

The background of the slide features a large, faint watermark of the University of Padua seal. The seal is circular, with the Latin text "UNIVERSITAS STUDII PADUENSIS" around the perimeter and "MCCXXII" at the bottom. In the center is a shield depicting two figures, one seated and one standing, under a gothic arch.

# Deep Learning

*LM Computer Science, Data Science, Cybersecurity*  
*2<sup>nd</sup> semester - 6 CFU*

*Nicolò Navarin* & *Alessandro Sperduti*

The background of the slide features a large, faint, circular watermark of the University of Cambridge seal. The seal contains the Latin motto 'VERITAS LIBERABIT VOS' around the perimeter and 'MCCXXII' at the bottom. In the center is a shield with two figures: a woman on the left holding a wheel and a man on the right holding a cross and a book.

# **(Very Shallow) Introduction to Machine Learning**

# AI, ML, NN



## Artificial Intelligence

The science to make things smart

## Machine Learning

Building machines that can learn

## Neural Network

A type of algorithms in machine learning

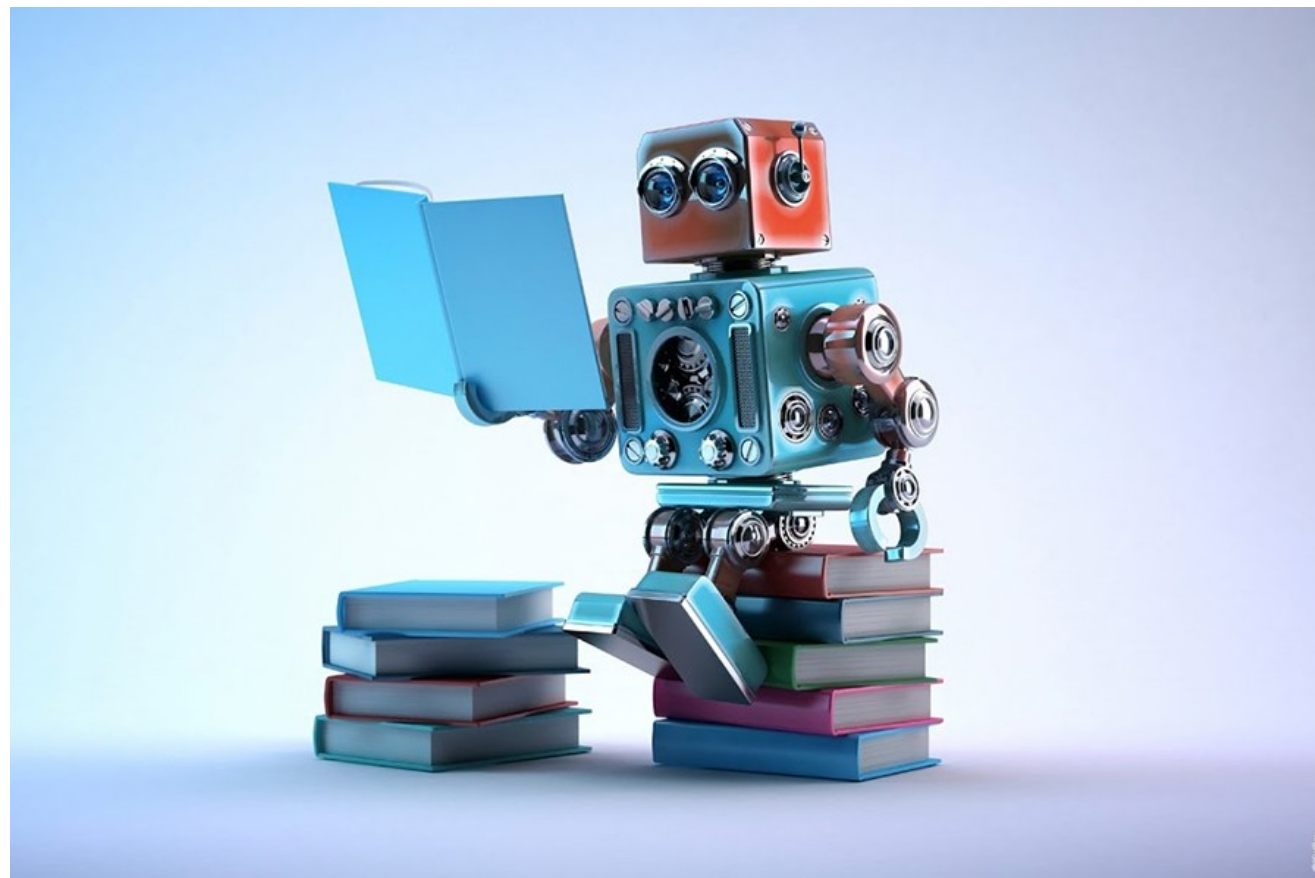
## Deep Learning

Multi-layer neural networks

# Machine Learning

“A computer program is said to learn from **experience**  $E$  with respect to some class of **tasks**  $T$  and **performance measure**  $P$  if its performance at tasks in  $T$ , as measured by  $P$ , improves with experience  $E$ .”

Tom Mitchell, 1997





# Some examples

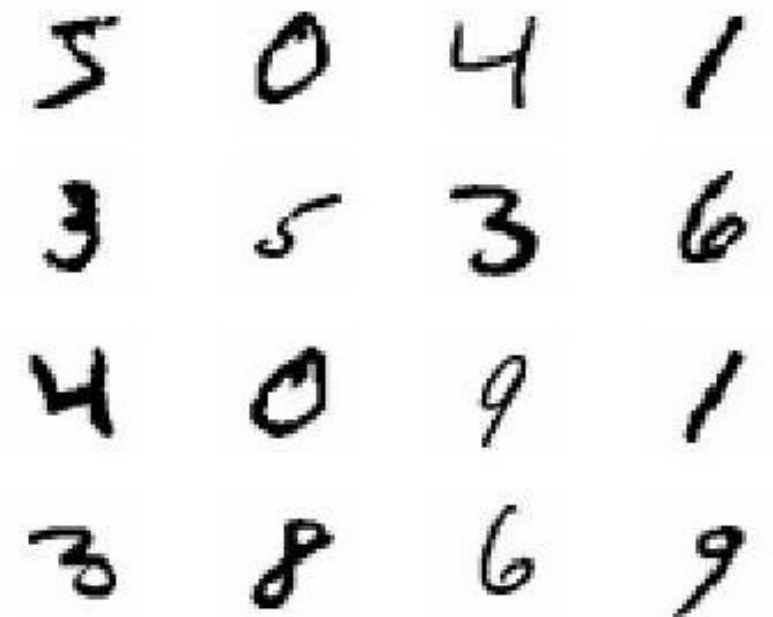
A **checkers** learning problem:

- Task **T**: playing checkers
- Performance measure **P**: percent of games won against opponents
- Training experience **E**: playing practice games against itself



A **handwriting recognition** learning problem:

- Task **T**: recognizing and classifying handwritten words within images
- Performance measure **P**: percent of words correctly classified
- Training experience **E**: a database of handwritten words with given classifications



# COVID-19

New [#DeepLearning](#) model detects [#coronavirus](#) pneumonia from [#CT](#) scans with comparable performance to expert radiologists [#COVID19](#) This [#AI](#) could help improve evaluation efficiency & diagnosis. Preprint: [Inkd.in/gNyYURD](https://www.linkedin.com/company/techforgood/) [#TechForGood](#) [#artificialintelligence](#) [#healthcare](#)



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## Deep learning-based model for detecting 2019 novel coronavirus pneumonia on high-resolution computed tomography: a prospective study

Jun Chen, Lianlian Wu, Jun Zhang, Liang Zhang, Dexin Gong, Yilin Zhao, Shan Hu, Yonggui Wang, Xiao Hu, Biqing Zheng, Kuo Zhang, Huiling Wu, Zehua Dong, Youming Xu, Yijie Zhu, Xi Chen, Lilei Yu, Honggang Yu

doi: <https://doi.org/10.1101/2020.02.25.20021568>

**This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.**

Abstract

Info/History

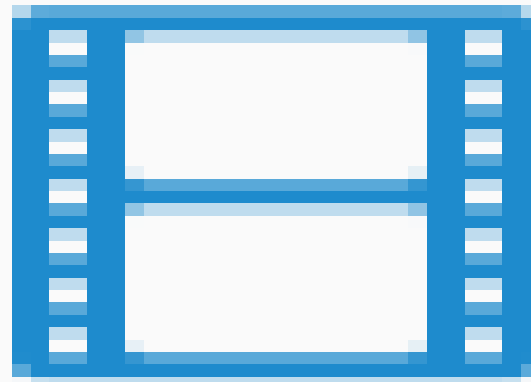
Metrics

Preview PDF

### Abstract

Background: Computed tomography (CT) is the preferred imaging method for diagnosing 2019 novel coronavirus (COVID19) pneumonia. Our research aimed to construct a system based on deep learning for detecting COVID-19 pneumonia on high resolution CT, relieve working pressure of radiologists and contribute to the control of the epidemic. Methods: For model development and validation,

# ML example: tic-tac-toe



# Video generation





# Neuralink-like mind reading

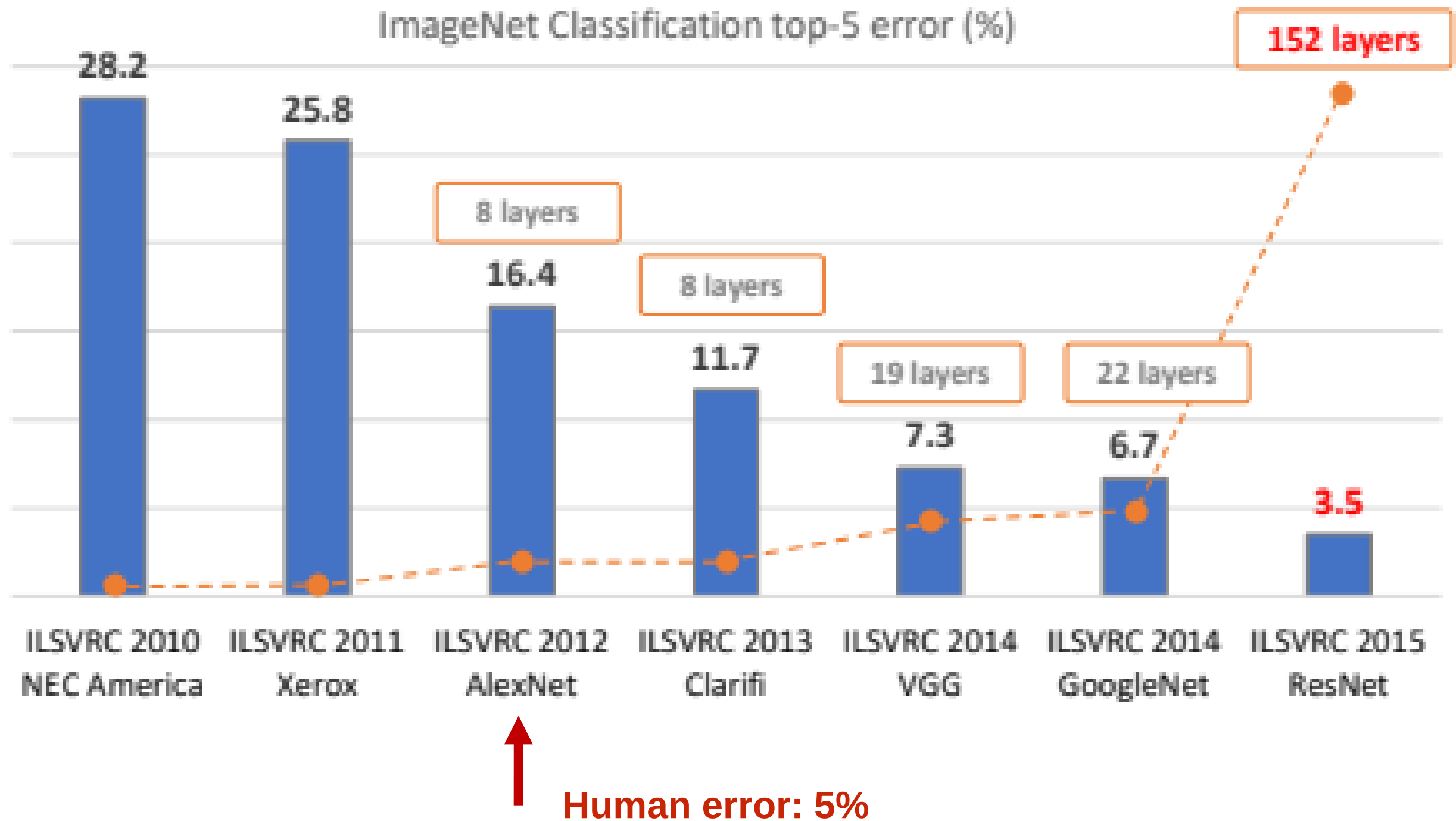


# Self-driving car

# Object detection



# Why Deep Learning ?





# Linear Algebra basics

- Notebook