Deep Learning and Computer Vision

Basics

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Definition I

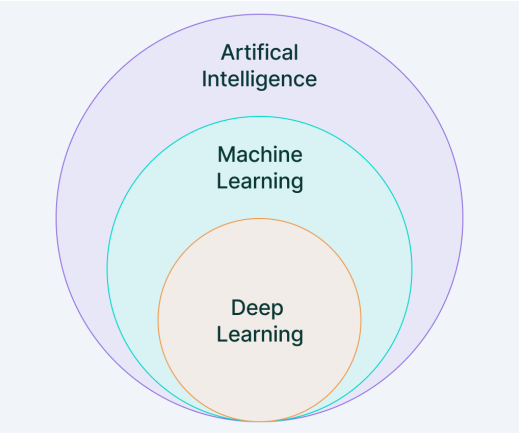

Figura: Deep Learning, Machine Learning, and Artificial Intelligence.

What it is

- Deep Learning is simply a branch of Machine Learning. The main difference is in the approach to modelling.
- In classic machine learning you try to find a model that fits the data, in Deep Learning you create a model that learns in a better way.

Definition II

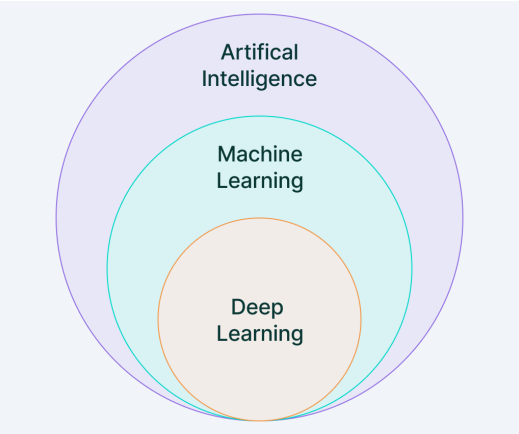

Figura: Deep Learning, Machine Learning, and Artificial Intelligence.

How it Works

- In Deep Learning, you design a neural network (a brain). This design is called "Architecture" and defines the kind of information the AI is more susceptible to learn from.
- For example, Convolutional Neural Networks are better at learning from images than numeric data.

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What it is

Self-driving cars [Tesla, 2016]

Medical Analysis [Intel, 2022]

- Computer Vision is the development of deep learning algorithms to teach a computer to understand visual inputs just like humans.
- For example, we can teach a self-driving car to recognize humans and pets, or teach a computer to identify anomalies in a patient's scans.

Image Segmentation

Image Segmentation

- In image segmentation, we seek to identify which pixels belong to a certain object.
- When analysing the effects of epidural anesthesia, we needed to identify the patient's feet to see if the procedure was successful or not.

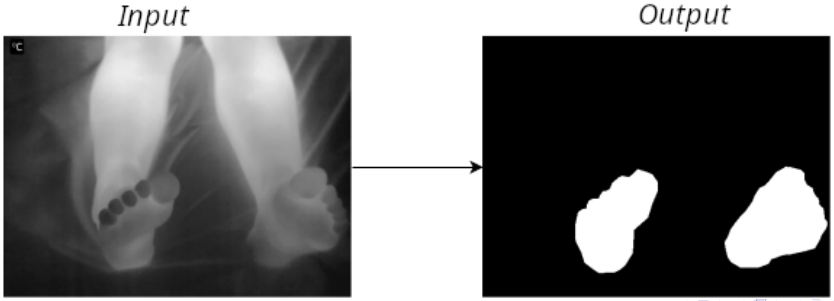


Image Registration I

Image Registration

- In image registration we mold an image to fit a given reference.
- In this example we mold a picture of a notebook to match the QR code reference.

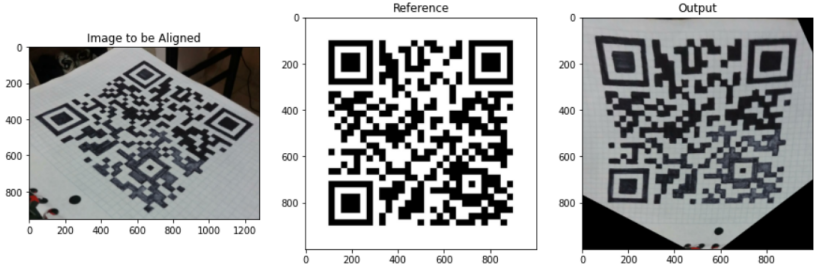
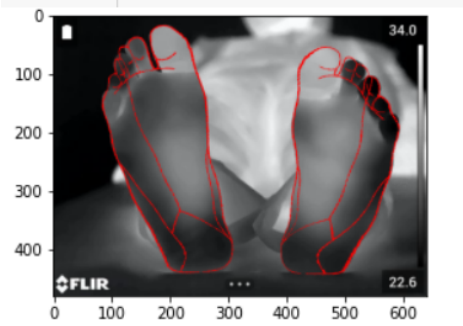


Image Registration II

Image Registration

- This is useful since we can use references to identify regions of interest without the need of a more complex algorithm.



References I

Intel (2022).
Computer Vision in Healthcare.

Tesla (2016).
Autopilot full self-driving hardware (neighborhood long).