Applied Deep Learning

Introduction to Deep Learning
03.10.2019

Alexander Pacha

Is this spam?

Congratulations! You have won €650.000,00 in the monthly Euro Millions / Google Promo lottery on April 26th 2019.

Please consult timothey.berrel@my-email.com for claiming your winnings with the following information:

1. Full Name
2. Address
3. Birth Date
4. Credit Card Number

Robert Avthantilayn
Online Coordinator

Is this spam?

Greetings,

I am Mrs.Margaret Ko May-Yee Leung Deputy Chairman, Managing Director and Executive Director of Chong Hing Bank Limited. I write briefly to seek your collaboration in a multi-million transaction with good return for us on participation. Reply for details.

Regards,

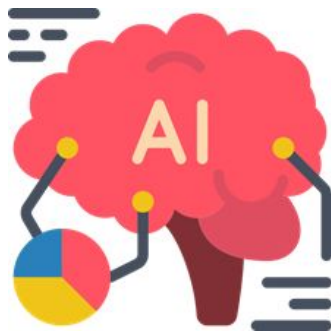Margaret Ko Leung

What do you see?

Source: https://bristolcountyvet.com/wp-content/uploads/2018/11/pexels-photo-min.jpg

What do you see?
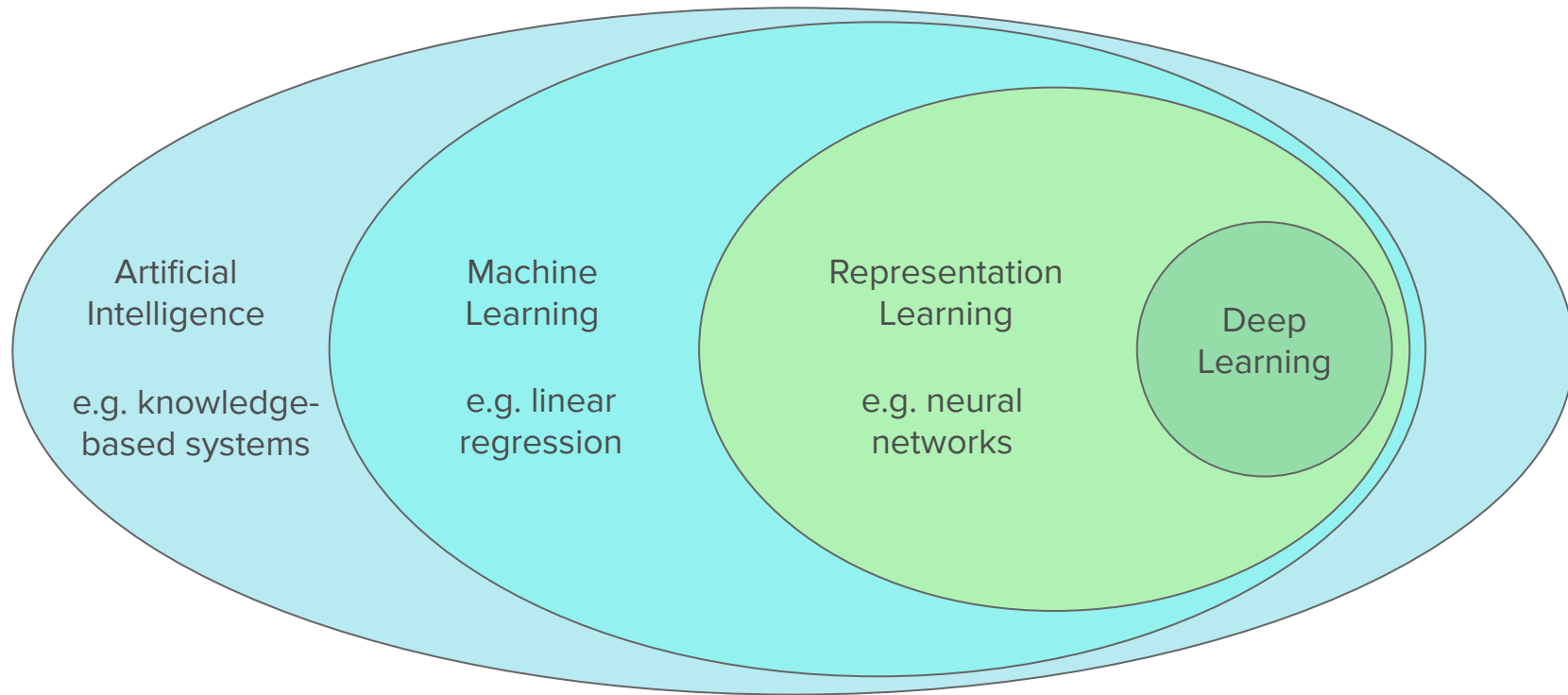
Machine Learning as Alternative

- Classical Programming quickly reaches its limits in certain situations
- Machine Learning can be a viable alternative to imperative programming
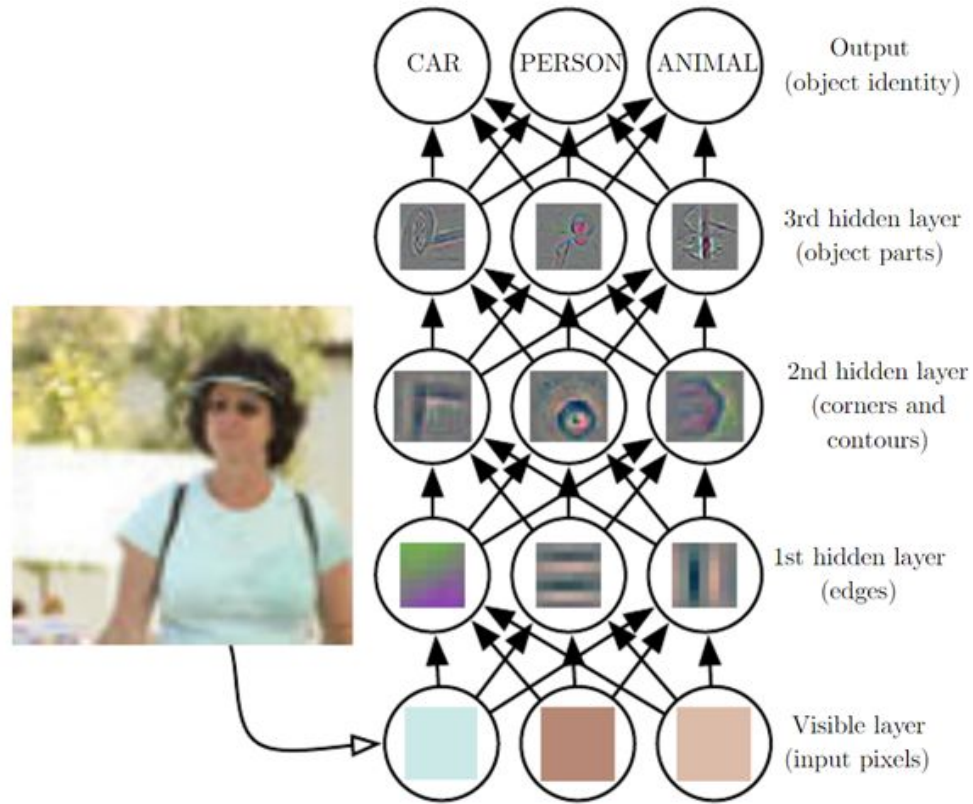

Training

Machine Learning = Use data to answer questions
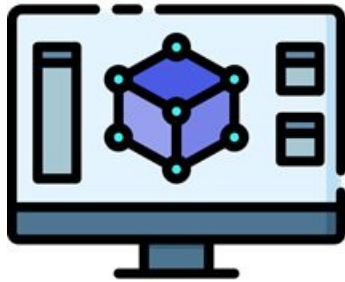
Inference

Terminology

Artificial Intelligence

e.g. knowledge-based systems

Machine Learning

e.g. linear regression

Representation Learning

e.g. neural networks

Deep Learning

Meaningful Representation

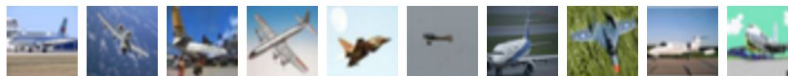Source: http://www.deeplearningbook.org/

How Can a Machine Learn?

Model

Loss

Optimization function

Image Classification

airplane

automobile

bird

cat
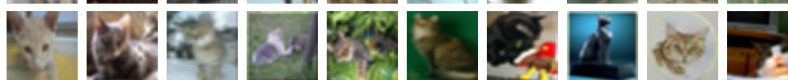
deer

dog

frog
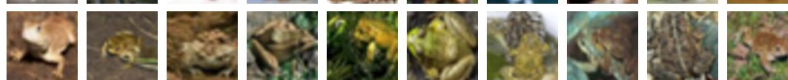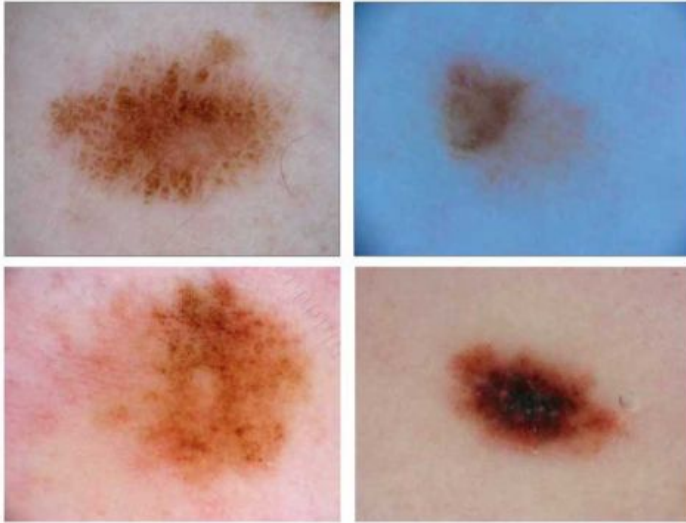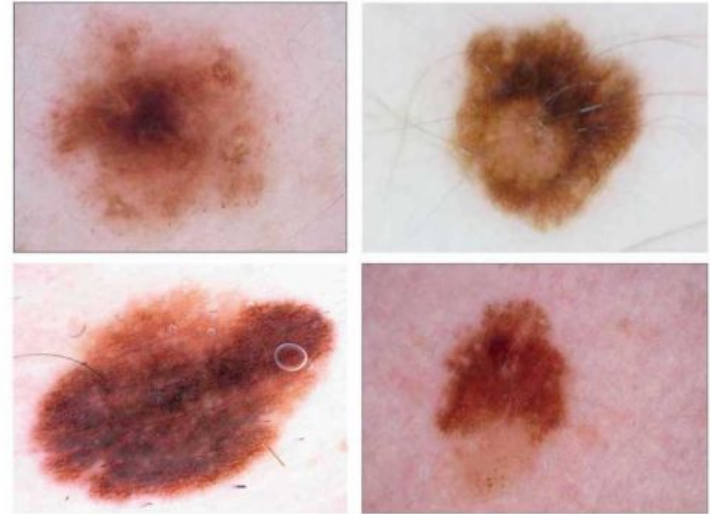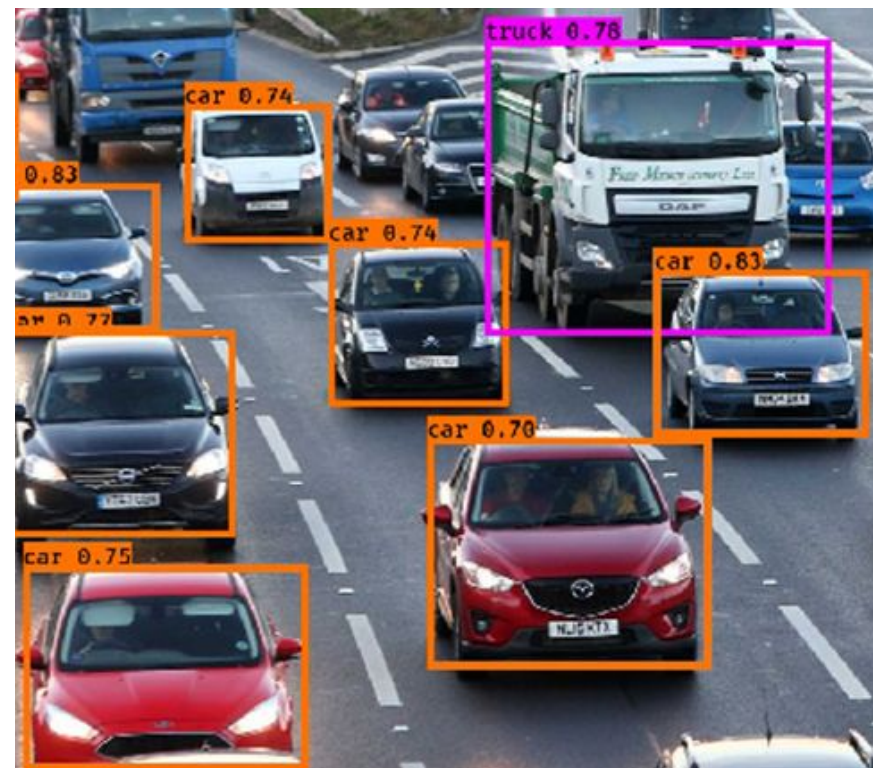
horse

ship

truck

Image Classification

Melanoma

Benign

Source: Lopez et al. Skin lesion classification from dermoscopic images using deep learning techniques. 2017
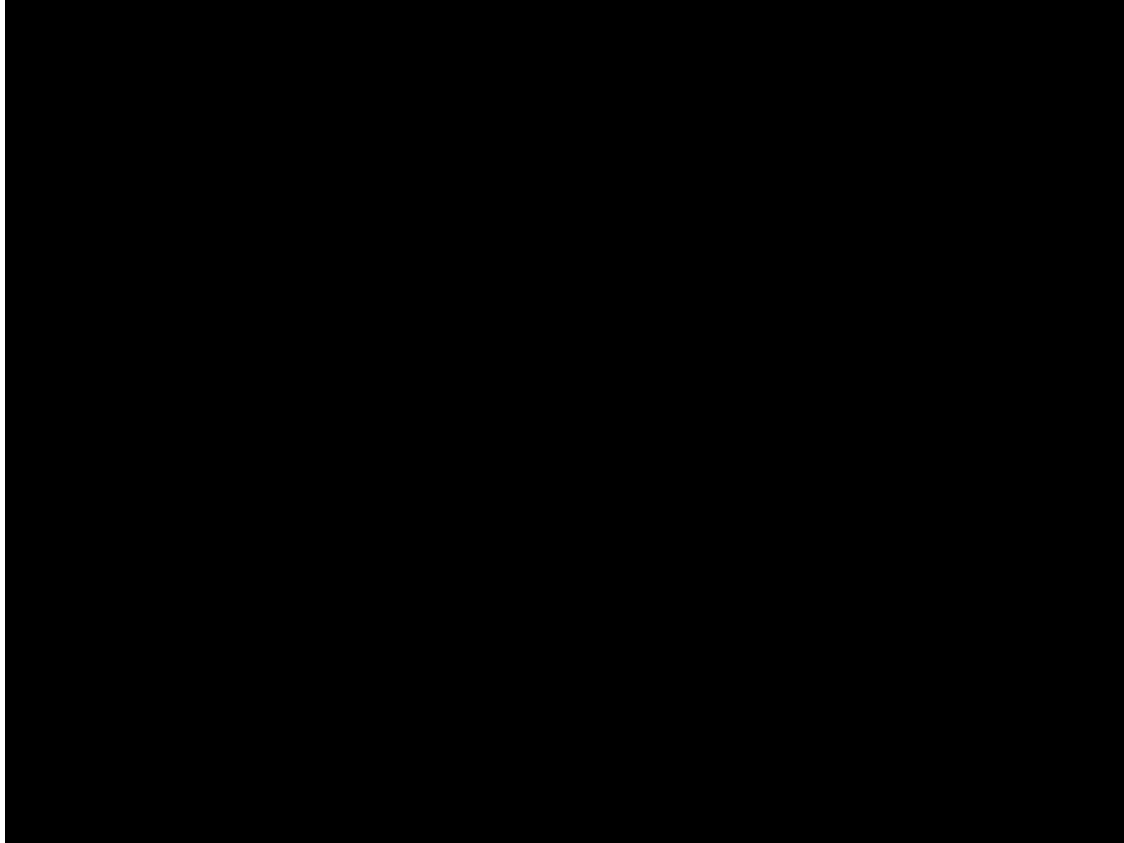
Object Detection

Voice Recognition and Natural Conversation

Google Duplex calls a hairdresser

Source:

Robo Calls

Source: https://www.youtube.com/watch?v=FO0iG_P0P6M

Music Harmonization
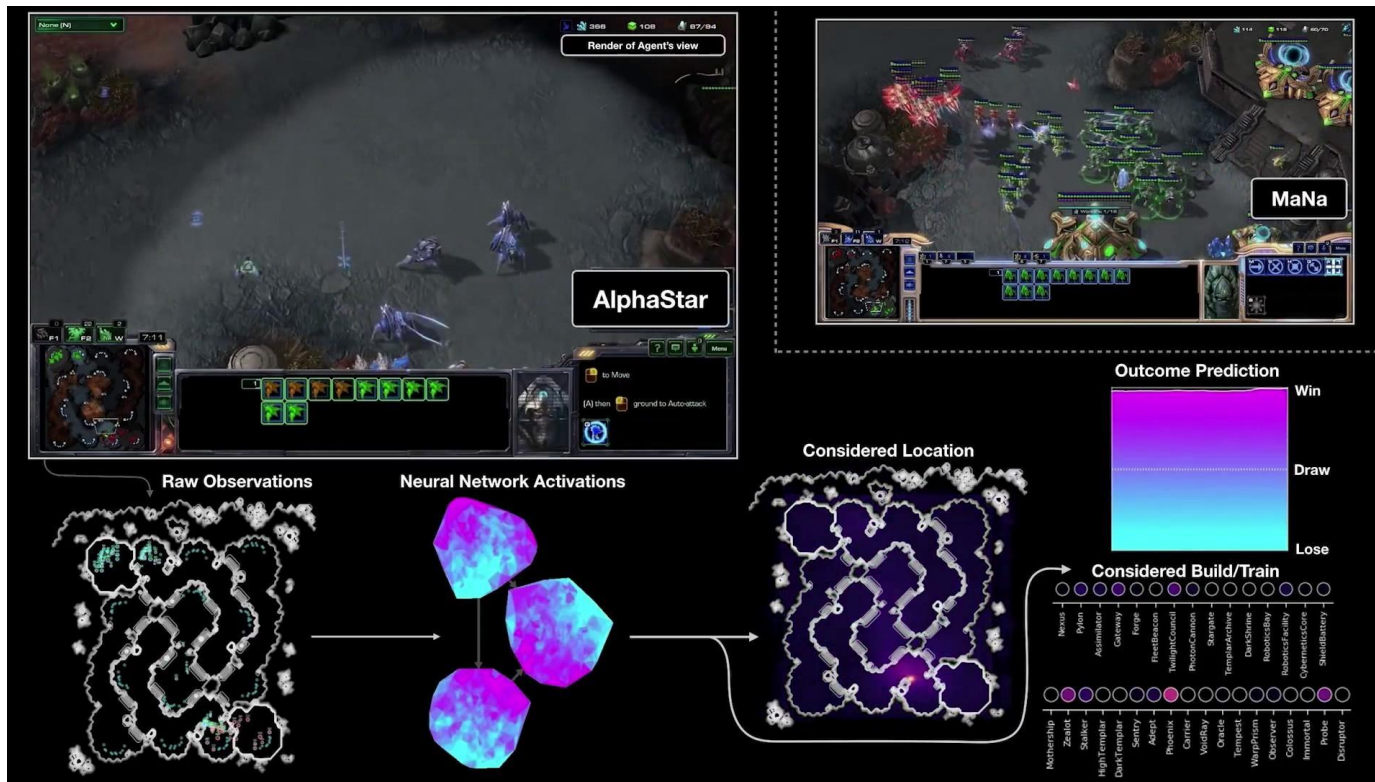
DeepBach

Source: https://www.youtube.com/watch?v=QiBM7-5hA6o

Deep Mind Plays Star Craft II

Summary

Machine Learning can be an alternative to imperative programming

Machine Learning = Using data to answer questions

Deep Learning can do pretty cool stuff