MODULE 1 : OVERVIEW OF MACHINE VISION

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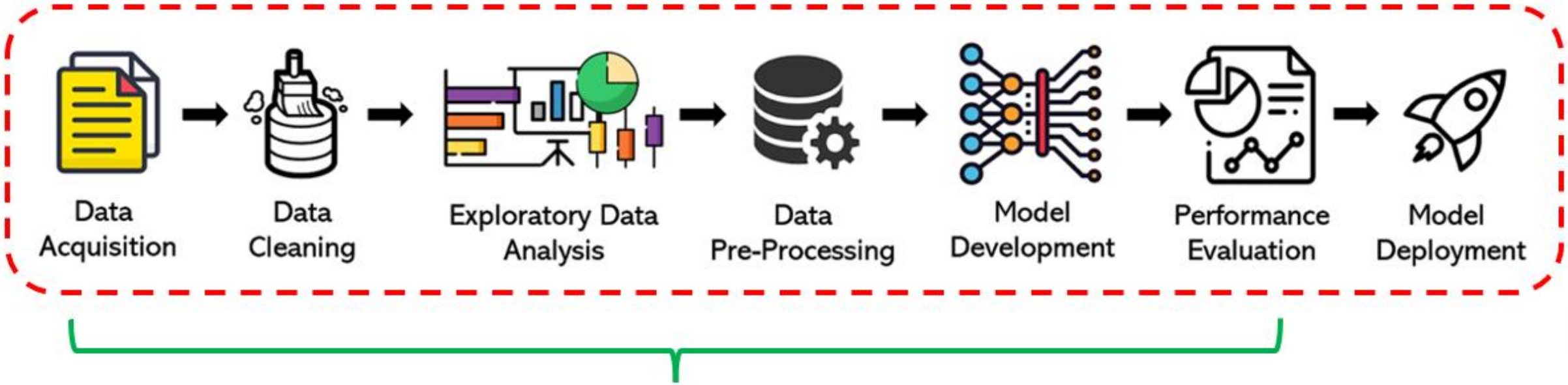
MODULE STRUCTURE



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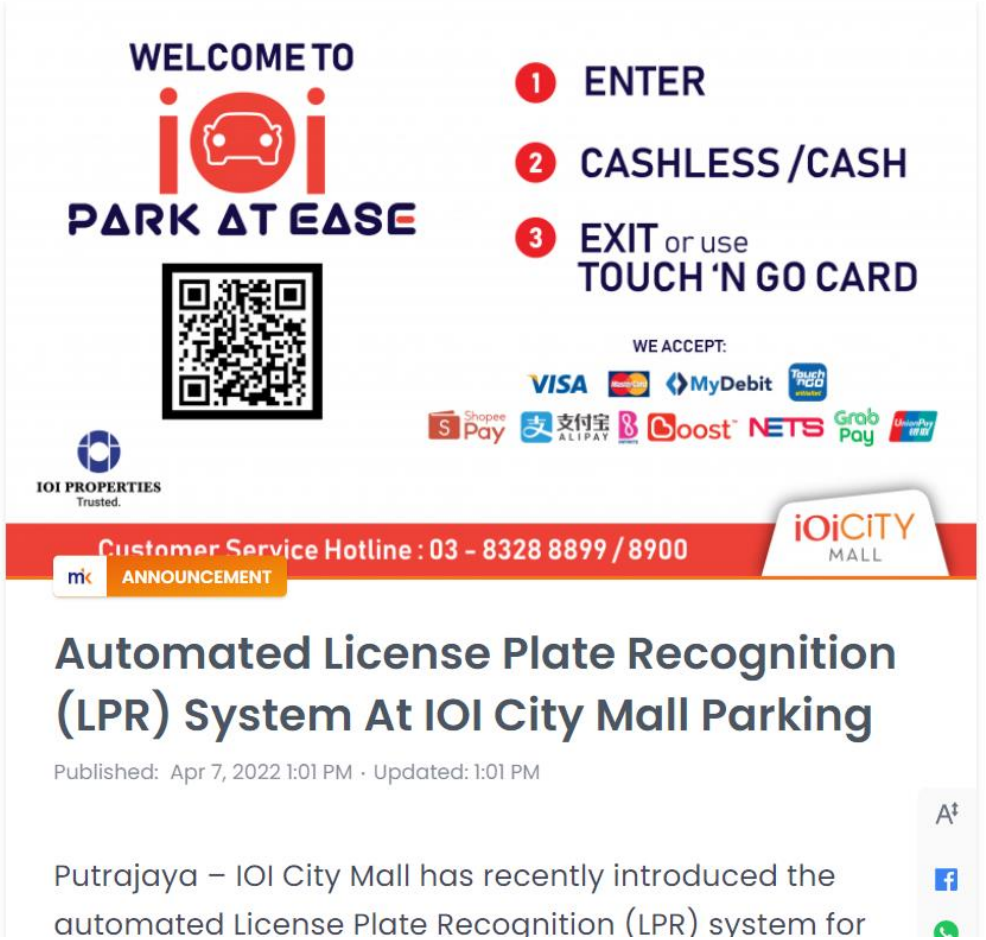
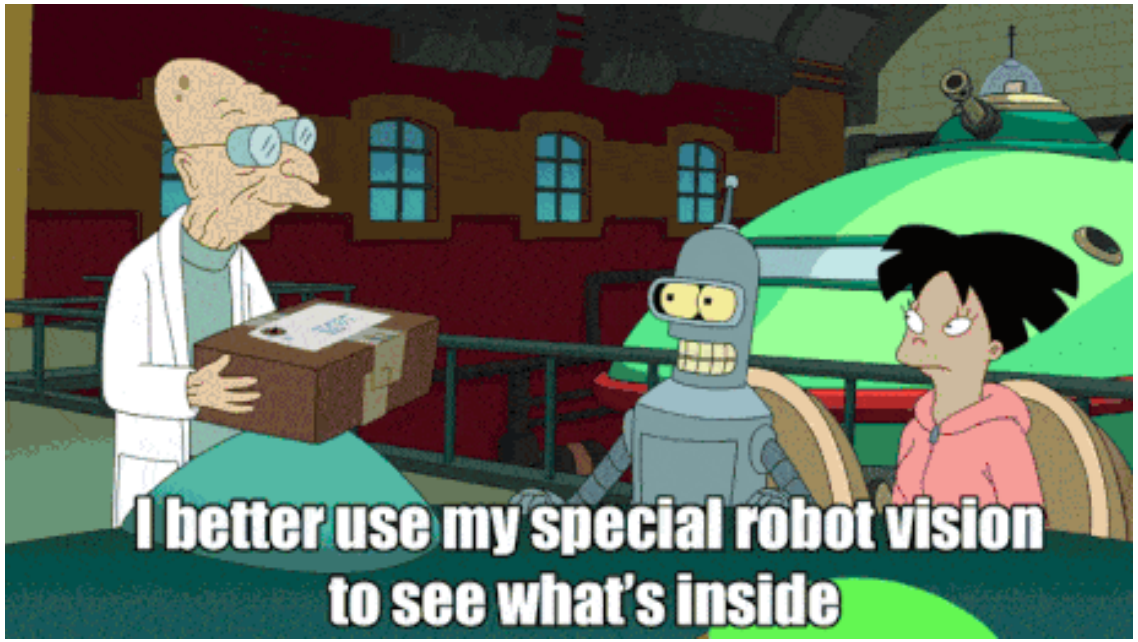


WHAT IS MACHINE VISION?



- Giving a computer/machine "eyes" 👀 so it can **see** and **understand things**
- See – using camera
- Understand things – **intelligence** 🧠 **HOW?**

🤔

HOW TO PROVIDE INTELLIGENCE?

Machine learning (algorithm), a **branch of artificial intelligence**, concerns the construction and study of systems that can **learn from data**.

LEARNING ALGORITHM

SUPERVISED LEARNING

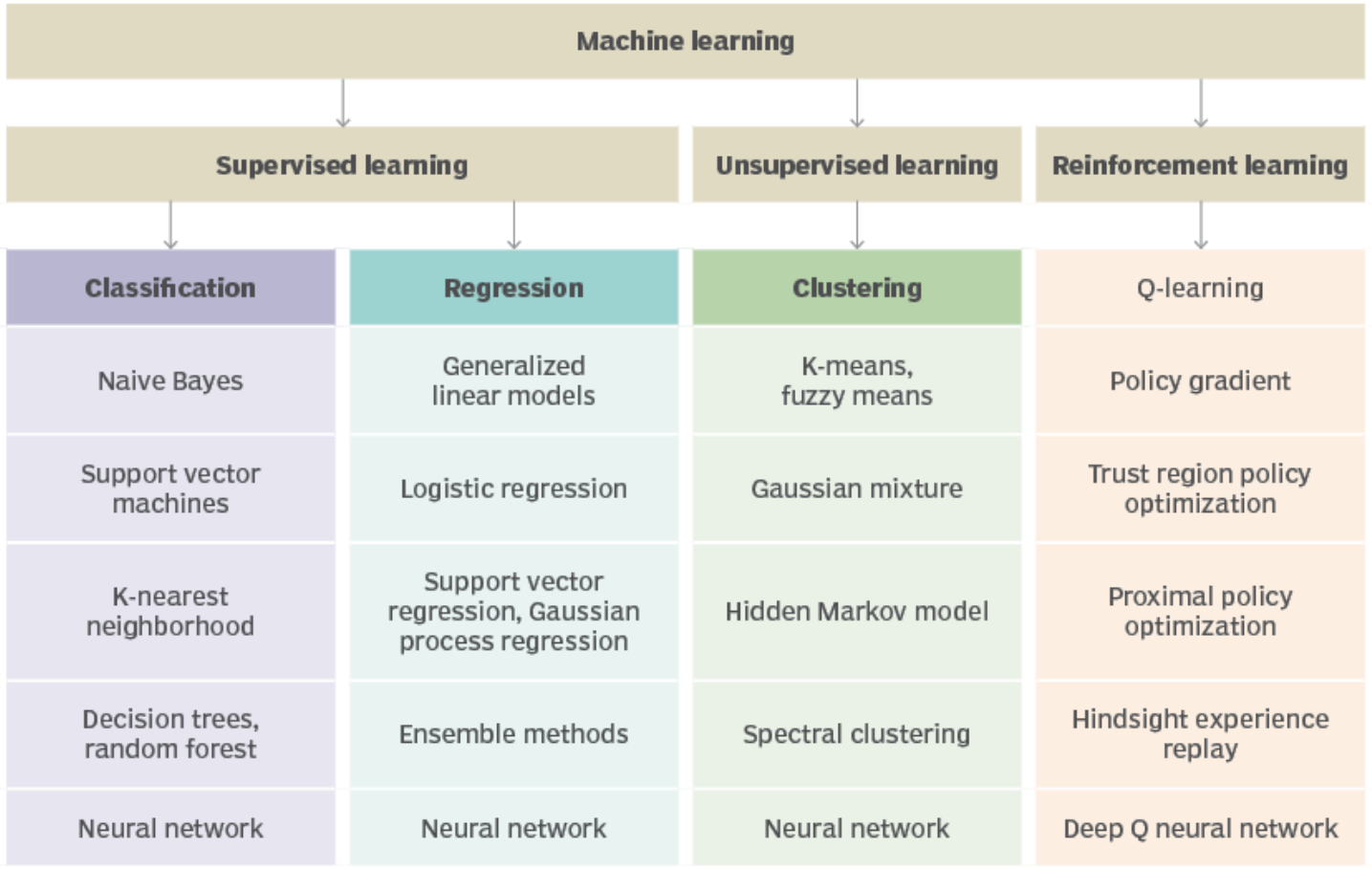
UNSUPERVISED LEARNING

REINFORCEMENT LEARNING

LEARNING ALGORITHM

Algorithms for machine learning

Different algorithms for supervised learning, unsupervised learning and reinforcement learning.



TYPE OF DATA

Data comes from a variety of **sources**, **formats**, **conditions** and **locations**

Data Sources


Images


Emails

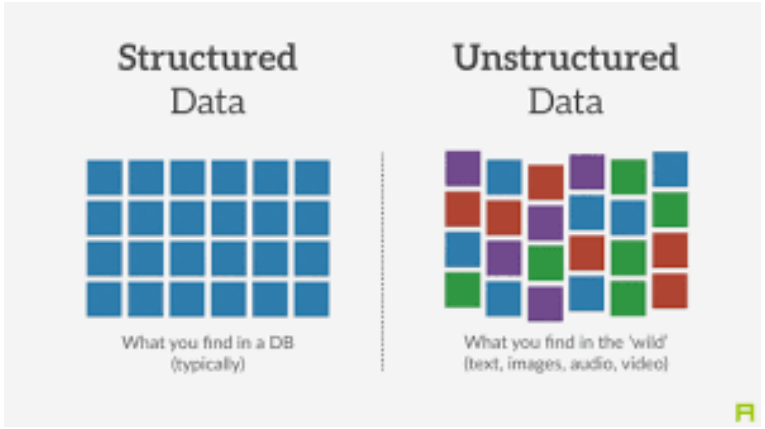

Documents


Spreadsheet


Videos


Text Content

Data Types



Data Locations

- ❑ On-premises databases
- ❑ Data warehouses
- ❑ Data lakes
- ❑ Cloud sources
- ❑ Edge devices
- ❑ Hybrid
- ❑ Sensors/IoT

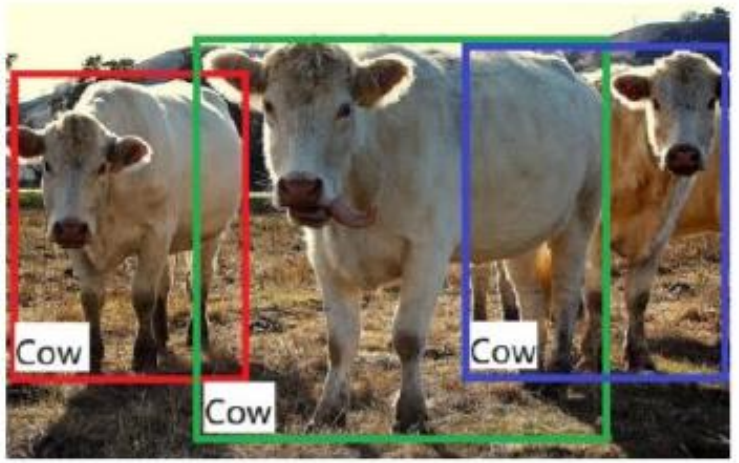
Image Classification, Object Detection, Image Segmentation

COMPUTER VISION

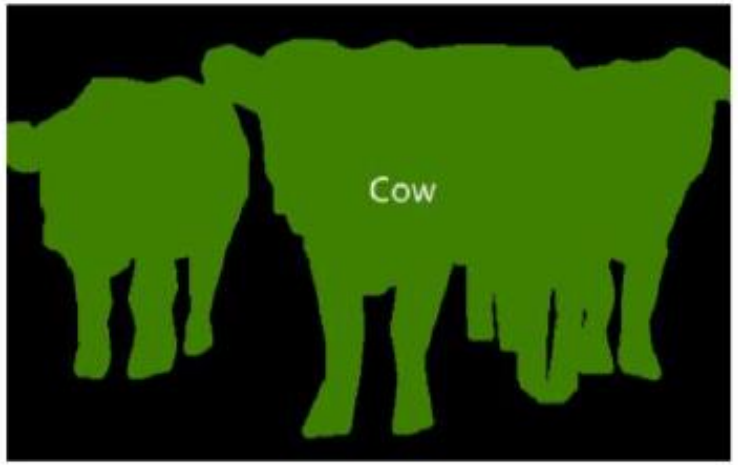
NATURAL LANGUAGE PROCESSING

TIME SERIES FORECASTING

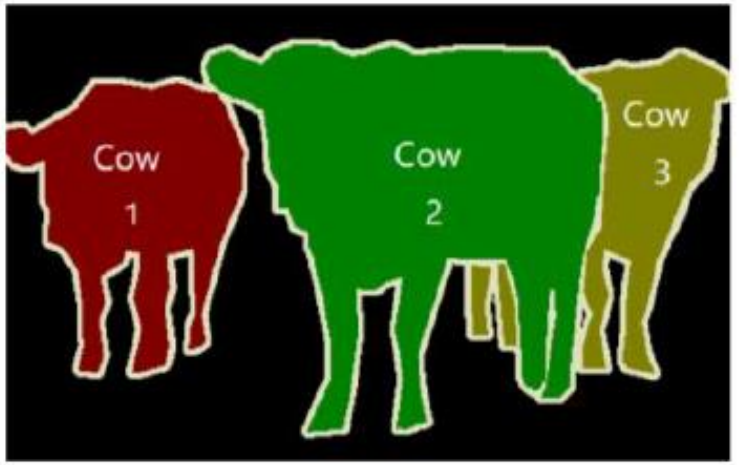
(a) Image Classification



(b) Object Detection

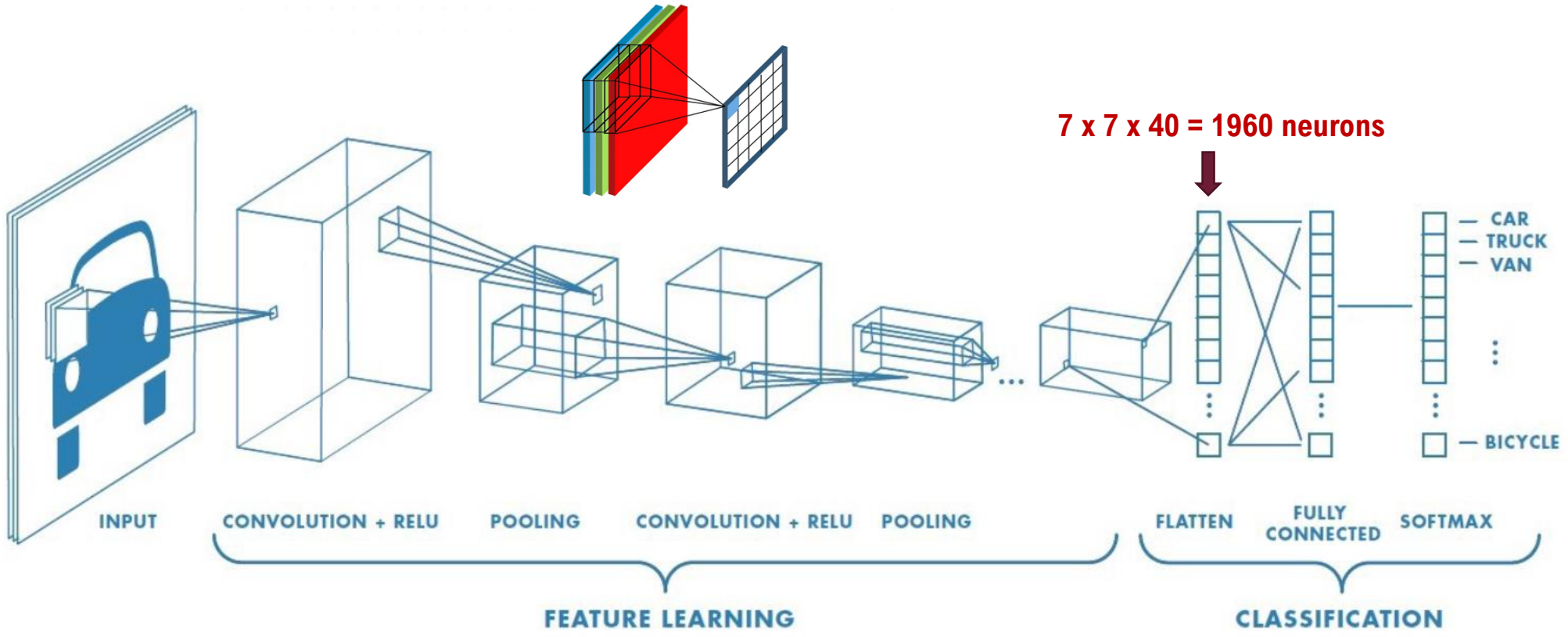


(c) Semantic Segmentation



(d) Instance Segmentation

DEEP LEARNING –
CONVOLUTIONAL NEURAL NETWORK (CNN)



Input Layer

39 x 39 x 3 = 4563 neurons

Feature Extraction Layer

(image down sampling process)

Output Layer

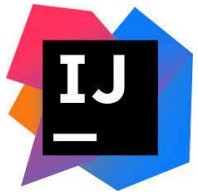
DEEP LEARNING FRAMEWORK

Caffe

INTEGRATED DEVELOPMENT ENVIRONMENT

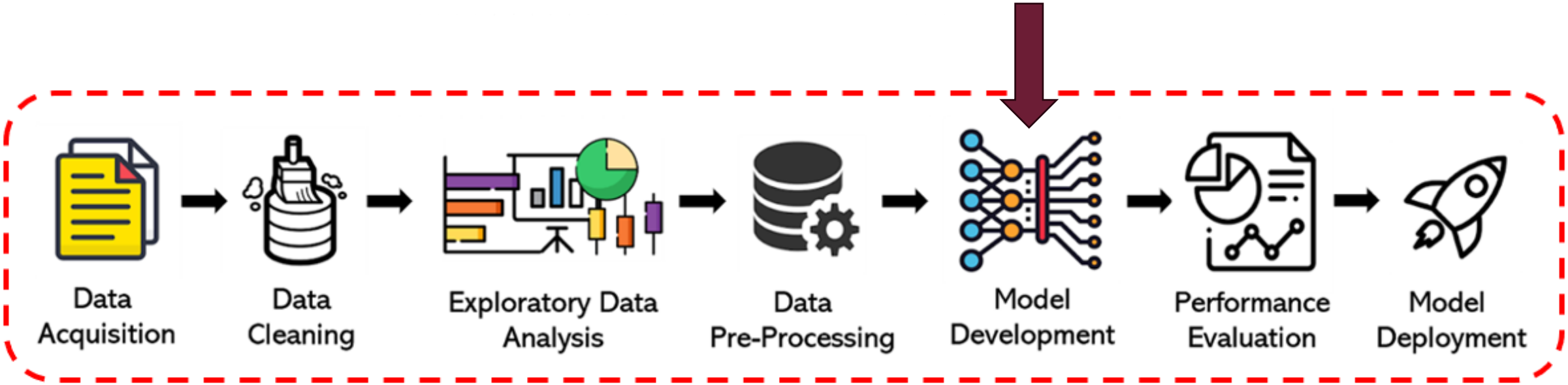
Programming Language

Integrated Development Environment (IDE)



Dependencies/Libraries

Deep Learning Framework



Tools (IDE) & Libraries