

COMPUTER VISION



Human-Computer Interaction

Dhritabrata Mitra

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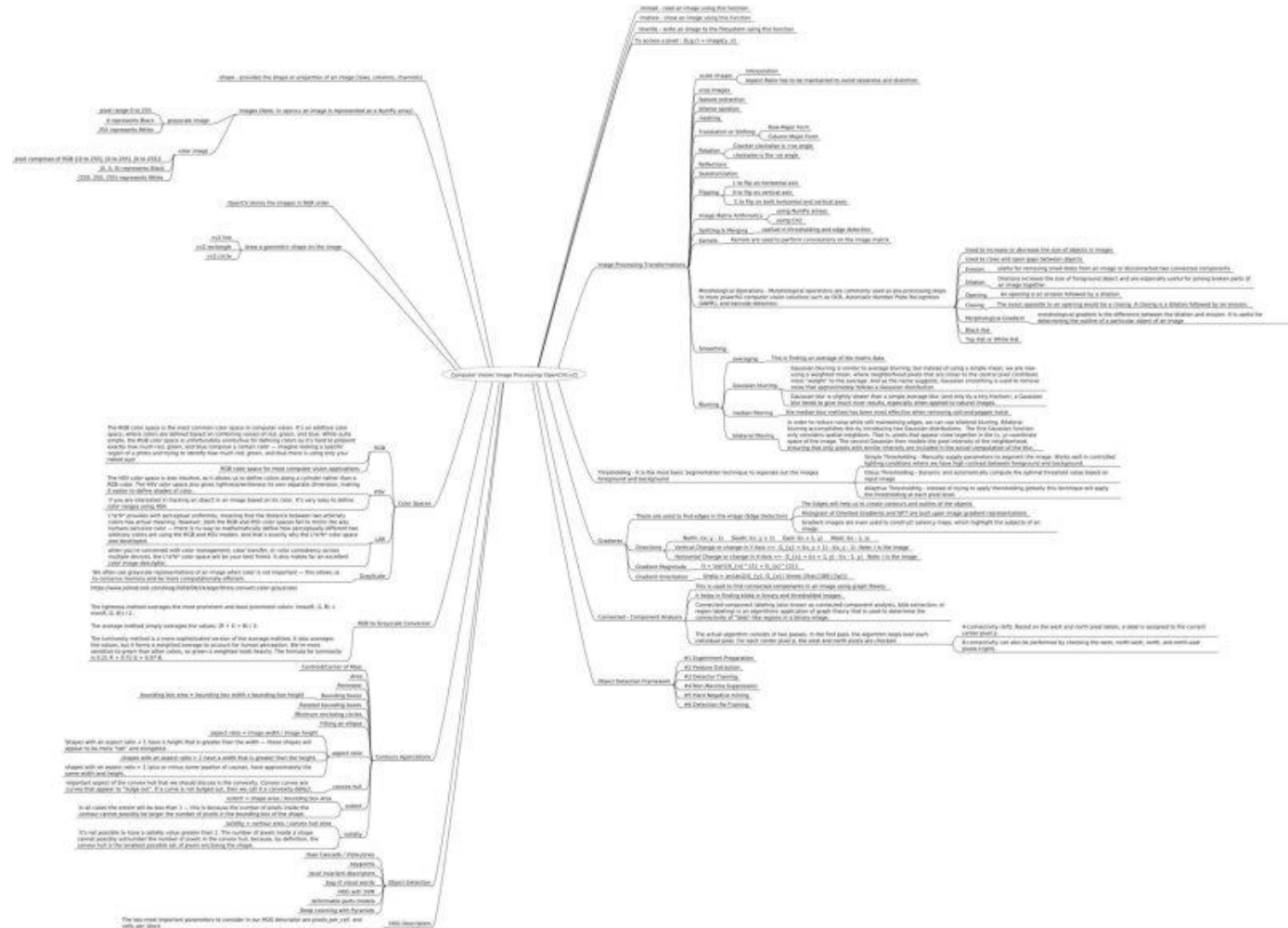
INTRODUCTION

- Computer vision uses algorithms and models to analyze visual information, allowing computers to interpret images or videos.
- Applications in various domains, such as healthcare, automotive, and security.
- Distinguishing between normal lung function and pneumonia.



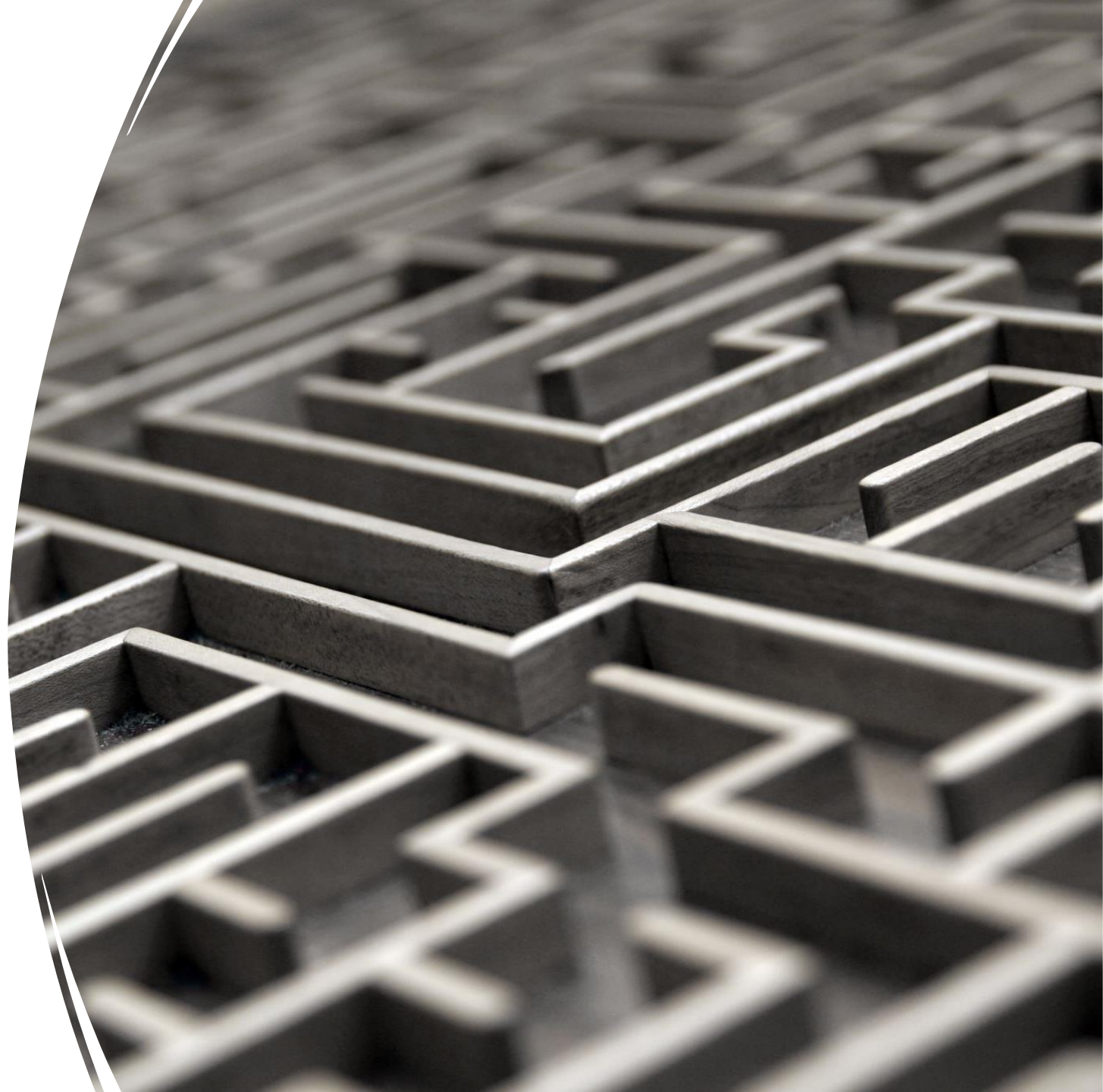
DOMAINS

- Image Classification
- Object Detection
- Image Segmentation
- Medical Image Analysis
- Much More



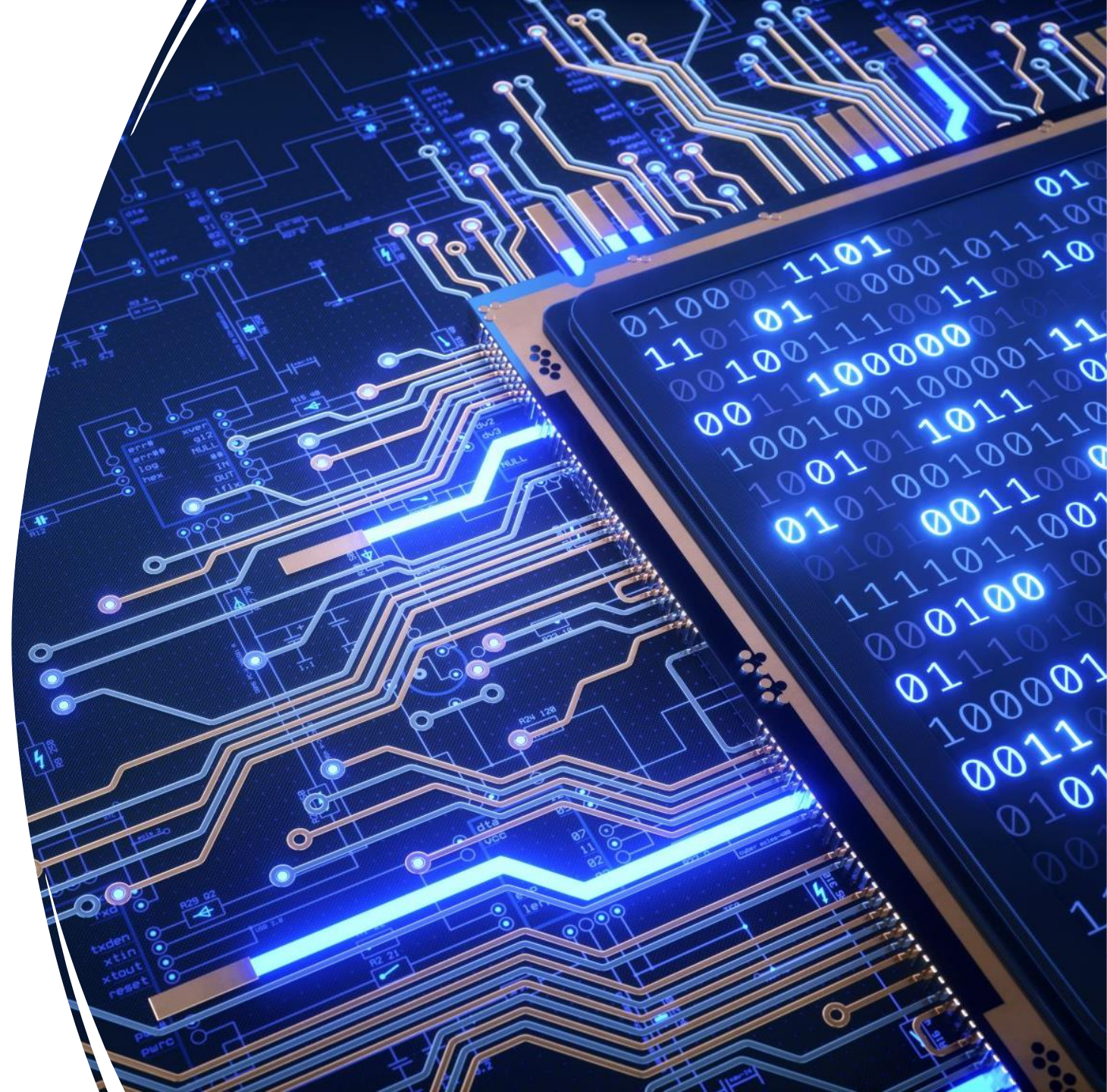
ADVANTAGE

- Makes things easier and faster
- Reliable
- Reduces costs
- Can be used in many areas



DISADVANTAGE

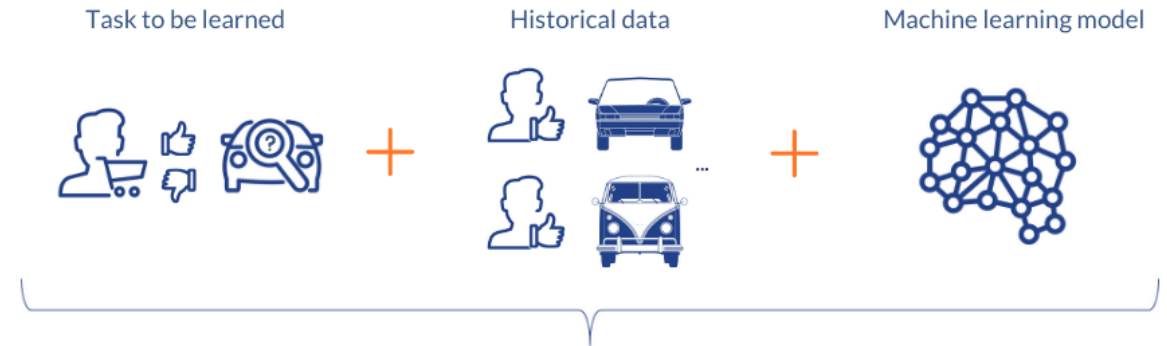
- Big need for specialists in Machine Learning and Artificial Intelligence.
- Can't warn us when they're about to fail.
- If there is a virus issue Computer Vision and image processing might not work well.



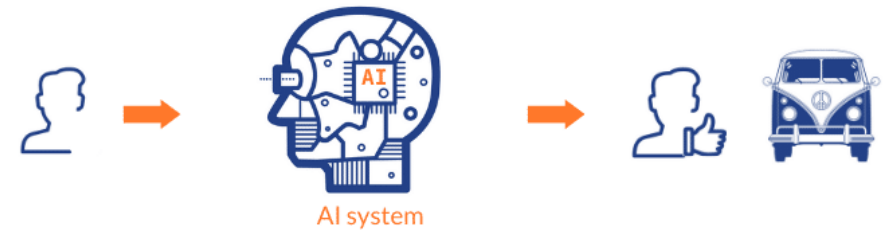
What is a Model?

- A program that can find patterns or make decisions from a previously unseen dataset.
- Pre-defined models such as VGG16, ResNet50, MobileNet, etc

Creating an ML model



Using the ML model



Dataset

Collection of data.

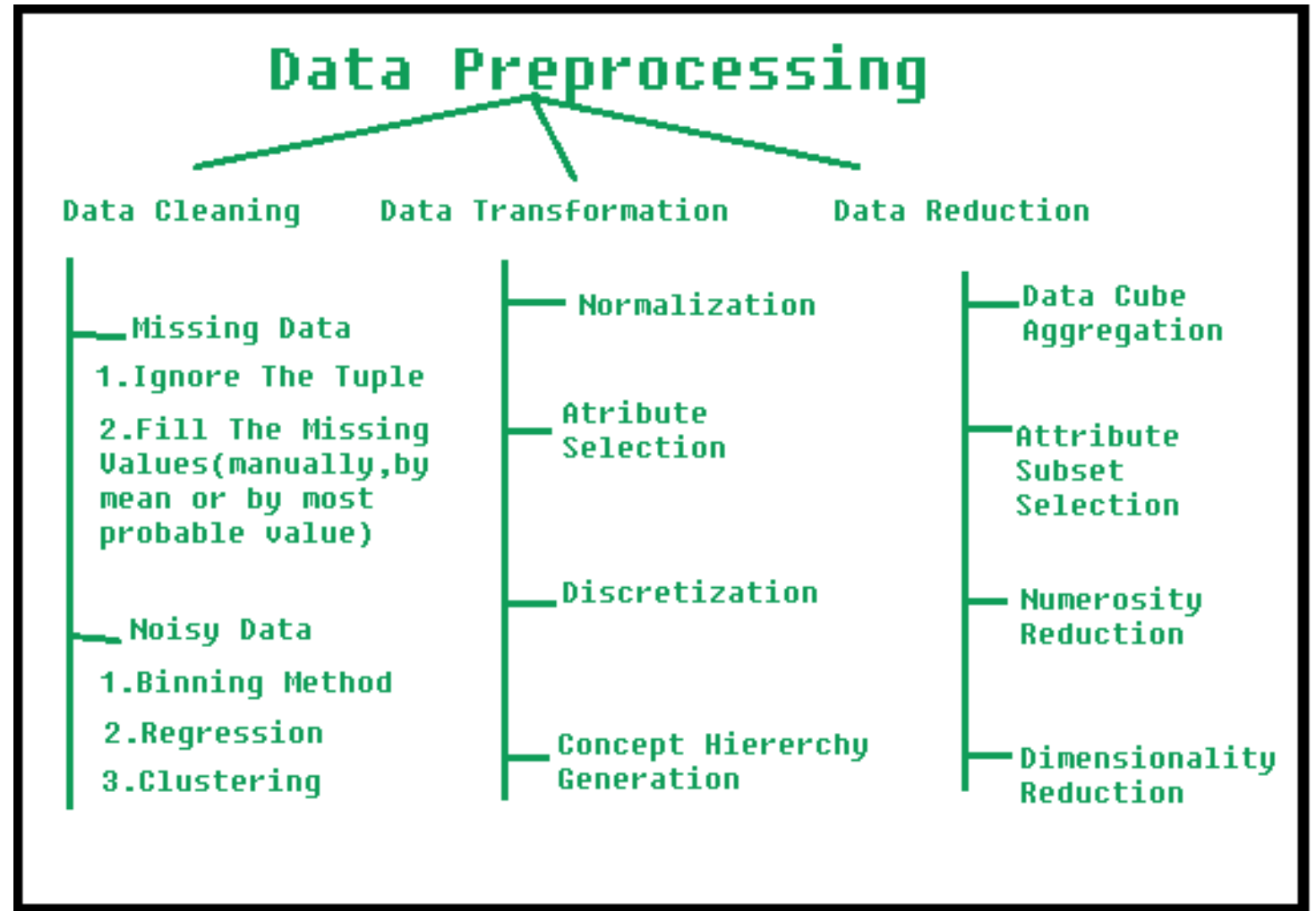
Used for training machine learning models.

Model gives the output based on what it learned from training using a dataset.

Data can be image, text, audio, etc

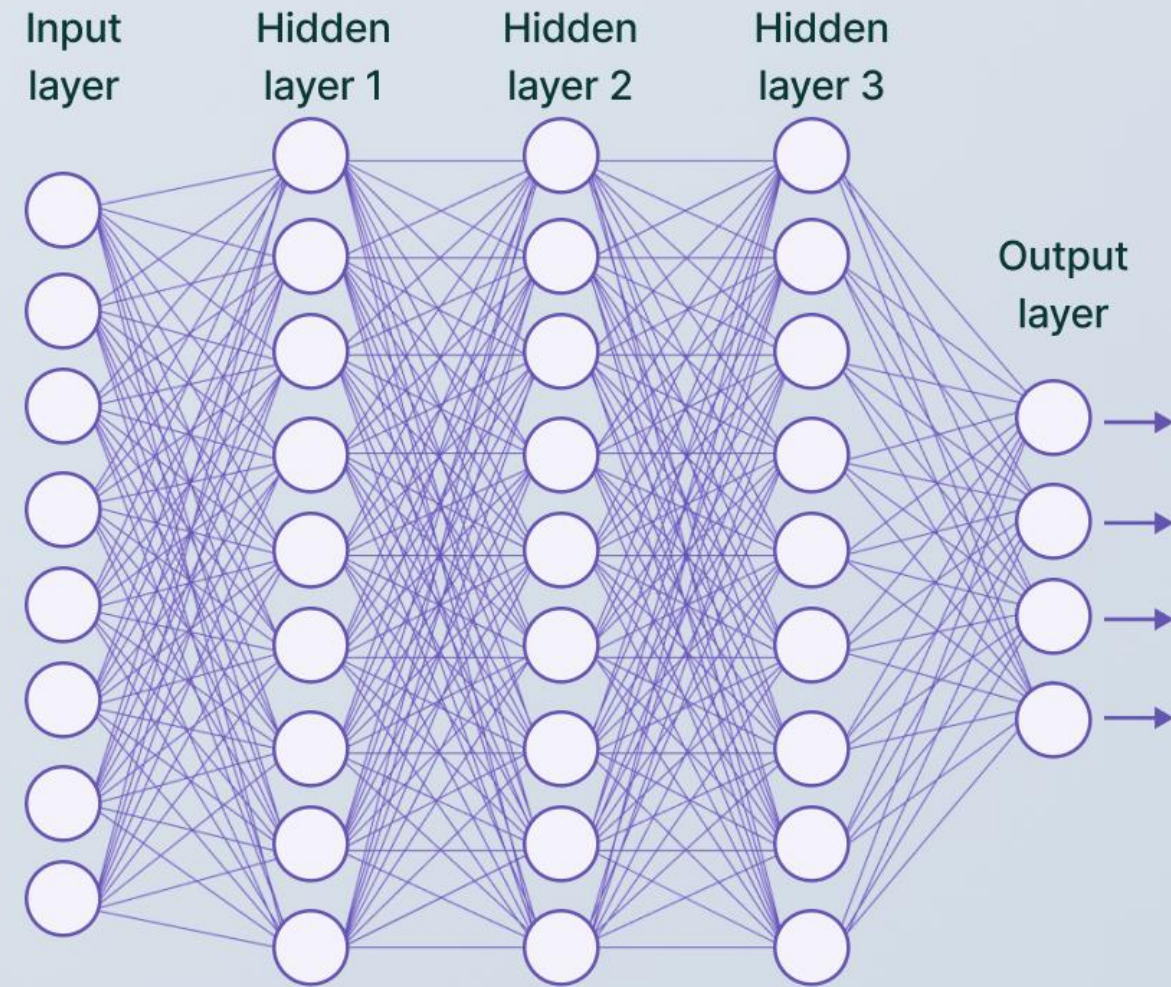
Data Preprocessing

- Clean and organize raw information so that computers and machine learning systems can easily understand and analyze it.



Convolutional Neural Network

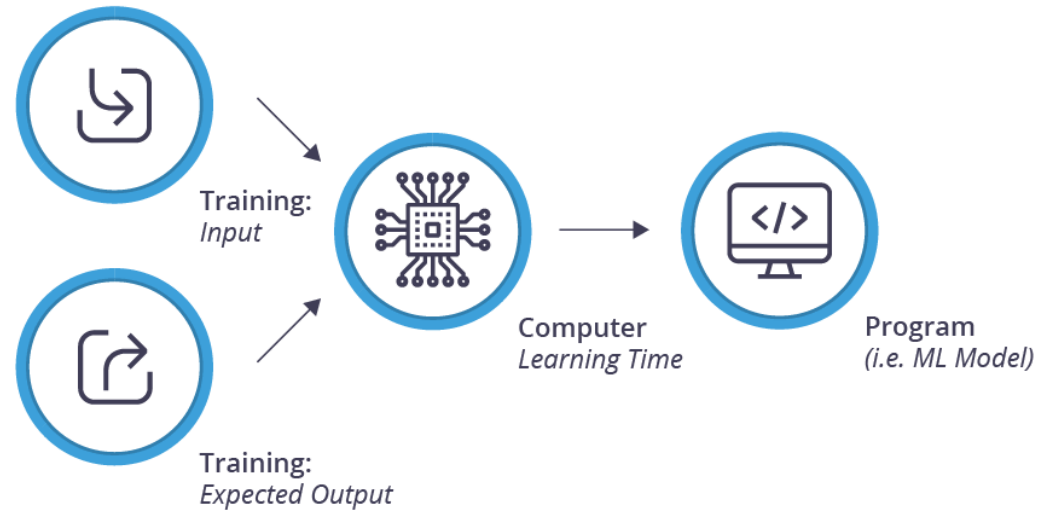
- Best for working with images.
- Learns to find important parts of data (using filters or kernels).
- Expensive to use them



TRAINING Phase

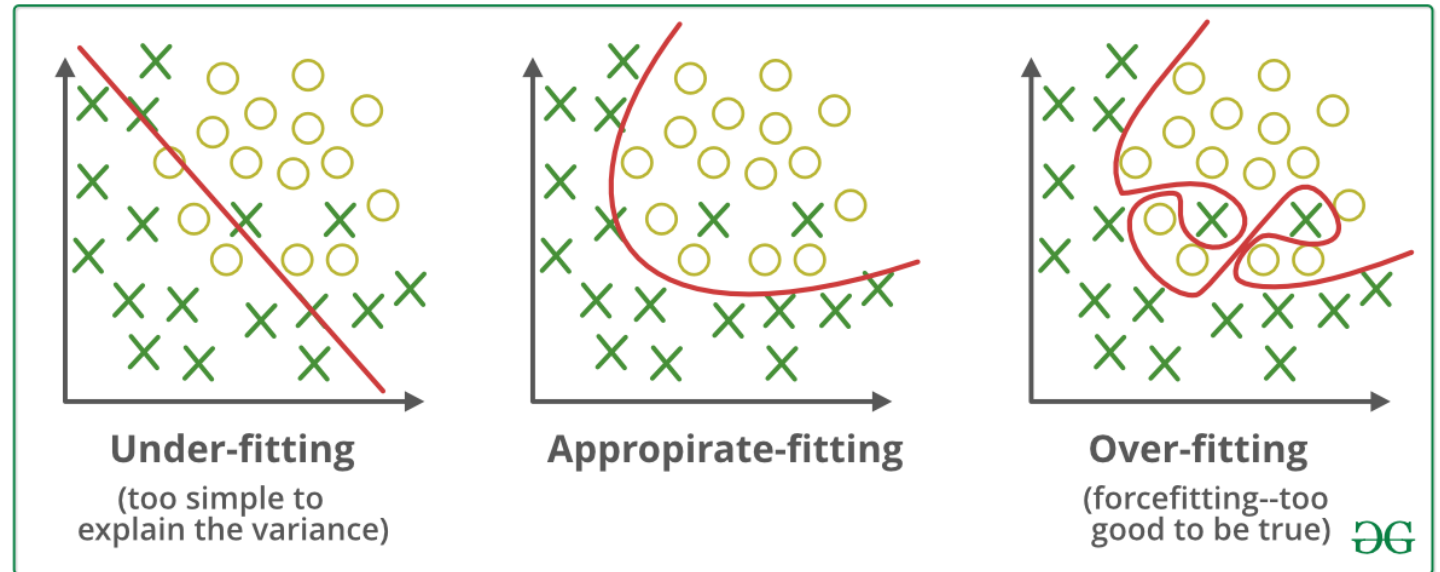
- Model is given input data to be trained on.
- Input data can be image, text, etc

The Machine Learning **Training Process**



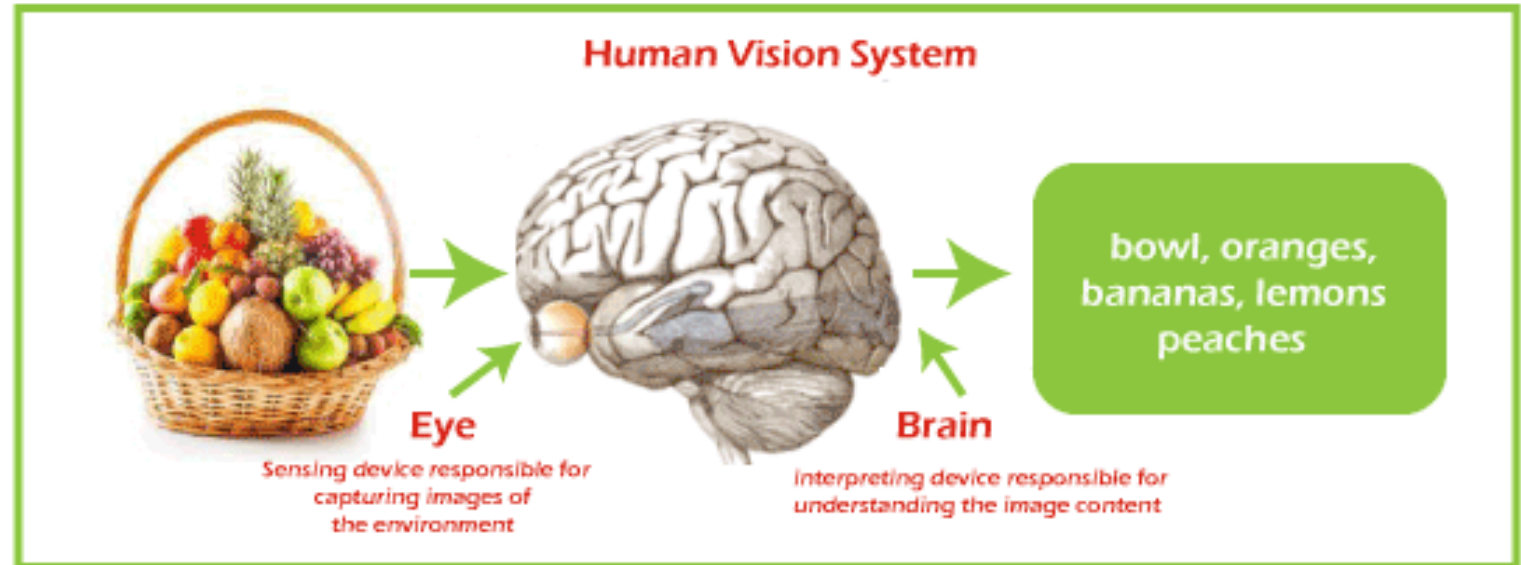
TESTING PHASE

- We check how accurate our model is.
- We check if our model is overfitted or underfitted.



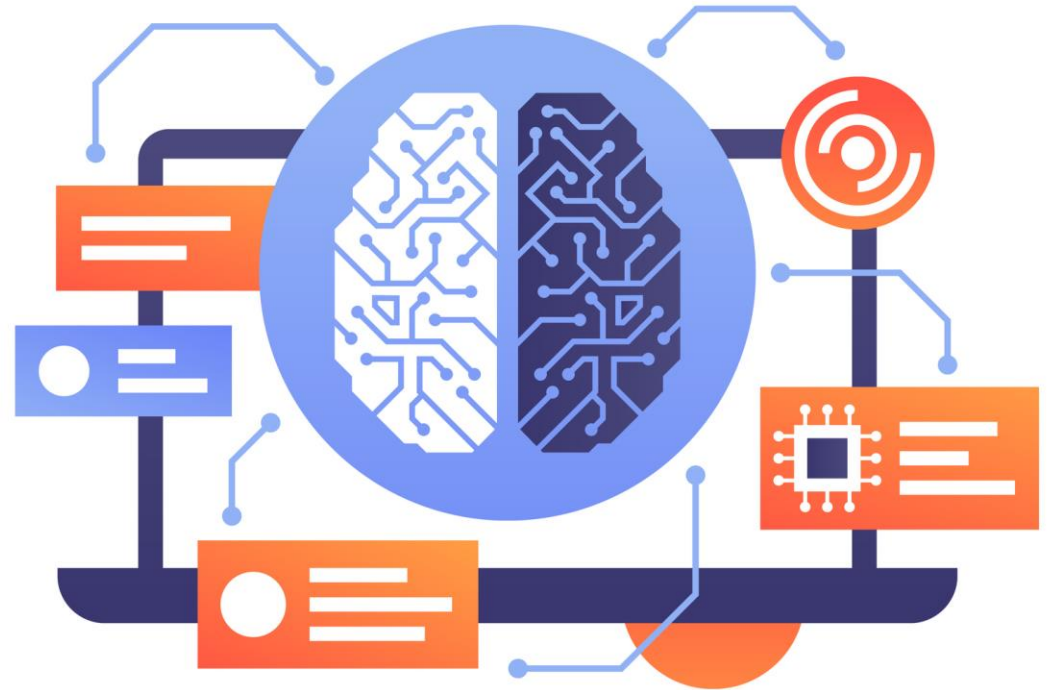
RELATION WITH HCI

- Virtual Reality.
- Gesture Recognition.
- Facial Recognition.
- Object Recognition and Tracking



IMPROVING MODEL

- Confusion Matrix
- Accuracy
- Precision
- Recall
- F1-score



RELATED WORK

- Very deep convolutional networks for large-scale image recognition. (<https://arxiv.org/pdf/1409.1556.pdf>)

- ImageNet Classification with Deep Convolutional Neural Networks.

(https://proceedings.neurips.cc/paper_files/paper/2012/file/c399862d3b9d6b76c8436e924a68c45b-Paper.pdf)



CONCLUSION

- In summary, computer vision is important because it helps machines see and understand images, like how people do.
- Thanks to progress in computer vision, we've seen big improvements in areas like recognizing images, finding objects, and even in things like self-driving cars and medical image analysis.

