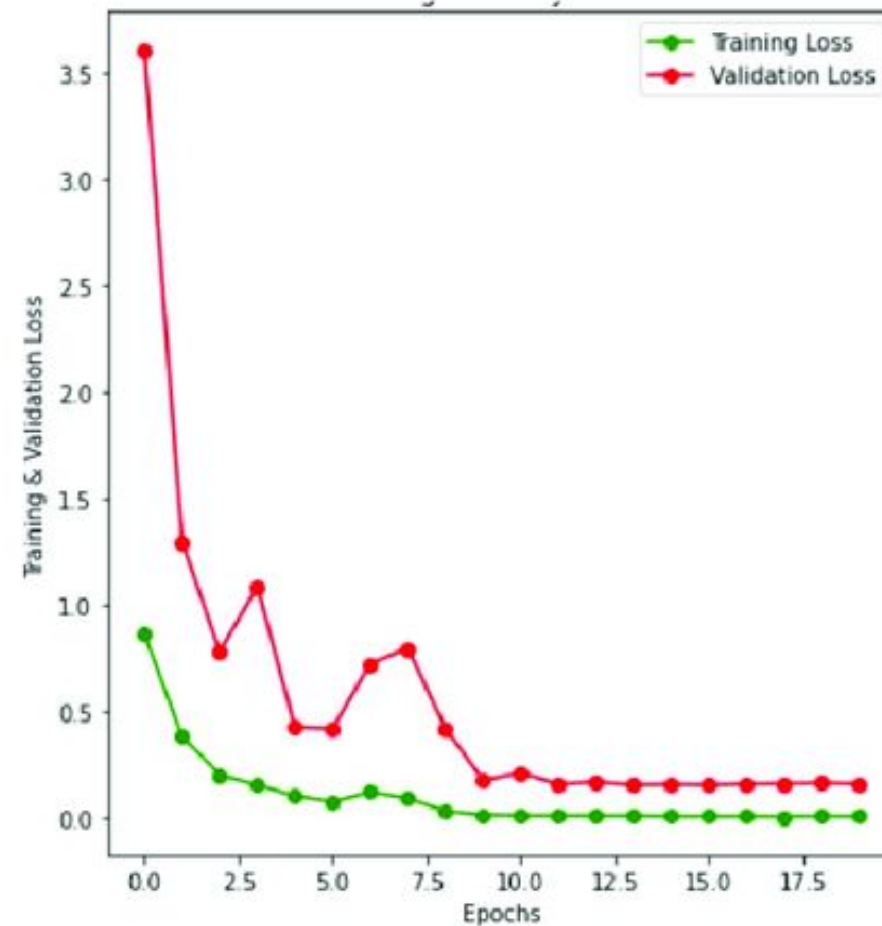
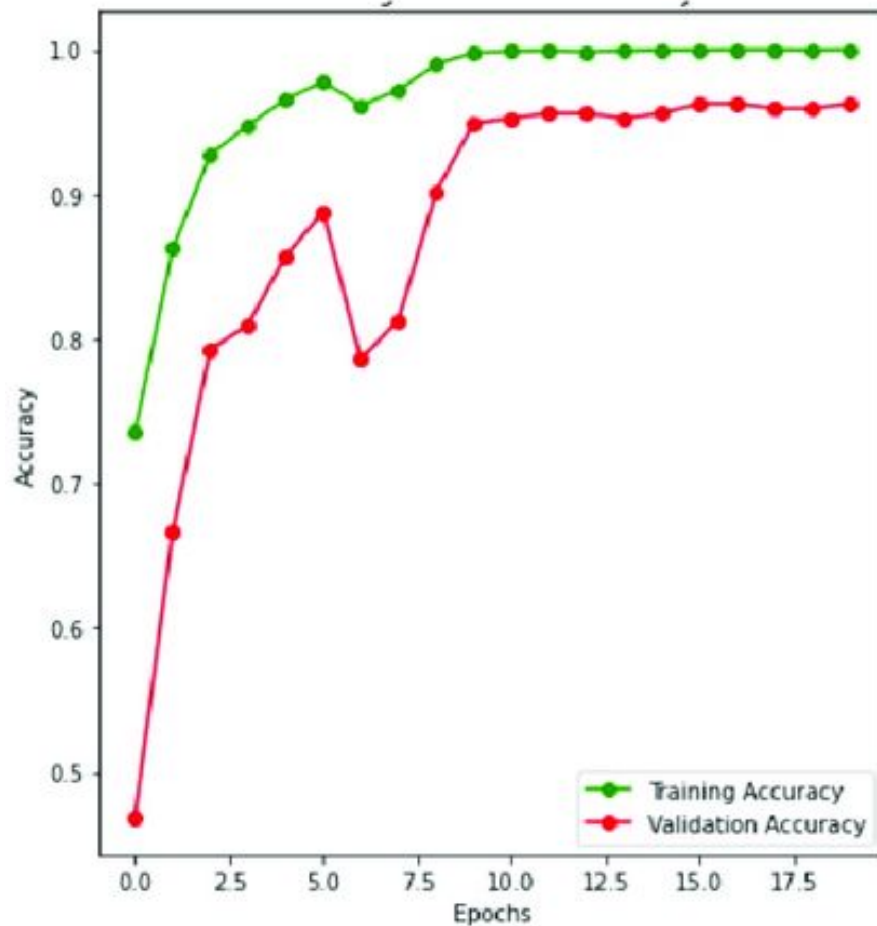
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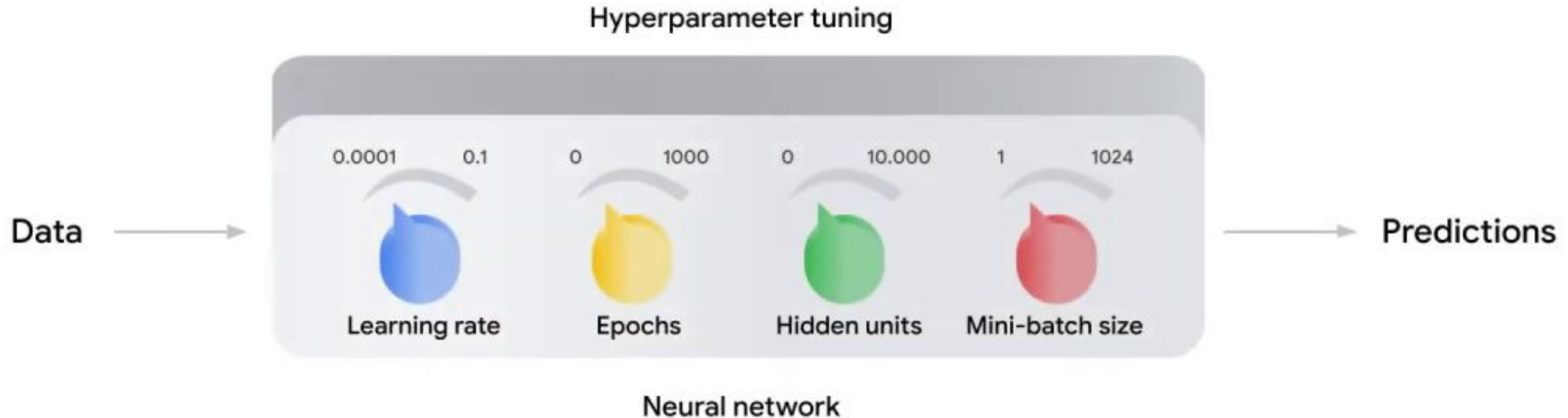
5. Evaluate the Model



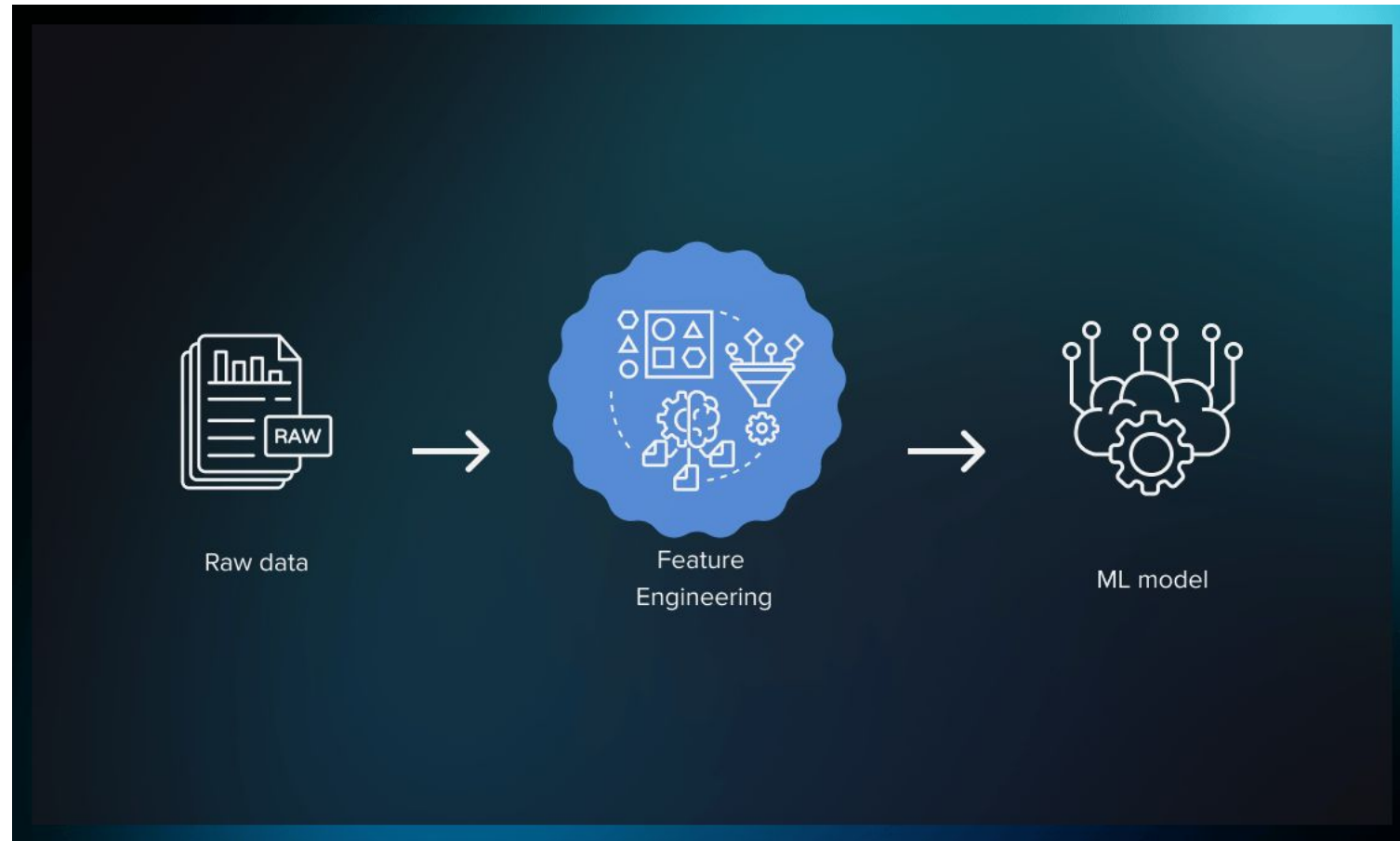
Improving your model - Hyperparameter Tuning



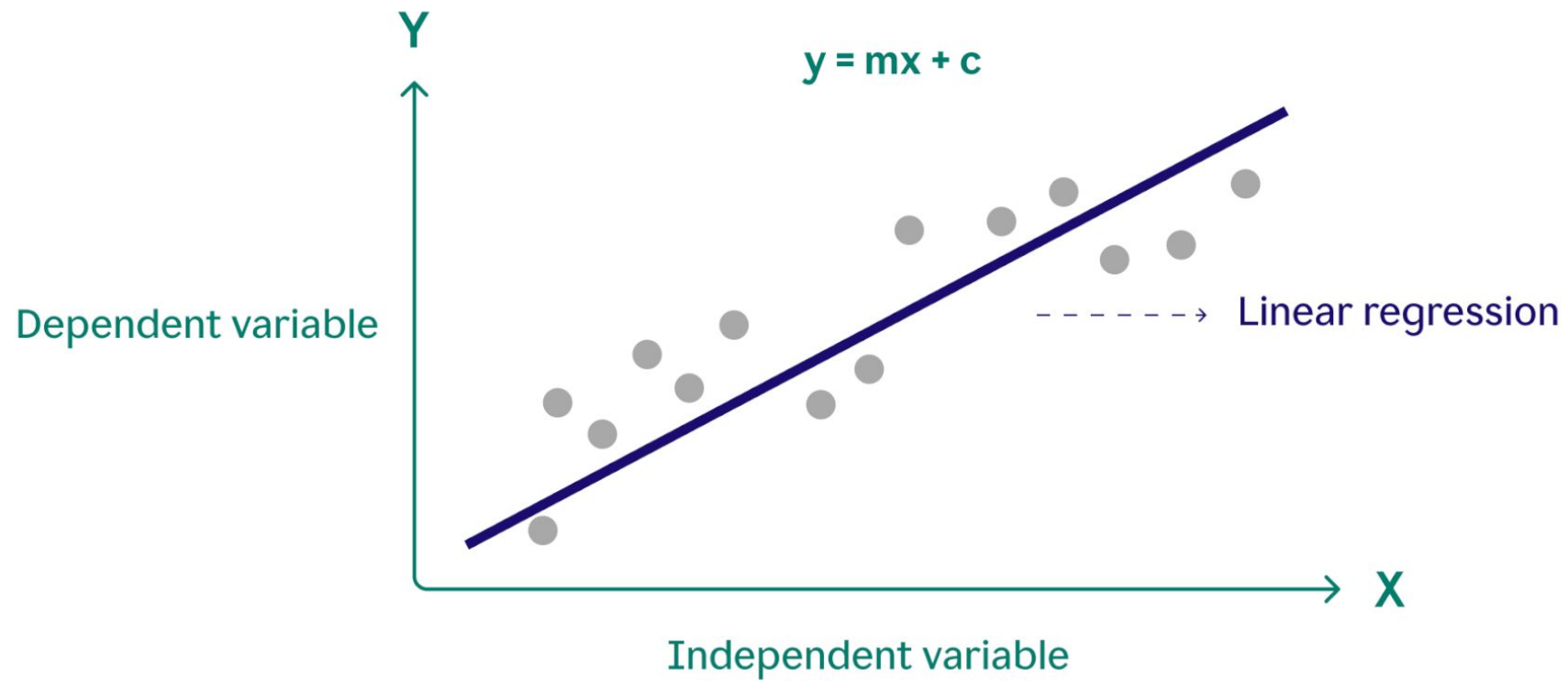
Improving your model - Hyperparameter Tuning



Improving your model - Feature engineering



Linear Regression



Linear Regression

iris setosa



petal

sepal

iris versicolor



petal

sepal

iris virginica



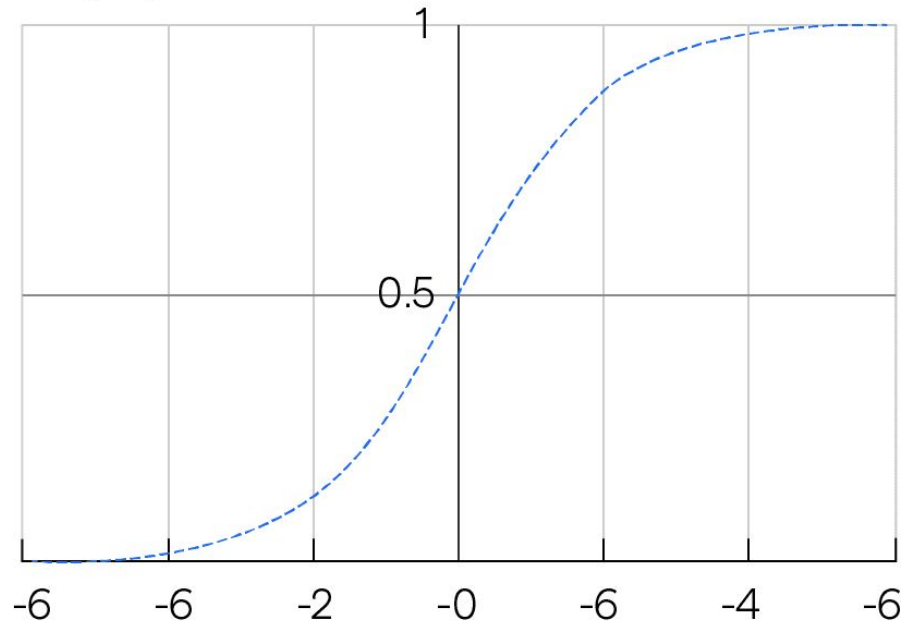
petal

sepal

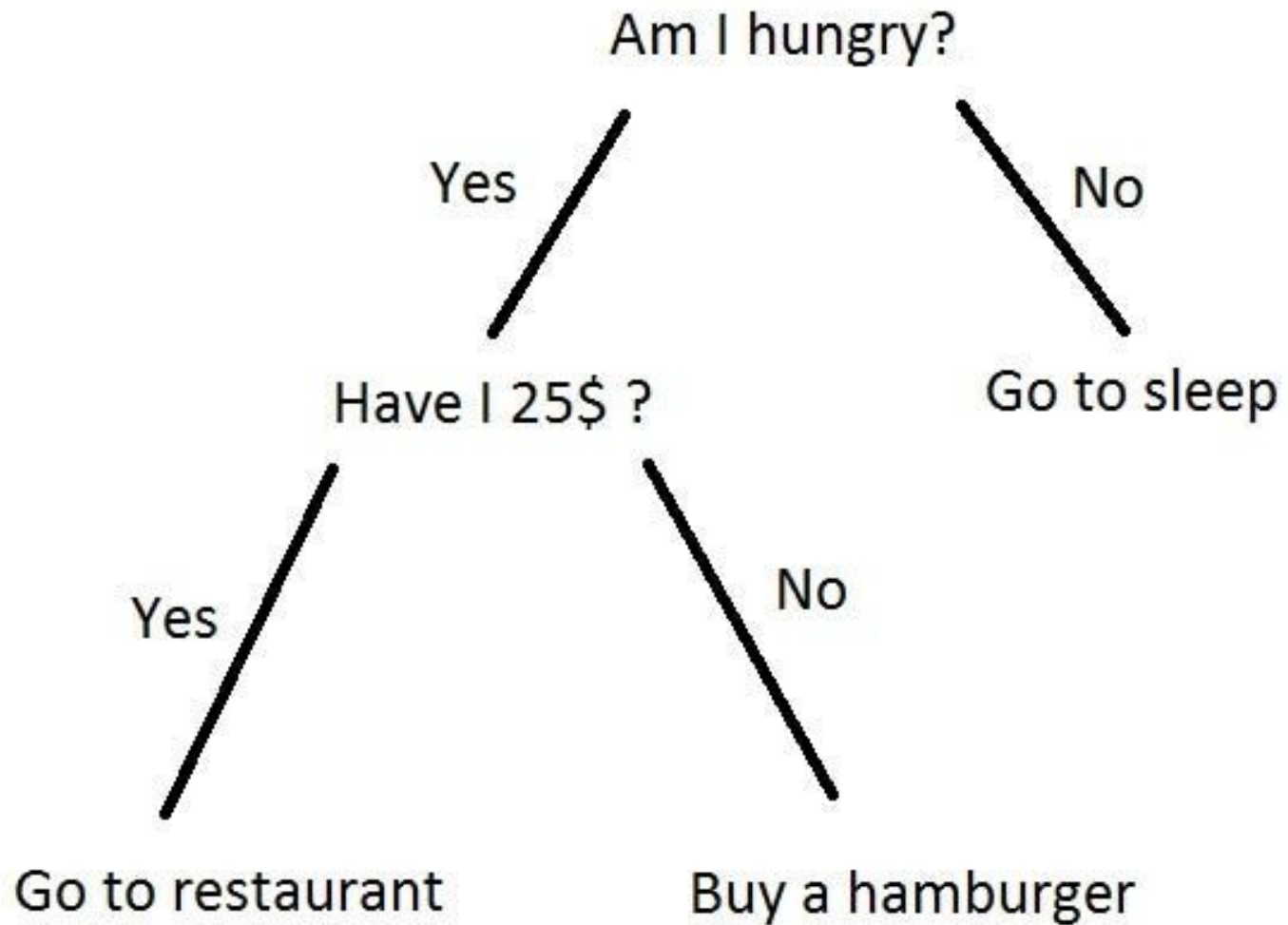
Logistic Regression

Sigmoid Function

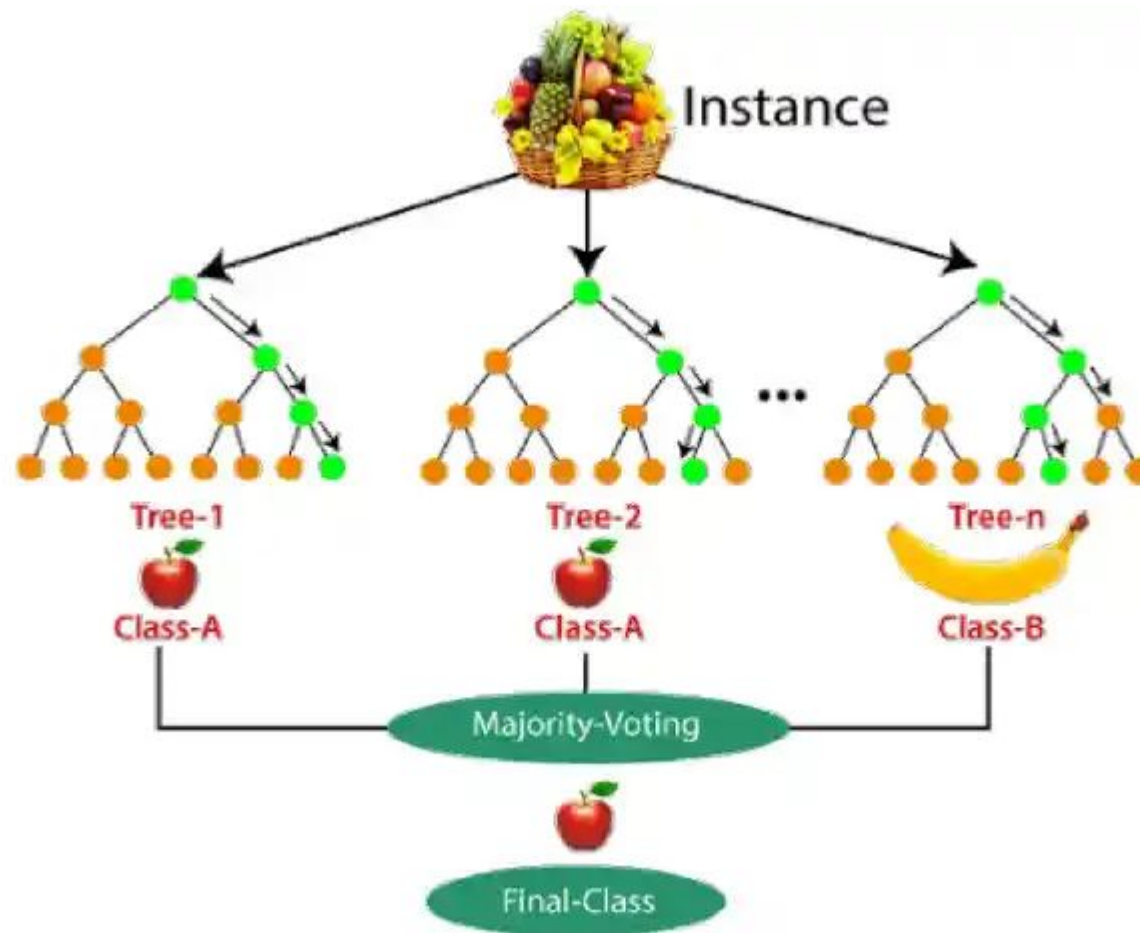
$$f(x) = \frac{1}{1 + e^{-fx}}$$



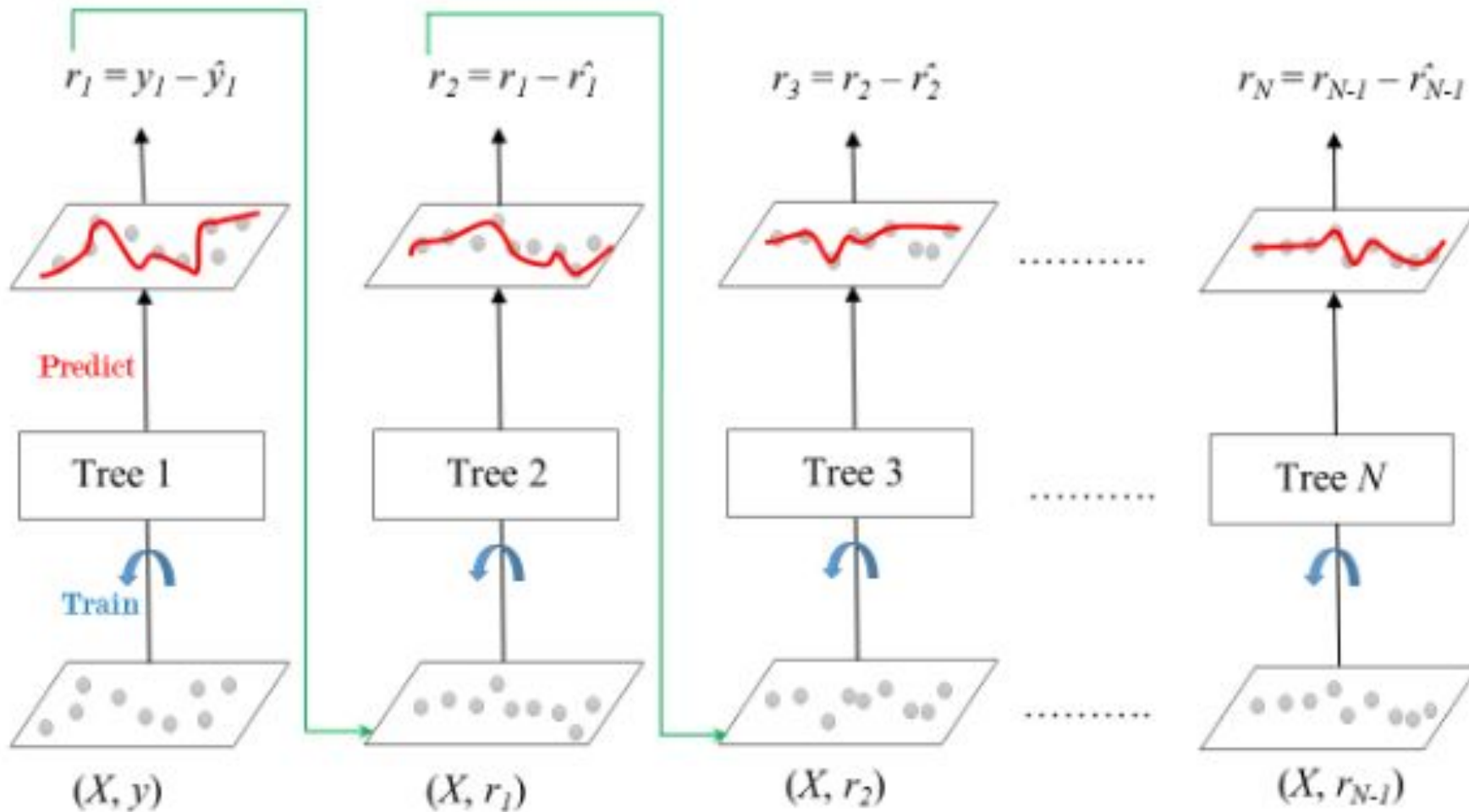
Decision tree



Random Forest



Gradient Boosting

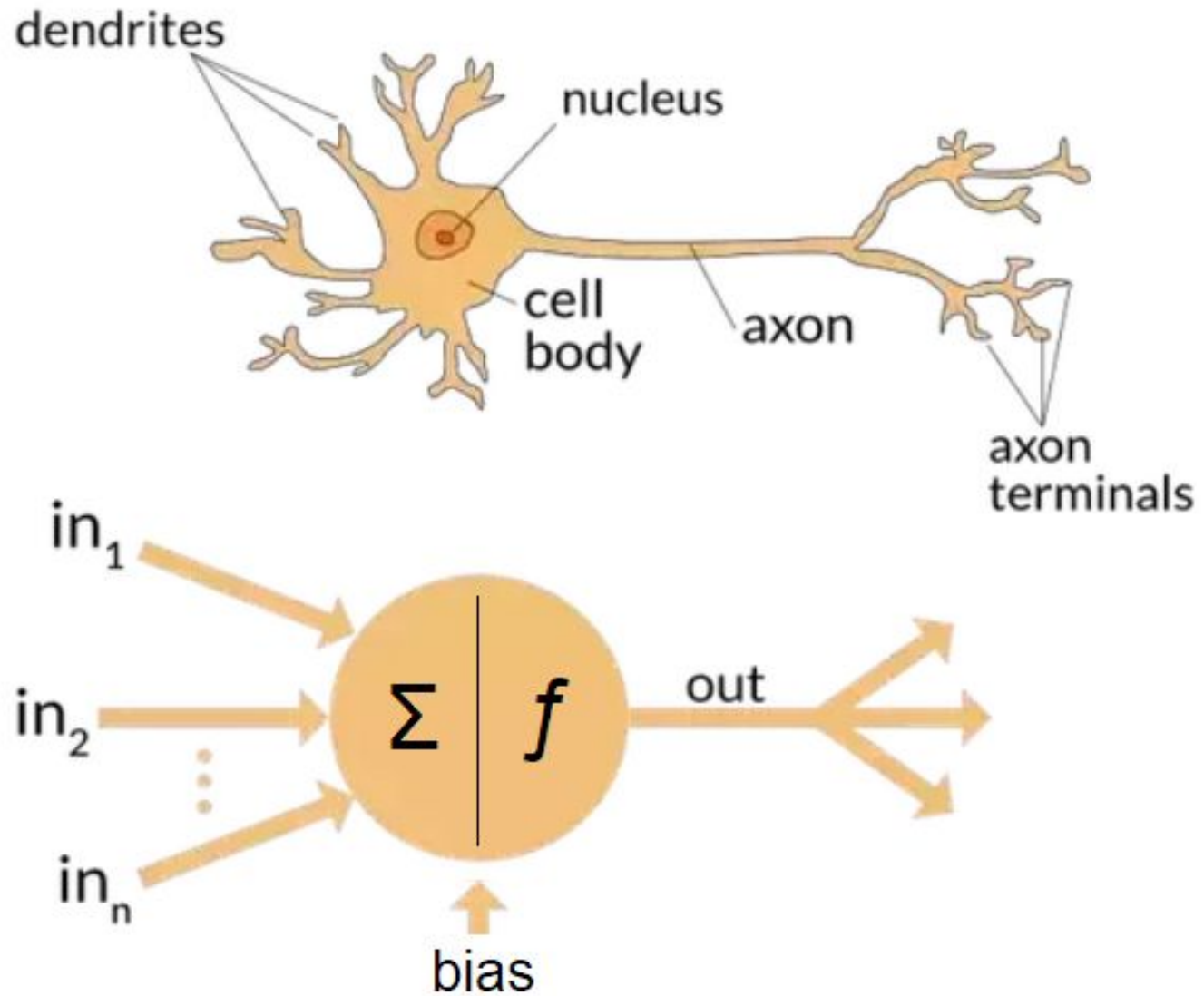


XGBoost

XGBoost

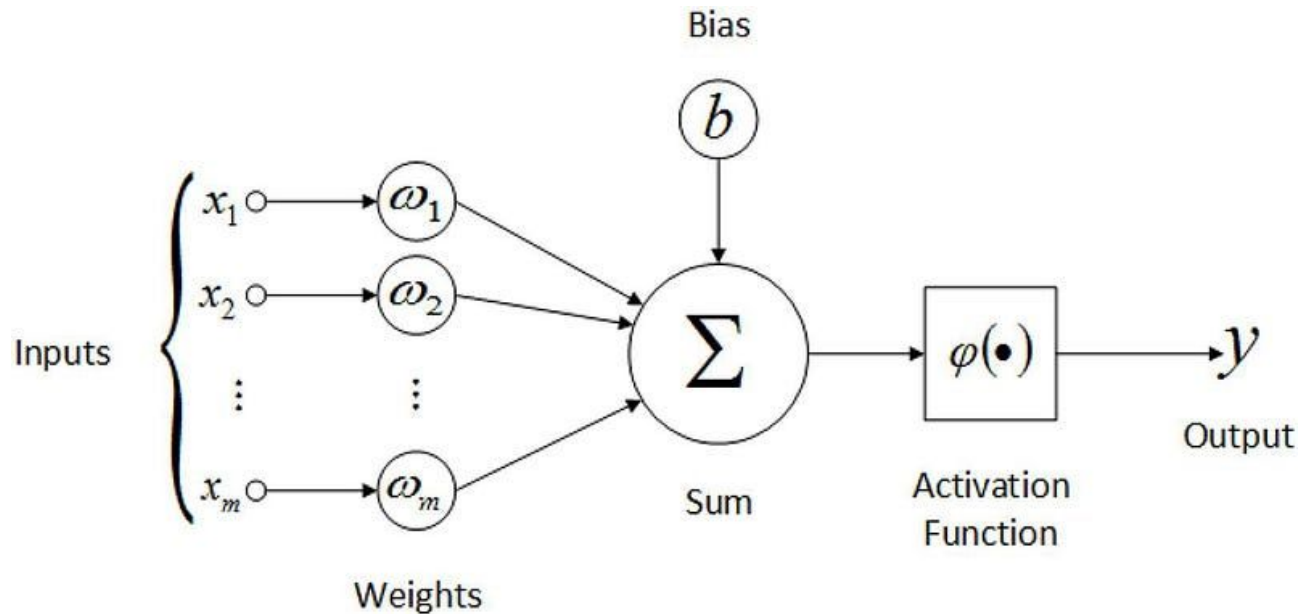
eXtreme Gradient Boosting

Neural Network



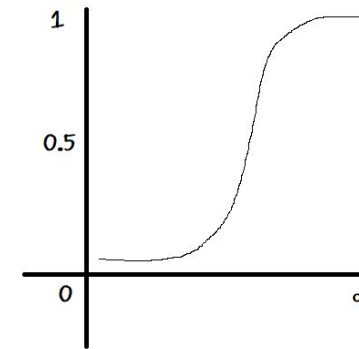
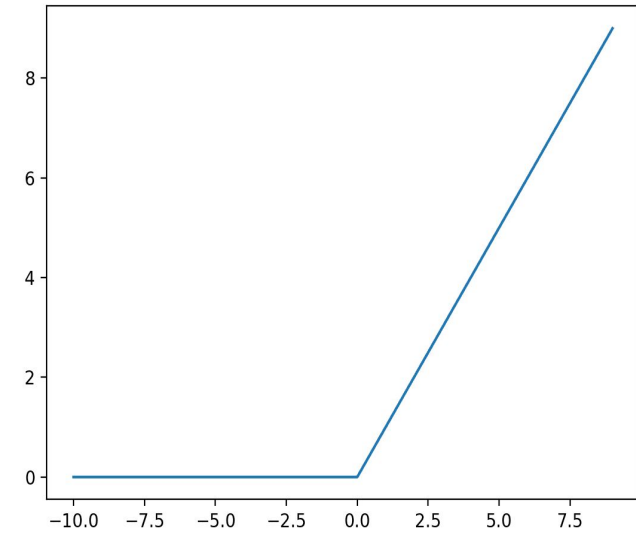
Neural Network - Forward Propagation

For hidden layers ->

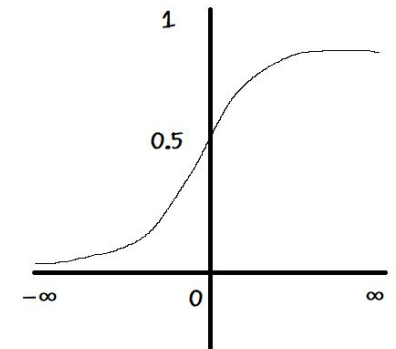


For output layers ->

ReLU

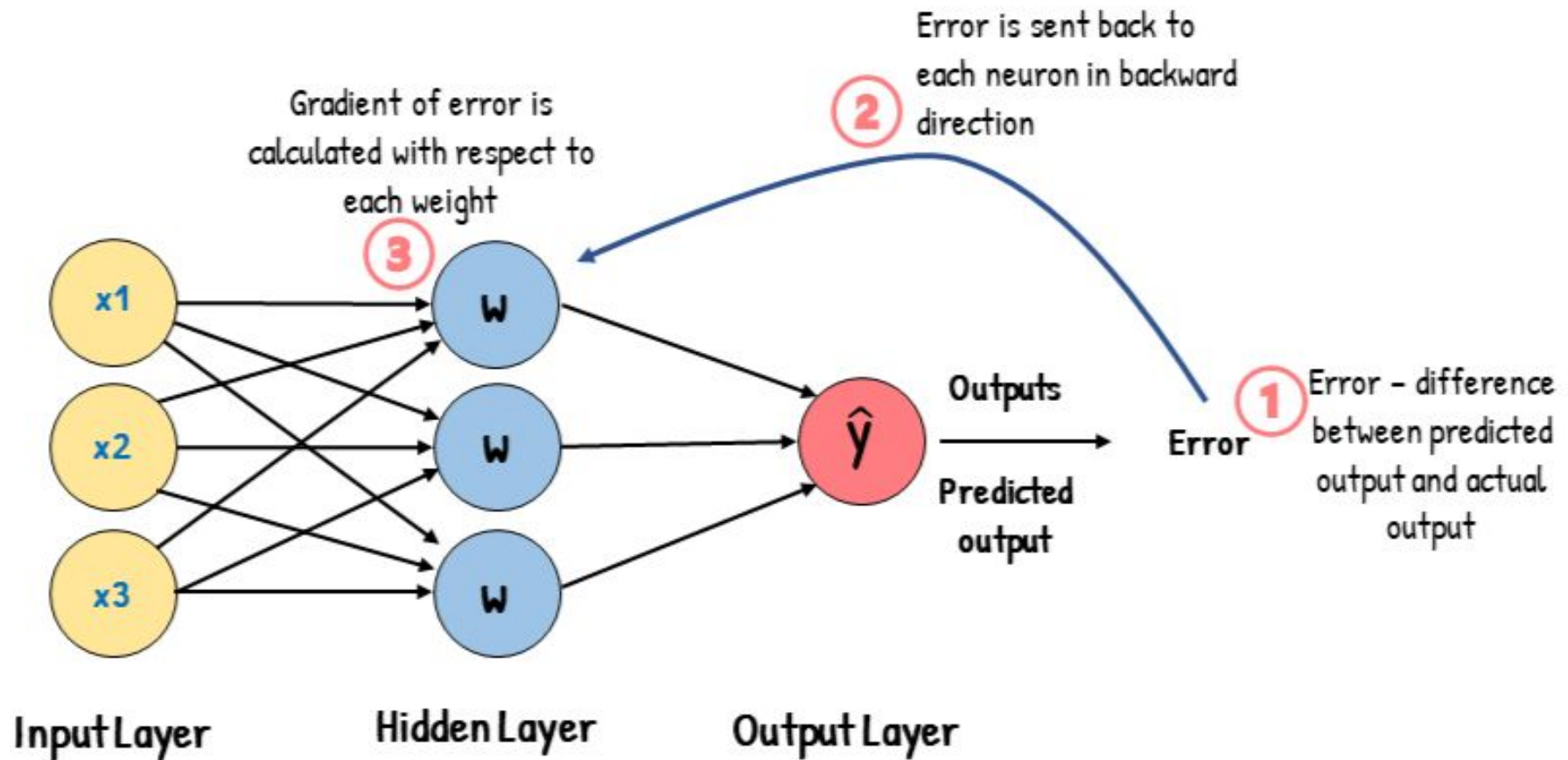


Sigmoid

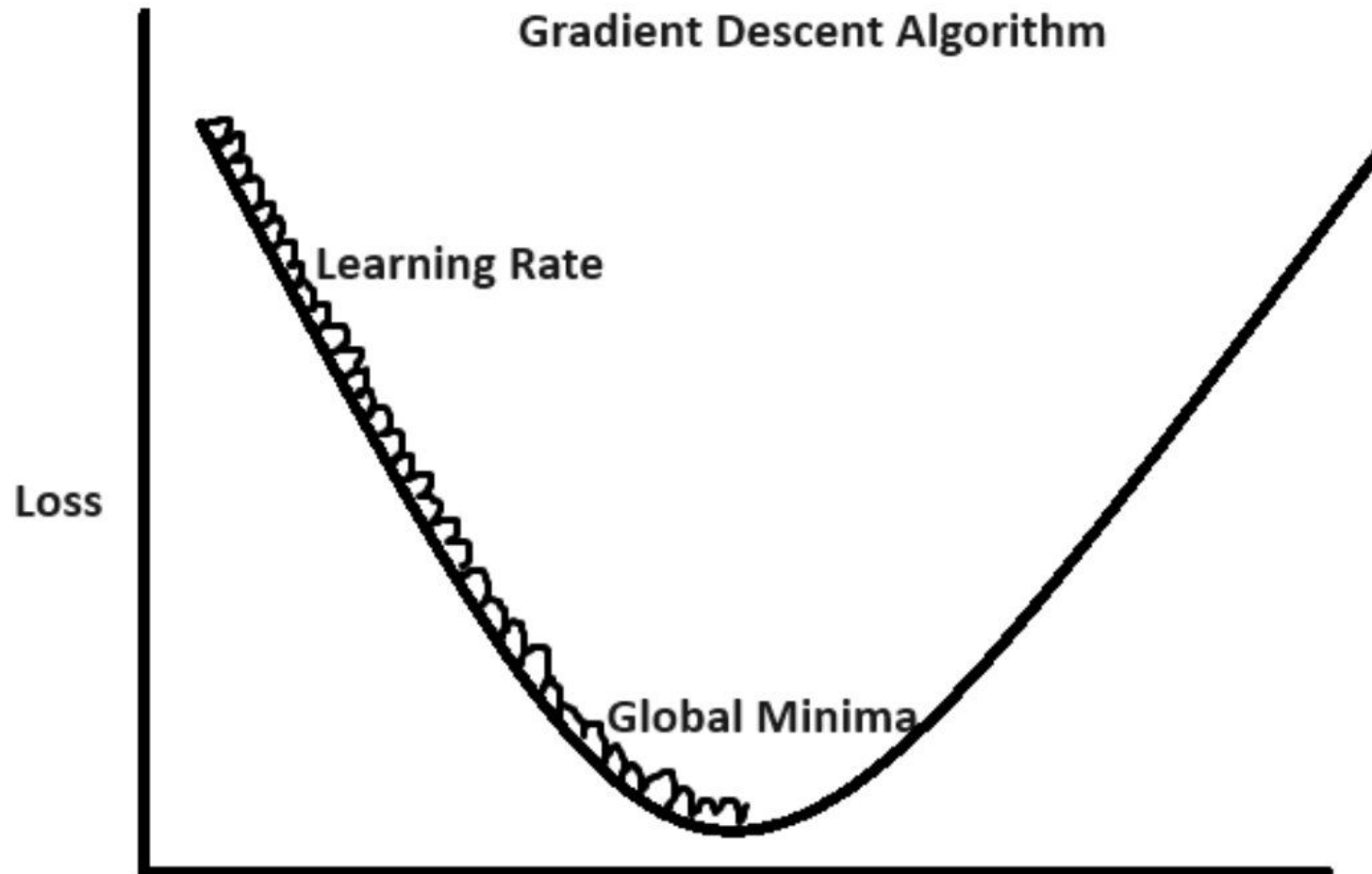


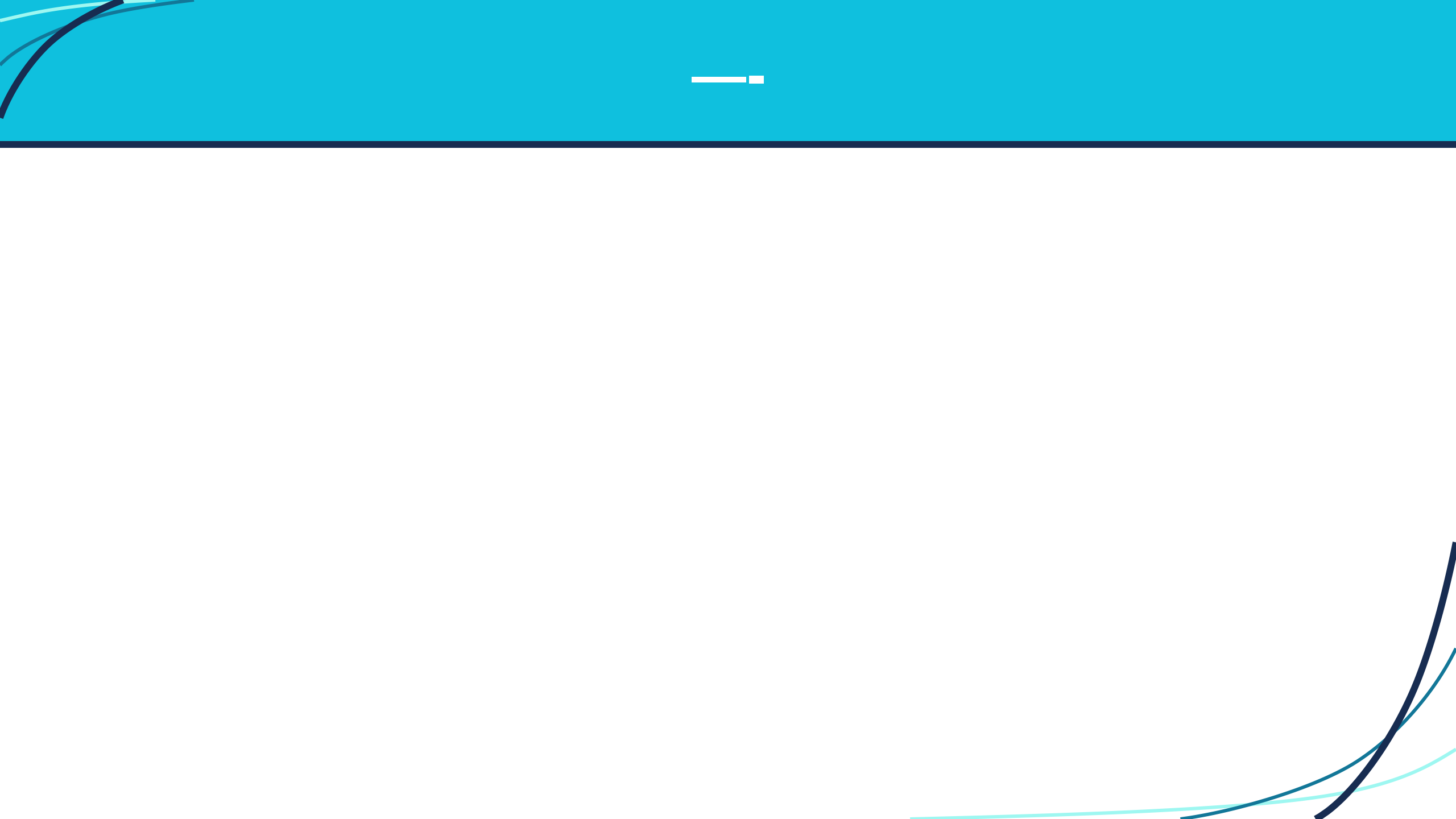
Softmax

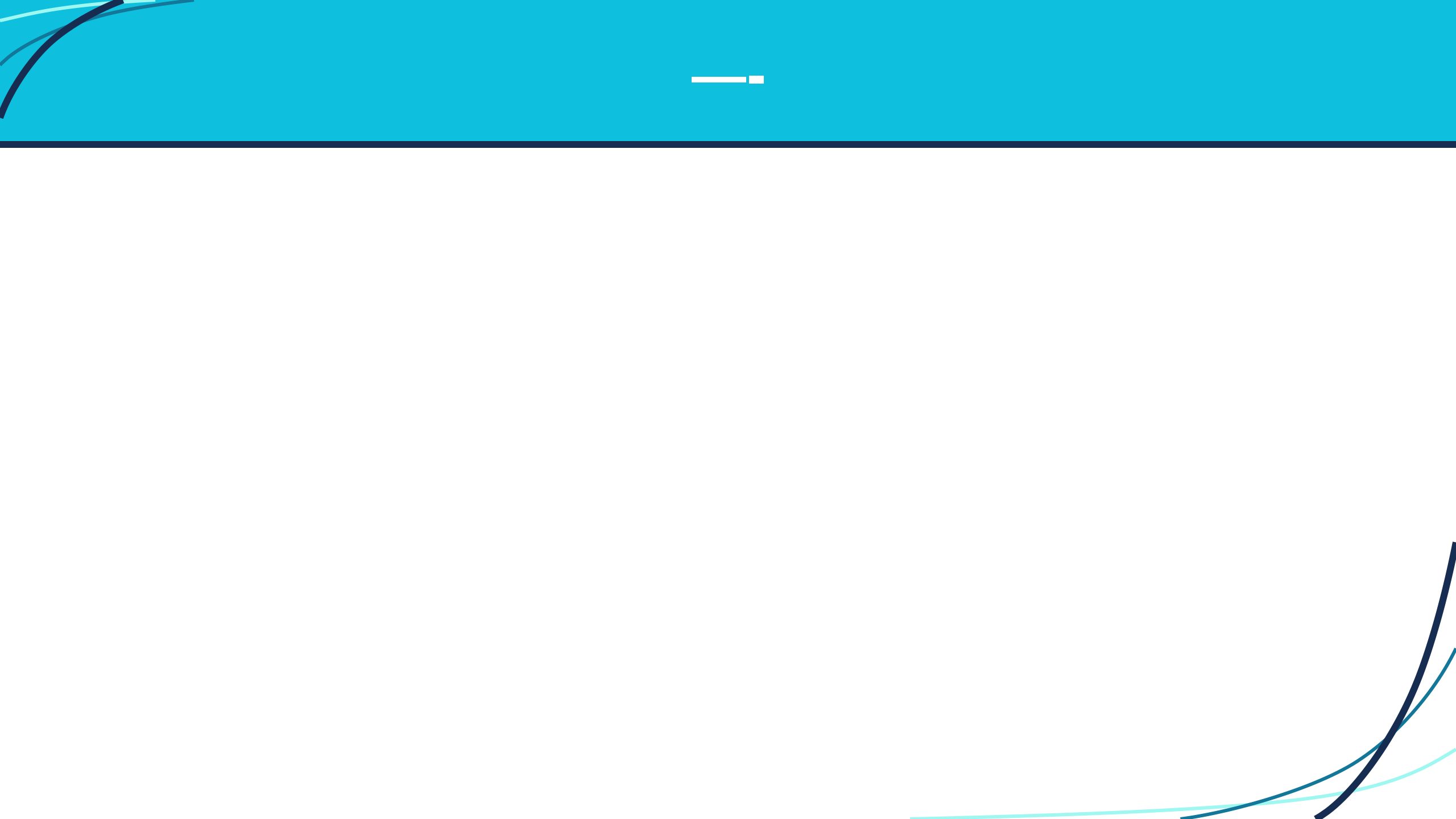
Neural Network - Backpropagation

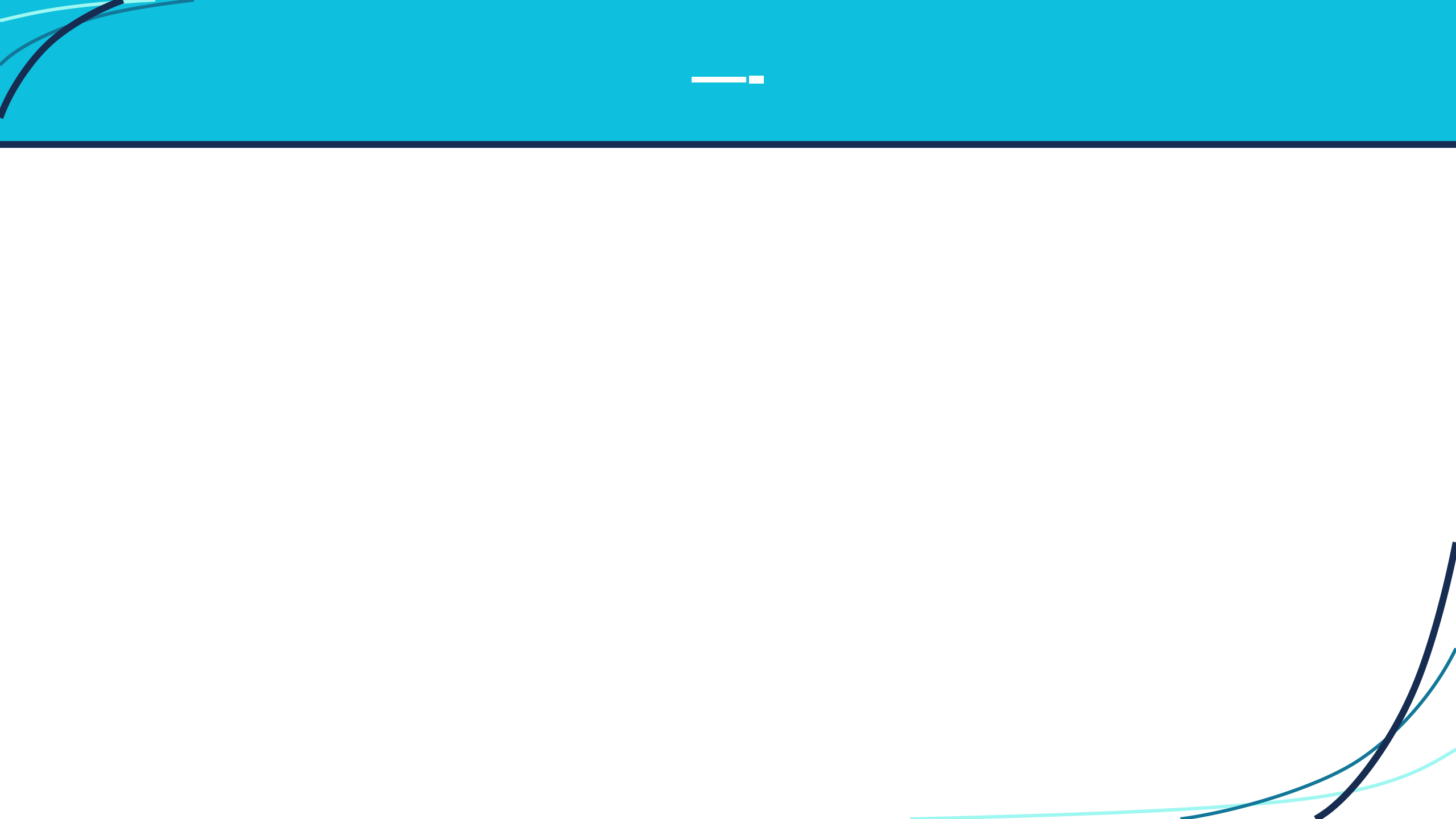


Neural Network - Backpropagation









Attendance QR

INSERT QR HERE



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