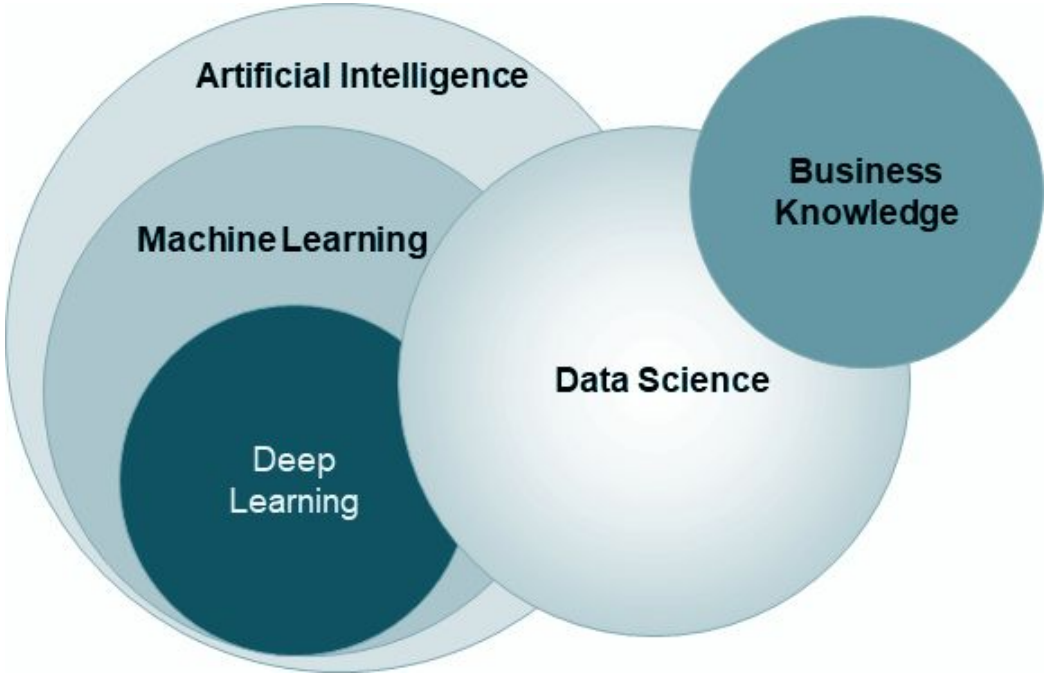
# Introduction to Machine Learning

# What is Data Science?



# How do humans learn?

A baby can learn to identify a bird with features like wings, it can fly or not

A mantis has wings and it can fly, so it must also be a bird, ain't it?


Look for new features. Gather more instances. Rectify past mistakes.

# Machine Learning

Learning is any process by which a system improves performance from experience

Machine Learning is concerned with computer programs that automatically improve their performance through experience

# From Heuristics to Machine Learning

## Heuristics


## Machine Learning

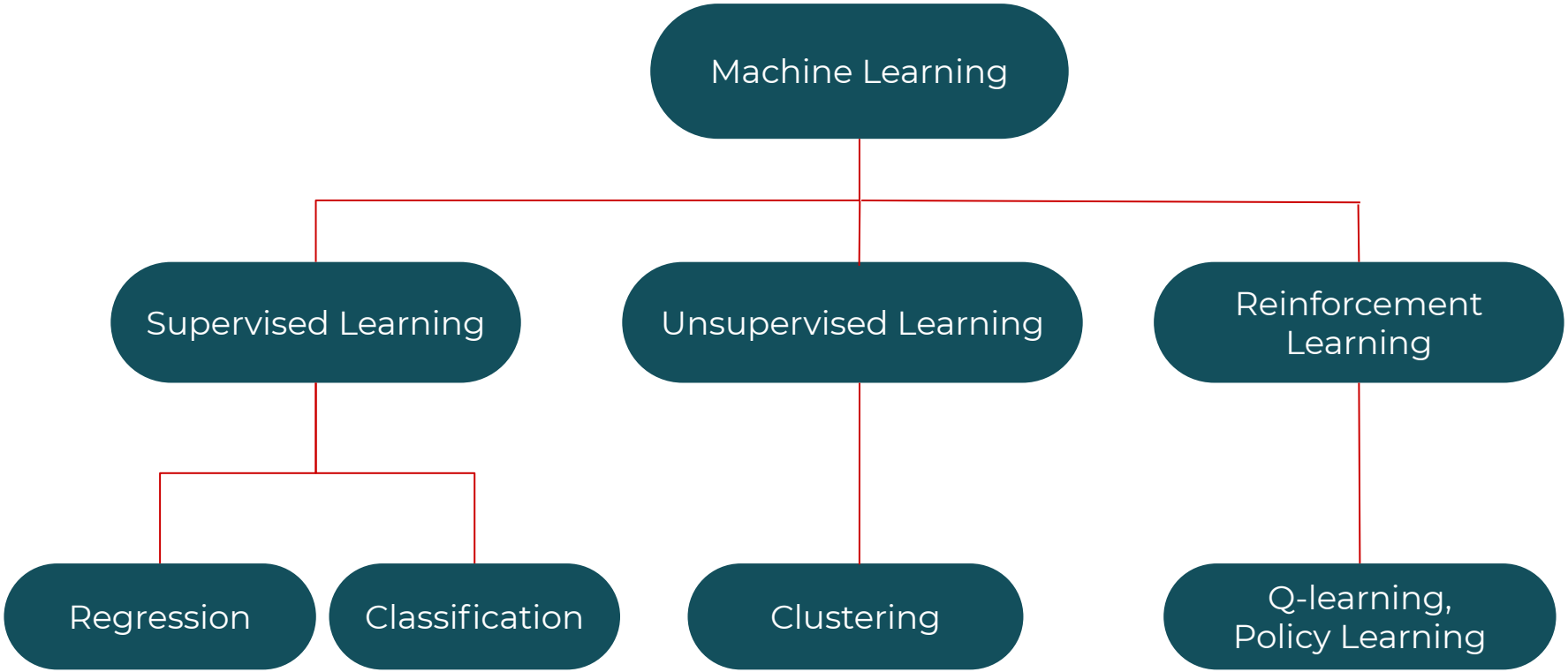
# Revisiting Bird Classification

Features/Input Variables

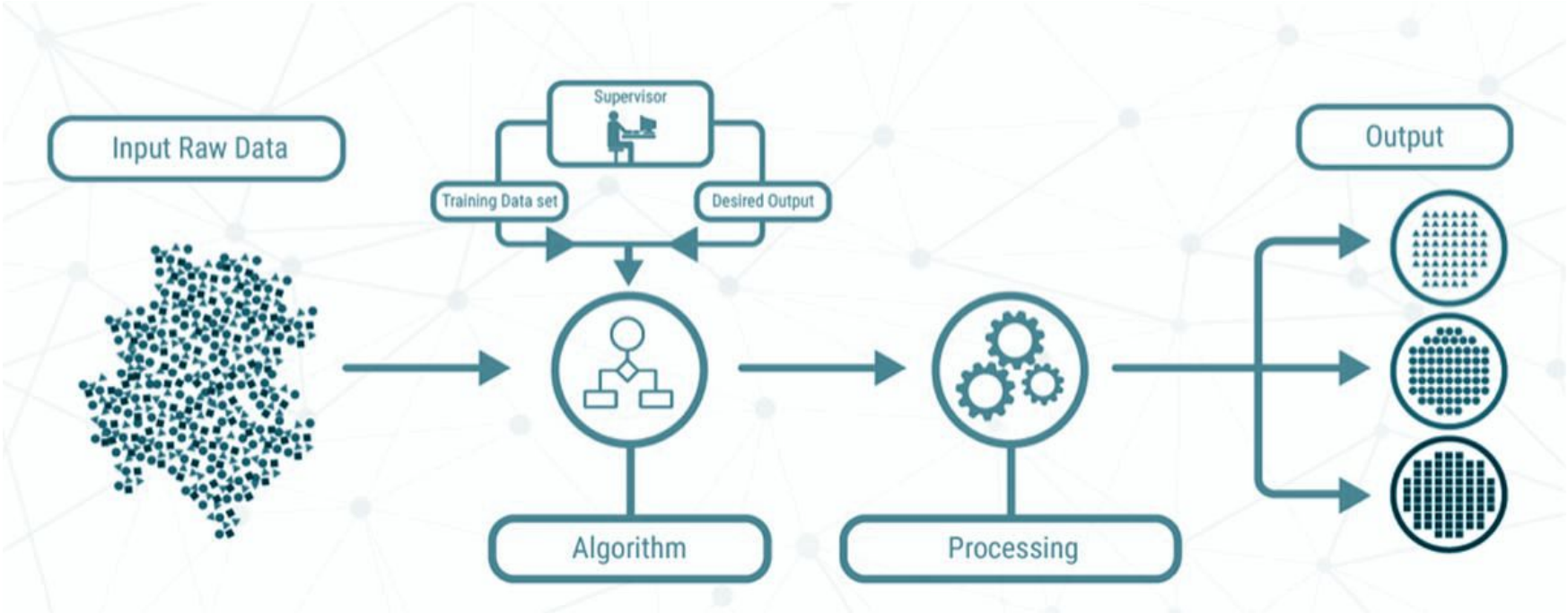
Dependent Variable

| Has Wings | Can Fly | Has Backbone | Has Chitin | Bird or Not |
|---|---|---|---|---|
| Yes | Yes | Yes | No | Bird |
| Yes | Yes | Yes | No | Bird |
| Yes | Yes | No | Yes | Not Bird |

# Tasks in Machine Learning



# Supervised Learning



# Datasets in Supervised Learning

| Feature 1 | Feature 2 | ..... | Feature K | Dependent Variable |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Observations or Examples or Instances

# Applications of Supervised Learning

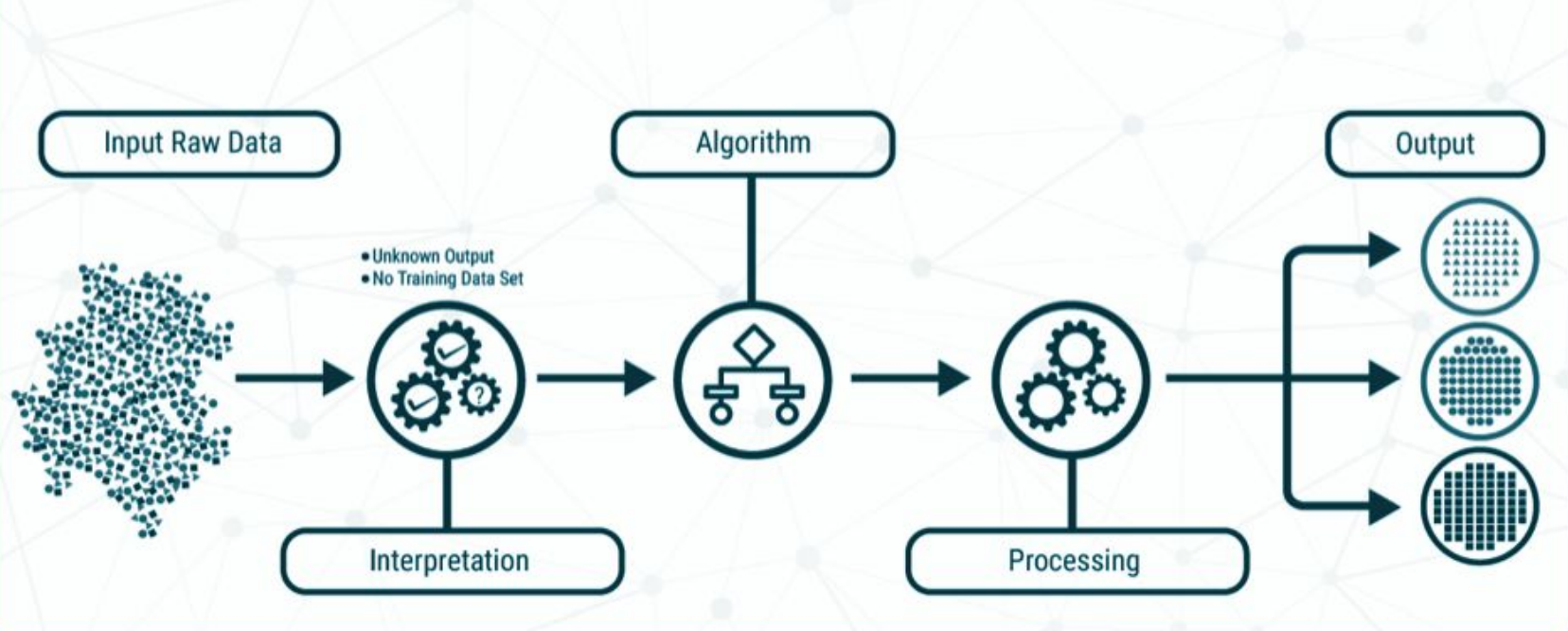
## Regression

- Real Estate Prediction
- Weather Forecasting
- Financial Portfolio Prediction
- ETA

## Classification

- Credit Card Fraud Detection
- Image Classification
- Spam Detection
- Insurance Decisioning

# Unsupervised Learning



# Datasets in Unsupervised Learning

| Feature 1 | Feature 2 | ..... | Feature K |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

No dependent variable available

Observations or Examples or Instances

# Applications of Unsupervised Learning

## Clustering

- Document theme extraction
- Customer Segmentation
- Insurance Fraud detection
- Delivery Store Optimization

# Reinforcement Learning

# Applications of Reinforcement Learning

- Traffic Light Control
- Resource Management
- Robotics
- Games
- Bidding & Advertisement

# Steps in Supervised ML Modeling