



UNIVERSITAT DE  
BARCELONA

## Implicaciones de la IA sobre Economía Aplicada y Empresa

III JORNADA DELS INSTITUTS DE RECERCA  
PROPIS DE LA UB

INTEL·LIGÈNCIA ARTIFICIAL (IA):  
RECERCA I SOCIETAT



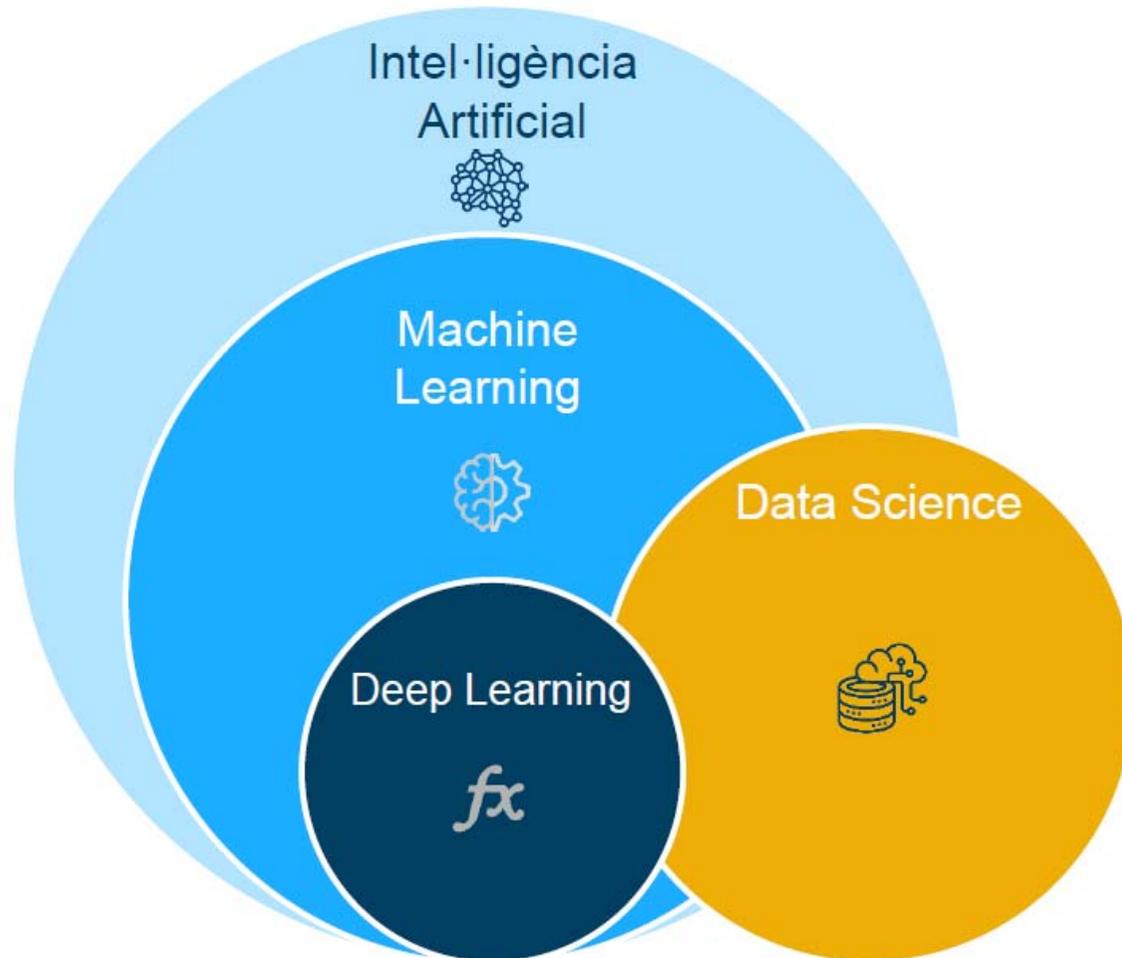
Aula Magna de la Universitat de Barcelona,  
c/Gran Via de les Corts Catalanes, 585, Edifici Històric, Universitat de Barcelona (Matí)  
Auditori del CCCB, Montalegre 5, 08001 Barcelona (Tarda)

13 de febrer de 2024

Organitza  
Instituts de Recerca de la Universitat de Barcelona

*Dr. Salvador Torra Porrás*

*Universidad de Barcelona. Facultad de Economía y Empresa  
Departamento de Econometría, Estadística y Economía Española  
[storra@ub.edu](mailto:storra@ub.edu)*



La intel·ligència artificial a Catalunya  
Juliol 2019

**Inteligencia Artificial** son en esencia sistemas de computación.

**Machine learning**, son métodos de aprendizaje automático que permiten la construcción de modelos a partir de datos.

**Deep learning**, es un caso particular de machine learning en donde la estructura de sus modelos poseen mayor complejidad.

Finalmente todo lo anterior es posible por la presencia una **cantidad inmensa de datos**.



Rethinking the impact of open data

A first step towards a European impact assessment for open data



The official portal for European data

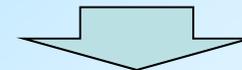
BIG DATA

ANÁLISIS ECONÓMICO Y BIG DATA

Daniel Peña
Pilar Poncela
Esther Ruiz
(editores)

Impacto económico de los datos abiertos, es evidente tanto para las empresas y organizaciones (iniciando nuevos modelos de negocio) como para la sociedad en general a largo plazo.

La presencia de datos masivos o Big Data ha permitido avanzar considerablemente en la ciencia de los datos (Data Science) conjuntamente con las técnicas de Machine learning.



Finalmente todo el ecosistema anterior permite desarrollar aplicaciones en economía en tiempo real.

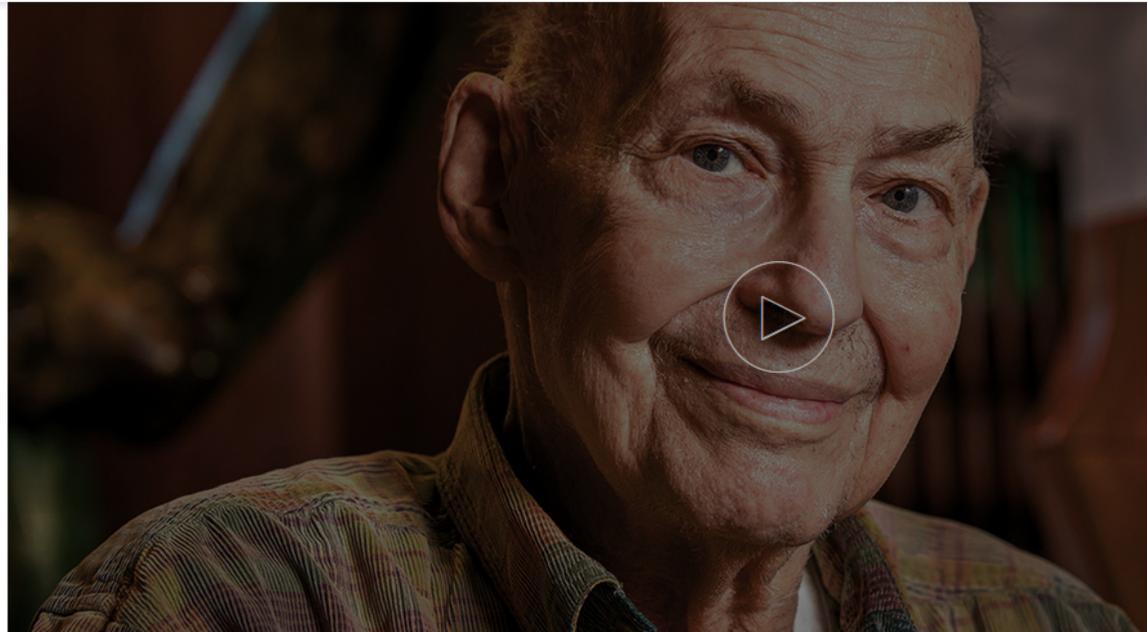
Evolución de la Predicción del PIB en tiempo real

Periodo: 2023-TIV

En términos de volumen CVEC

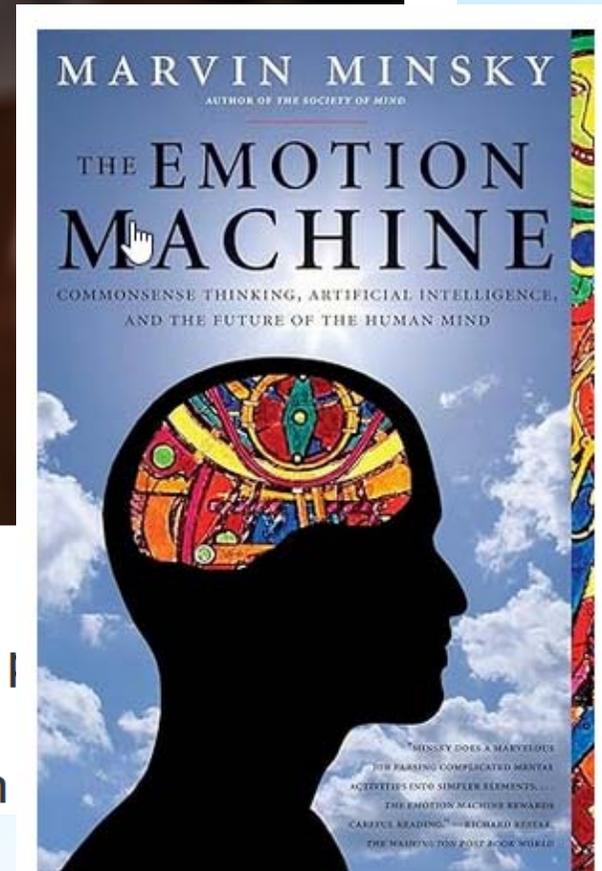
11 de enero de 2024





NOTICIA PREMIOS FRONTERAS DEL CONOCIMIENTO

# Marvin Minsky, padre de la Inteligencia Artificial, y Fundación BBVA Fronteras del Conocimiento en Tecnologías de la Información y la Comunicación





# UNIVERSITAT DE BARCELONA

Font: EIC (DGI-ACCIÓ).



**Centres tecnològics i de recerca**

**Universitats i centres formatius**

**Smart**

**1. Desenvolupadora d'algoritmes**

**2. Consultoria**

**3. Desenvolupadora de software o dispositius**

**4. Proveïdor de serveis**

**Start-ups**

**Fires i congressos**

**Associacions, fundacions i clústers**

**Institucions i Adm. púb.**

## INTERNATIONAL MONETARY FUND

# Gen-AI: Artificial Intelligence and the Future of Work

Prepared by Mauro Cazzaniga, Florence Jaumotte, Longji Li, Giovanni Melina, Augustus J. Pantou, Carlo Pizzinelli, Emma Rockall, and Marina M. Tavares

SDN/2024/001

IMF Staff Discussion Notes (SDNs) showcase policy-related analysis and research being developed by IMF staff members and are published to elicit comments and to encourage debate. The views expressed in Staff Discussion Notes are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

2024 JAN

## Article

19-12-2023 - 11:45  
20230601ST093804



### EU AI Act: first regulation on artificial intelligence

The use of artificial intelligence in the EU will be regulated by the AI Act, the world's first comprehensive AI law. Find out how it will protect you.



ARTIFICIAL NEURAL NETWORKS: AN ECONOMETRIC PERSPECTIVE \*

Econometric Reviews, Volume 13, Issue 1, 1994



Actualmente existe una clara aproximación entre los modelos de Machine learning (en especial los **modelos neuronales**) y la econometría. De forma que los primeros pueden considerarse **aproximadores universales** que poco a poco van rompiendo el problema de su interpretación.

Halbert Lynn White Jr.

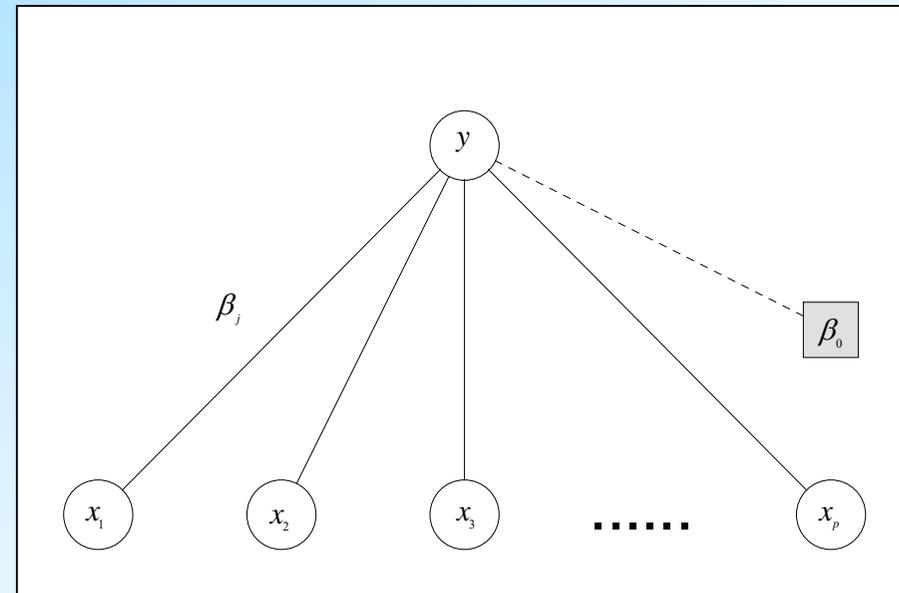


$$y = \beta_0 + \sum_{i=1}^p \beta_i x_i + \varepsilon$$

$$X = (x_1, x_2, \dots, x_p)'$$

$$\{\beta_j, j = 1, \dots, p\}$$

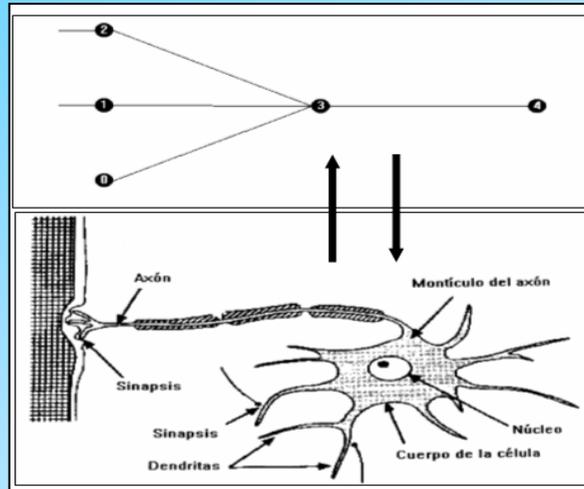
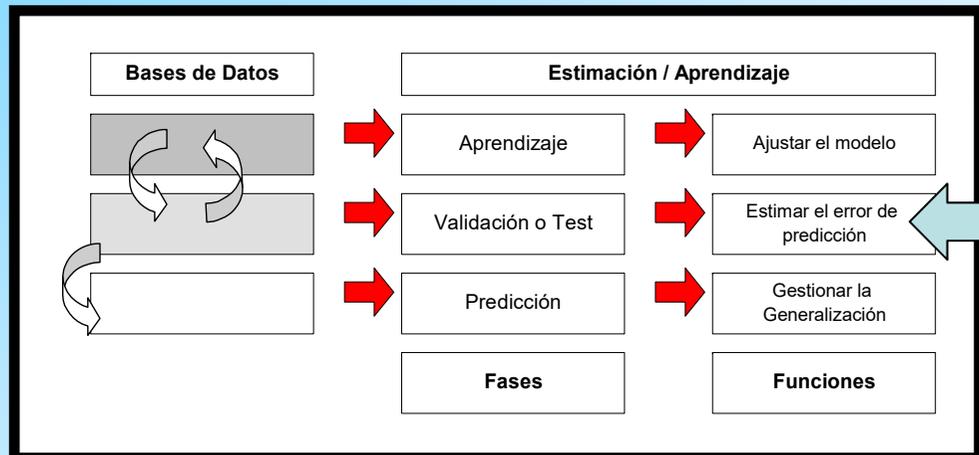
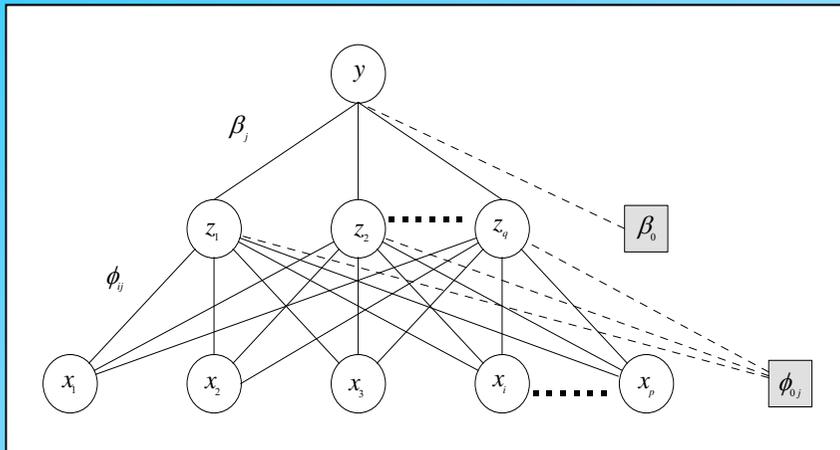
Chung-Ming Kuan





ARTIFICIAL NEURAL NETWORKS: AN ECONOMETRIC PERSPECTIVE \*

Econometric Reviews, Volume 13, Issue 1, 1994



SIMILITUDES

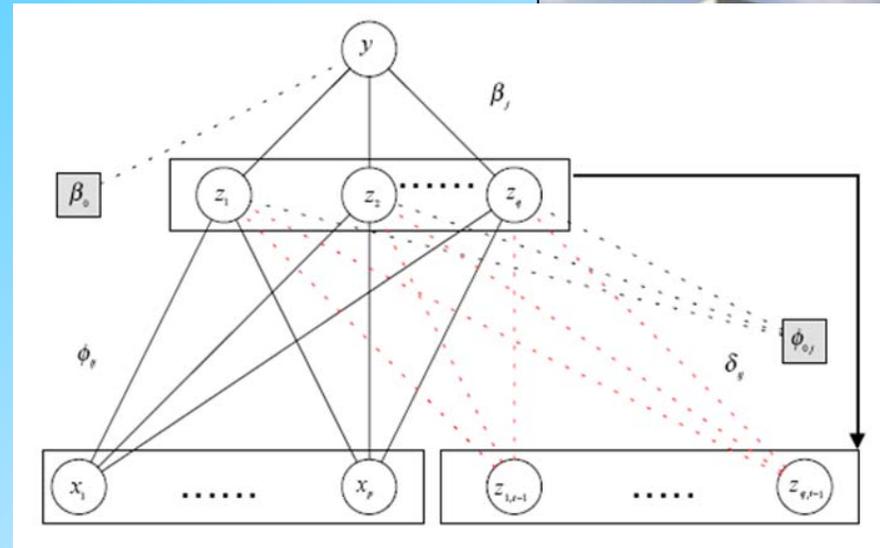
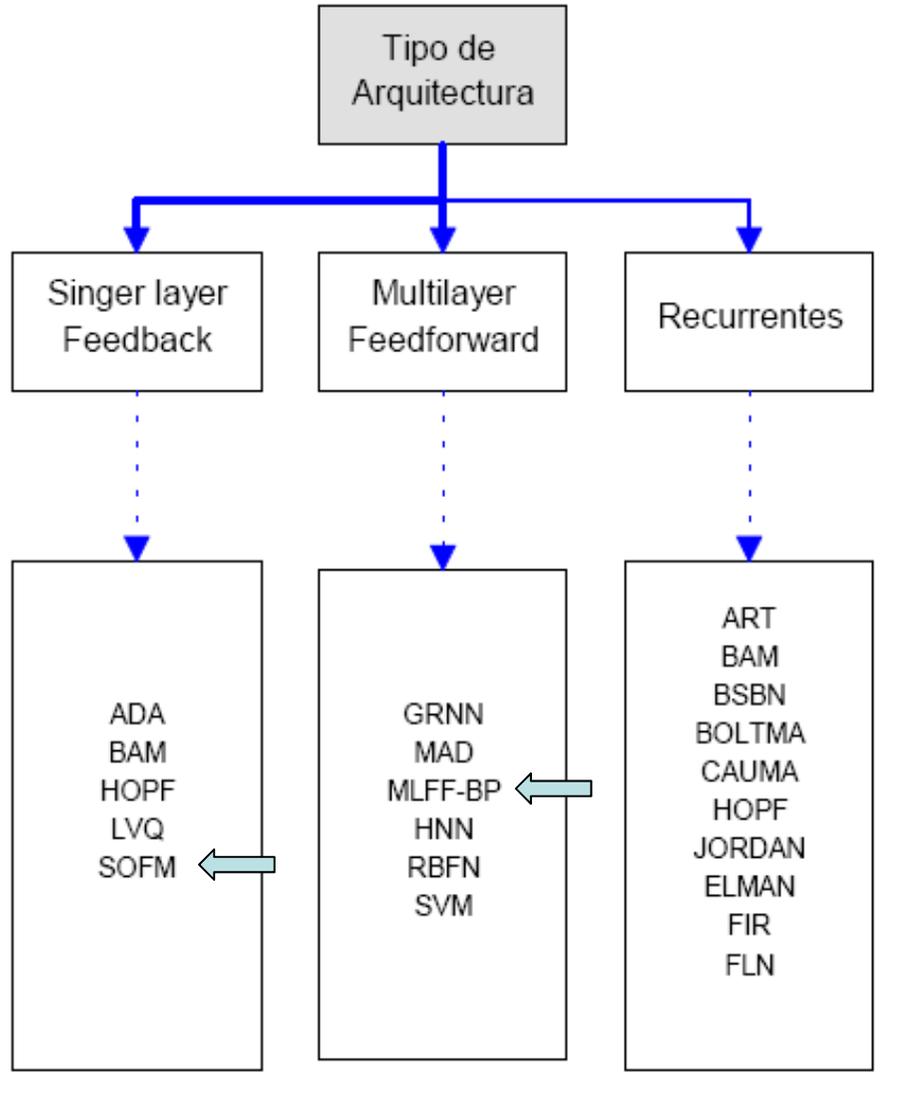
Impulsos	↓	Inputs
Dendritas	↓	Pesos
Sinapsis	↓	Sumatorio
Activación	↓	Activación
Respuesta	↓	Transferencia
Axon	↓	Output

$$y = \beta_0 + \sum_{j=1}^q \beta_j g \left( \sum_{i=1}^p \phi_{ij} x_i + \phi_{0j} \right) + \varepsilon$$

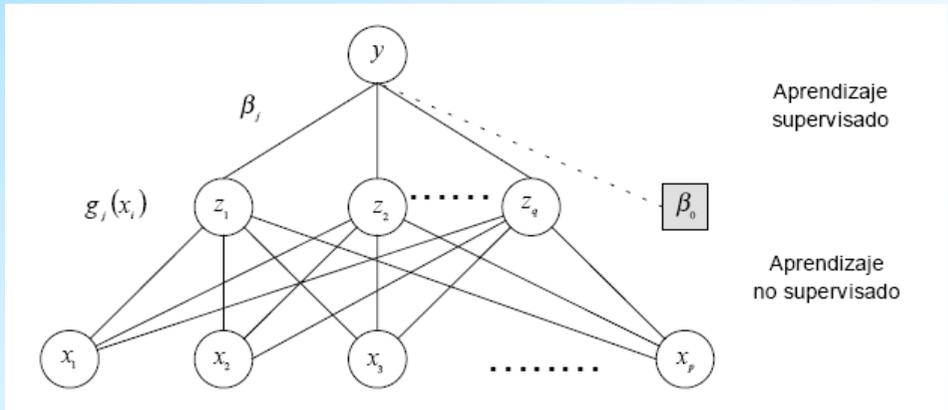
$$X = (x_1, x_2, \dots, x_p)$$

$$\left\{ \phi_{ij}, i = 1, \dots, p, j = 1, \dots, q \right\}$$

$$\left\{ \beta_j, j = 1, \dots, q \right\}$$



Elman Model



RBF Model

Learning: supervised and unsupervised



## Deep Feed-forward Neural Network (DFNN)

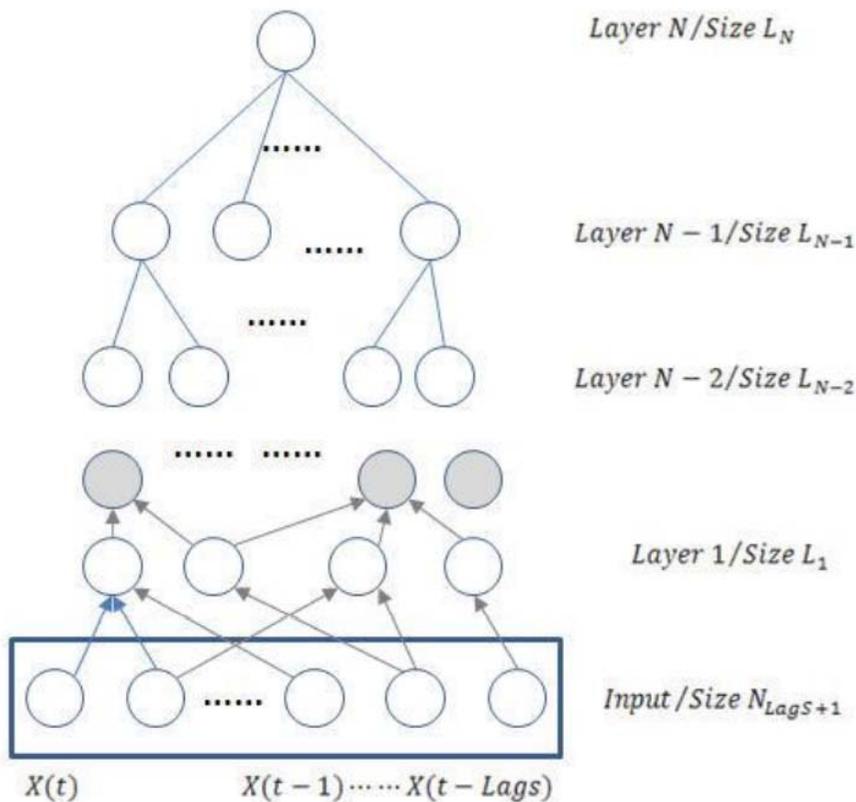


Figure 2. Diagram of a Deep Feedforward Network

La estimación de los parámetros se realiza mediante el algoritmo Adam (Adaptive Moment Estimation), que es una variante de la **backpropagation**.

*Journal of Economic Literature* 2019, 57(3), 535–574  
<https://doi.org/10.1257/jel.20181020>

### Text as Data†

MATTHEW GENTZKOW, BRYAN KELLY, AND MATT TADDY<sup>✉</sup>

An ever-increasing amount of economic research is recorded as digital data, and this data, in turn, offers a variety of applications.

**Vladimir N. Vapnik**

**The Nature of Statistical Learning Theory**

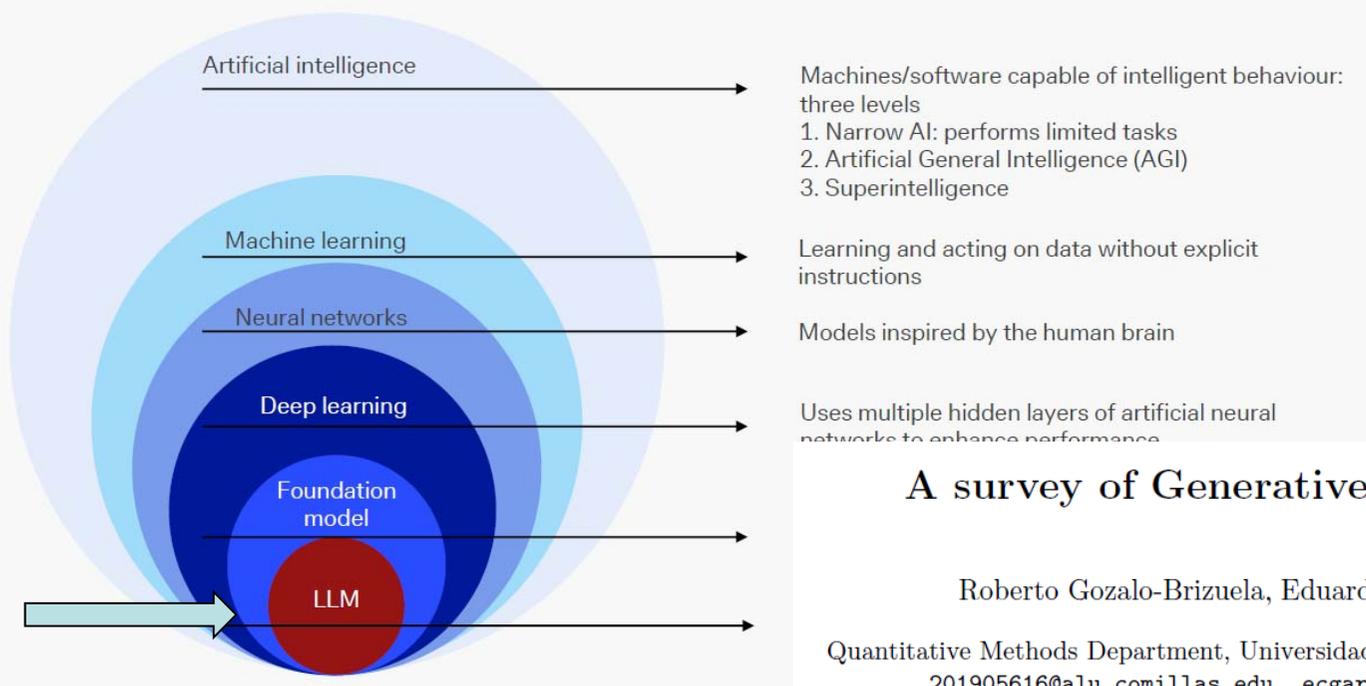
Second Edition

... and culture is text as an input to ... from other forms ... and survey a variety

teoría estadística del aprendizaje



**Natural Language Processing (NLP):** Técnicas que permiten para manipular el lenguaje humano que proviene de la lingüística computacional. En cambio los LLM (**Large Language Models**) son modelos neuronales cuya estructura profunda les permite comprender texto. Finalmente tenemos **Generative artificial intelligence (GenAI)** que permite la generación de contenidos nuevos y/o originales (generando problemas éticos pero también muchas posibilidades).



Source: Deutsche Bank.

**A survey of Generative AI Applications**

Roberto Gozalo-Brizuela, Eduardo C. Garrido-Merchán

Quantitative Methods Department, Universidad Pontificia Comillas, Madrid, Spain  
201905616@alu.comillas.edu, ecgarrido@icade.comillas.edu



GPT-4 Technical Report

OpenAI\*

Abstract

We report the development of GPT-4, a large-scale, multimodal model which can accept image and text inputs and produce text outputs. While less capable than humans in many real-world scenarios, GPT-4 exhibits human-level performance on various professional and academic benchmarks, including passing a simulated bar exam with a score around the top 10% of test takers. GPT-4 is a Transformer-based model pre-trained to predict the next token in a document. The post-training alignment process results in improved performance on measures of factuality and adherence to desired behavior. A core component of this project was developing infrastructure and optimization methods that behave predictably across a wide range of scales. This allowed us to accurately predict some aspects of GPT-4's performance based on models trained with no more than 1/1,000th the compute of GPT-4.

GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models

Tyna Eloundou<sup>1</sup>, Sam Manning<sup>1,2</sup>, Pamela Mishkin\*<sup>1</sup>, and Daniel Rock<sup>3</sup>

<sup>1</sup>OpenAI
<sup>2</sup>OpenResearch
<sup>3</sup>University of Pennsylvania

August 22, 2023

Abstract

We investigate the potential implications of large language models (LLMs), such as Generative Pre-trained Transformers (GPTs), on the U.S. labor market, focusing on the increased capabilities arising from LLM-powered software compared to LLMs on their own. Using a new rubric, we assess occupations based on...

Causal Machine Learning: A Survey and Open Problems

Jean Kaddour\*<sup>1</sup>, Aengus Lynch\*<sup>1</sup>, Qi Liu<sup>2</sup>, Matt J. Kusner<sup>1</sup>, Ricardo Silva<sup>1</sup>
\*Equal contribution. <sup>1</sup>University College London. <sup>2</sup>University of Oxford.
{jean.kaddour.20, aengus.lynch.17}@ucl.ac.uk.

22 July 2022.

Table with 3 columns: Group, Occupations with highest exposure, % Exposure. Rows include Human alpha, Human beta, and Human zeta.

Causal Machine Learning (CausalML)



UNIVERSITAT DE BARCELONA



Claim prediction in the areas of home and car insurance



Valuation of Properties  
Comparison of methodologies



Machine Learning for Improved Forecasting



## SALVADOR TORRA I PORRAS



### Associate professor

Financial Markets  
Statistics for Business and Economics  
Artificial Intelligence

Educational background: PhD Economics

- [List of articles](#)
- [Extended CV](#)

<https://orcid.org/0000-0002-8786-8800>

<https://www2.scopus.com/authid/detail.uri?authorId=9036281900>

[https://scholar.google.es/citations?hl=es&user=\\_wUoS6UAAAAJ&view\\_op=list\\_works&sortby=pubdate](https://scholar.google.es/citations?hl=es&user=_wUoS6UAAAAJ&view_op=list_works&sortby=pubdate)