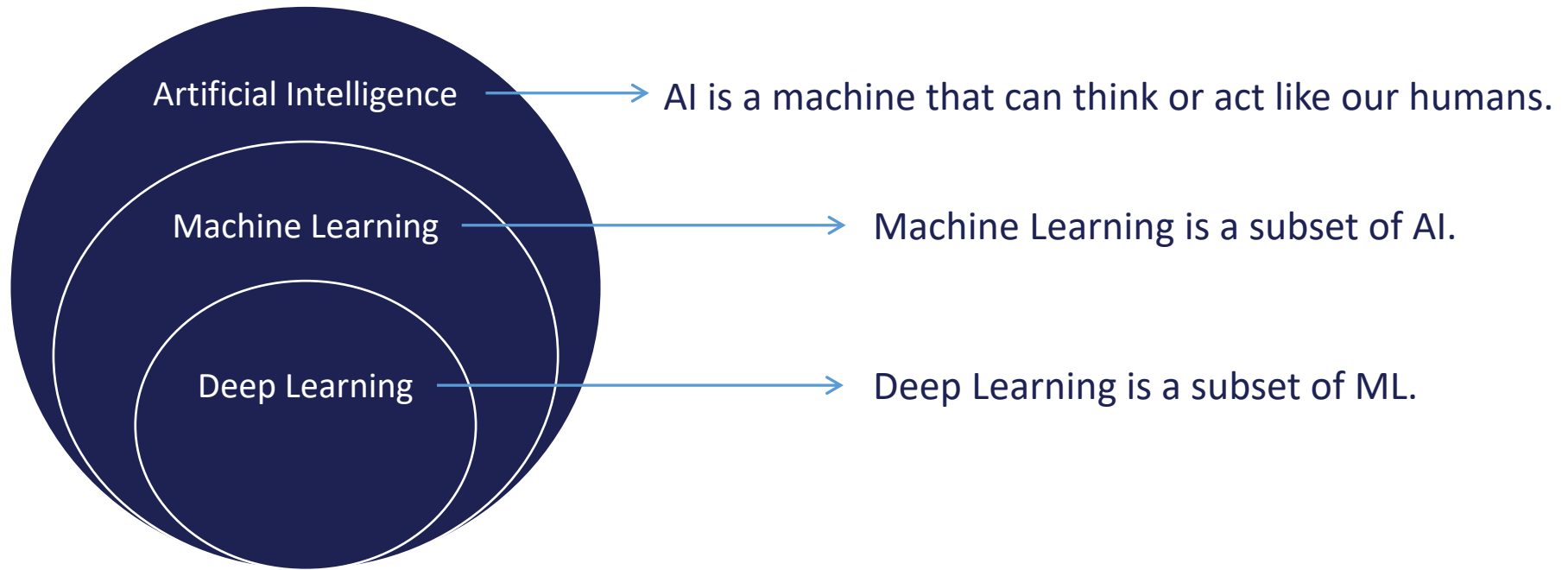


# Deep Learning

## Introduction

Hans  
30/09/2021

# Artificial Intelligence



# What is AI?

The theory and development of computer systems that are able to perform task normanlly requiring human intelligence such as visual perception, speech recognition, decision-making and translation between languages.

AI includes following areas of specialisation

- Gaming • Robotics • Automobiles
- Marketing • Social Media

.....



# Typical AI Cases



Imagine 1990  
<<Edward Scissorhands>>

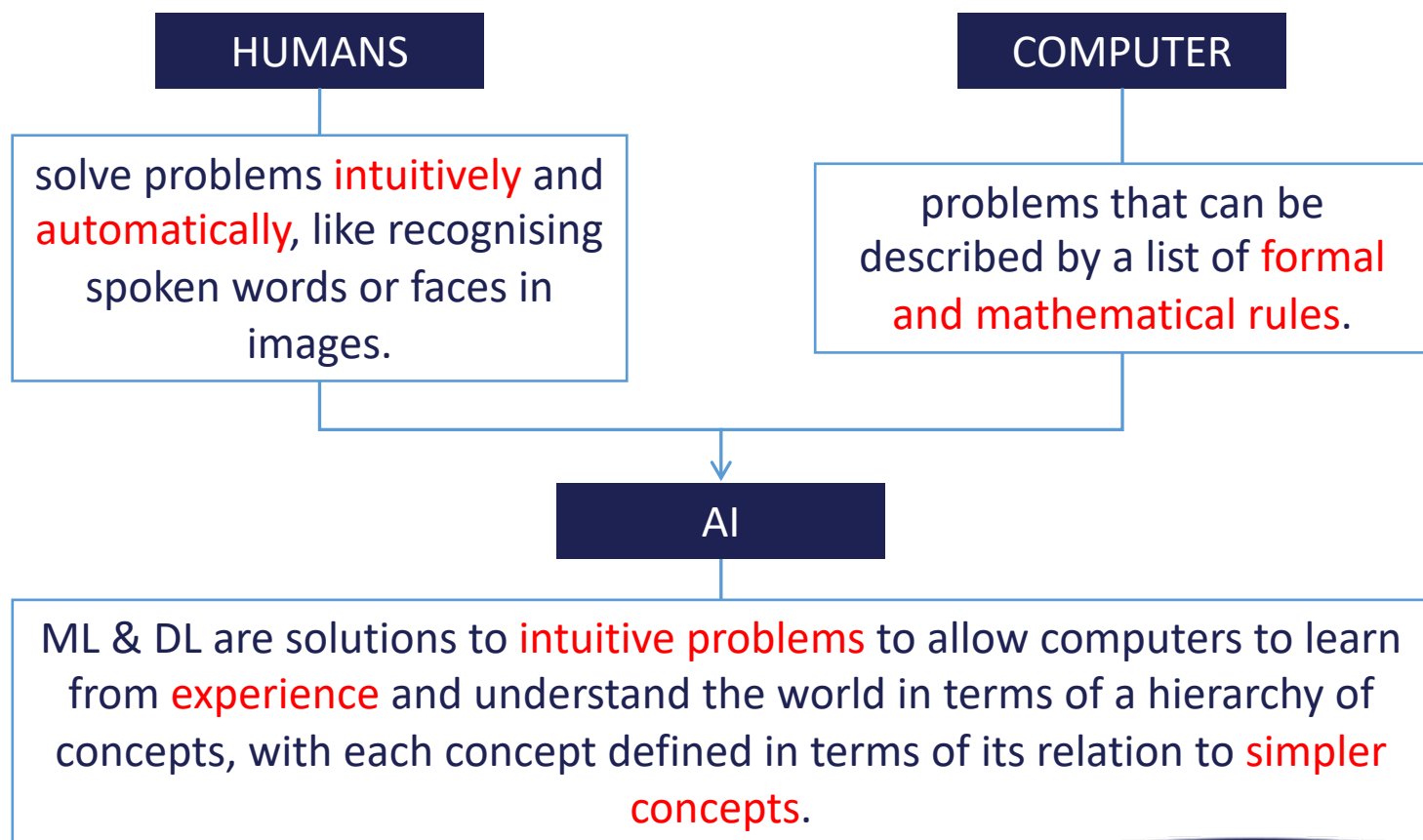


Early 1997  
IBM's Deep Blue

- Siri 2011
- Atlas 2013
- AlphaGo 2014
- GPT-3 2020

Now 2011~  
Massive Products

# How to deal with problems?



# How to realise AI?

1. Knowledge based methods: Hard-code knowledge about the world in formal languages and a computer can reason about statements in these formal languages automatically using logical inference rules.



It failed to understand a story about a person named Fred shaving in the morning.



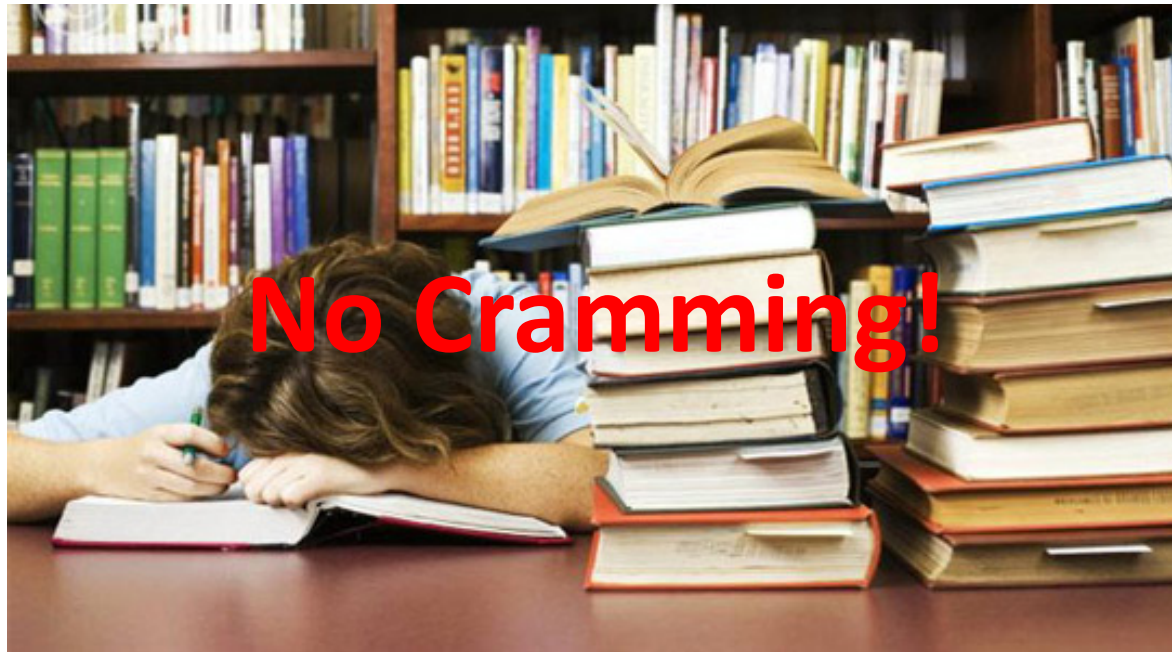
This is a person!



Is this a person?



# How to realise AI?



Is there an AI system that has the ability to acquire its own knowledge?



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# How to realise AI?

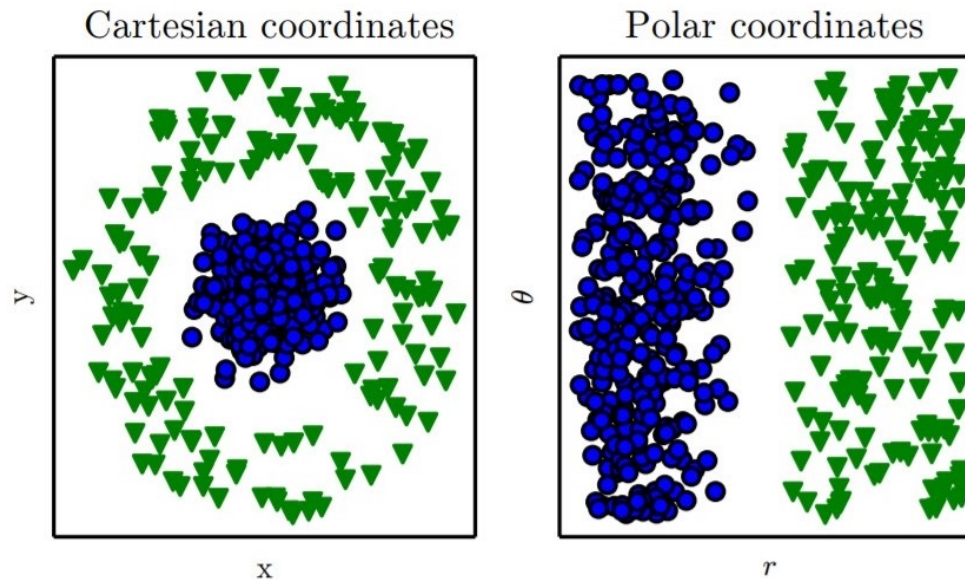
2. Machine Learning: **how the features in the representations relate to the results.**
- a. Logistic Regression: can determine whether to recommend cesarean delivery.
  - b. Naive Bayes: can separate legitimate e-mail from spam e-mail.
  - c. SVM
  - d. Decision Tree
  - e. Random Forest

.....

**REPRESENTATION**



# Representation

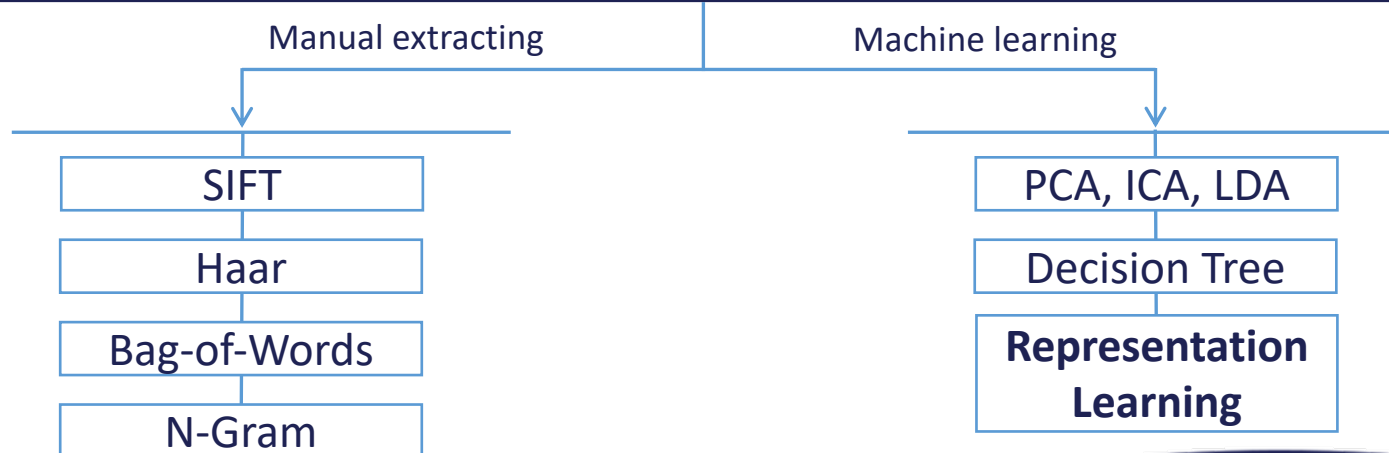


Suppose we want to separate two categories of data by drawing a line between them in a scatterplot. In the plot on the left, we represent some data using Cartesian coordinates, and the task is impossible. On the right, we represent the data with polar coordinates and the task becomes simple to solve with a vertical line.

# Representation

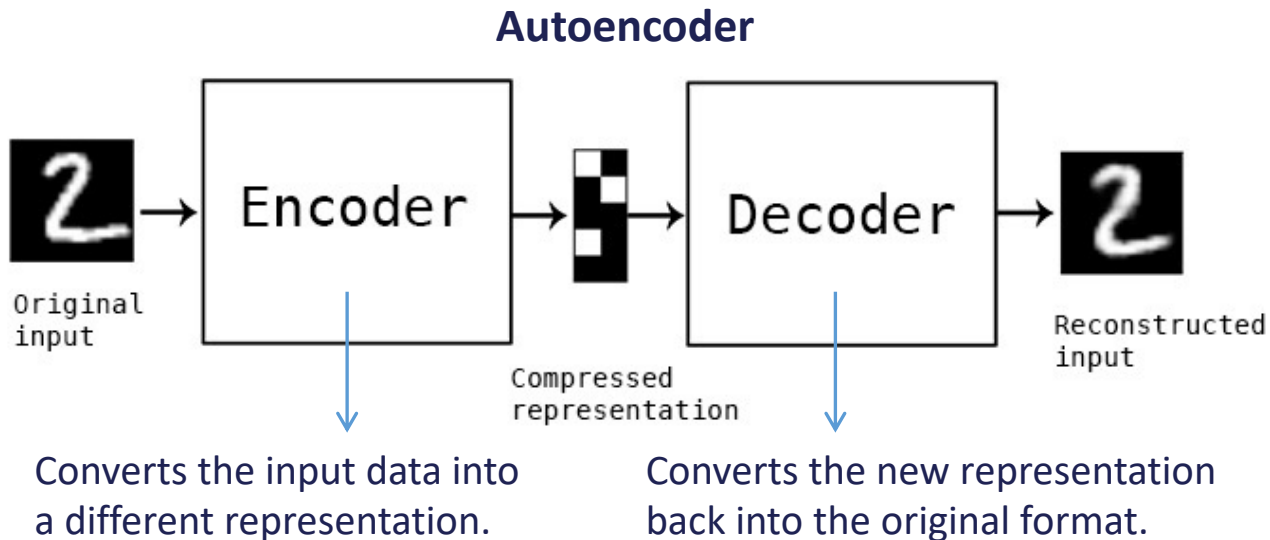
Many artificial intelligence tasks can be solved by designing the right set of **features** to extract for that task, then providing these features to a simple machine learning algorithm.

Each piece of information included in the representation is known as a feature.



# Representation Learning

Learned representations often result in much better performance than hand-designed representations, which allow AI systems to rapidly adapt to new tasks with minimal human intervention.



# Factors of Variation



Label: Car

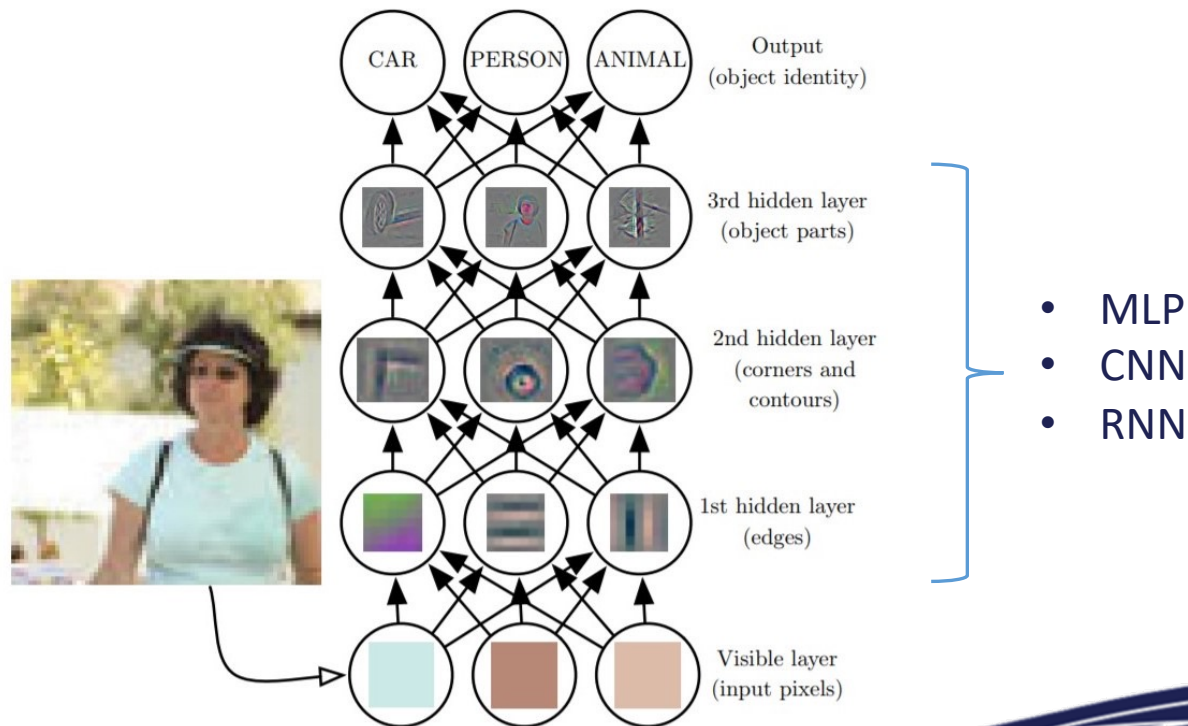


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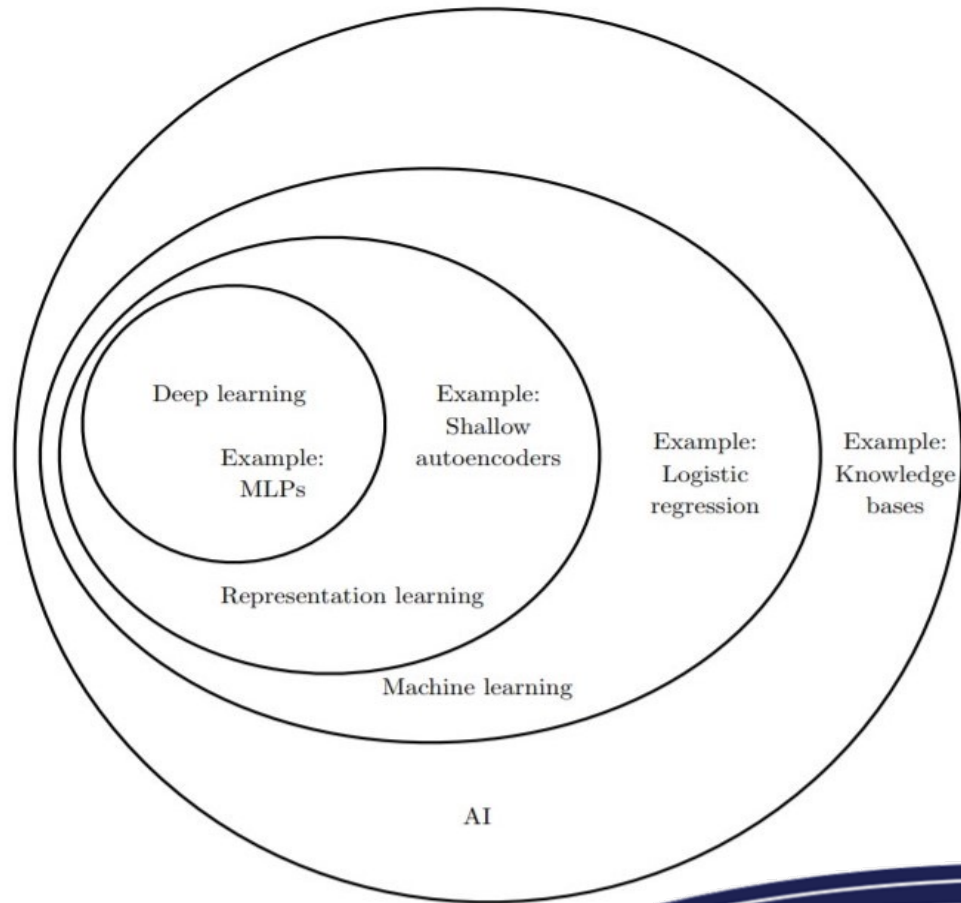
# Deep Learning

In Representation Learning, how to identify the key factor of variation is difficult. While this issue can be addressed by Deep Learning, which allows the computer to build complex concepts out of simpler concepts.





# Deep Learning



# Thank You



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