

Getting started with Machine Learning

Víctor Orozco

8 de noviembre de 2017

Nabenik

Introducción



Víctor Orozco

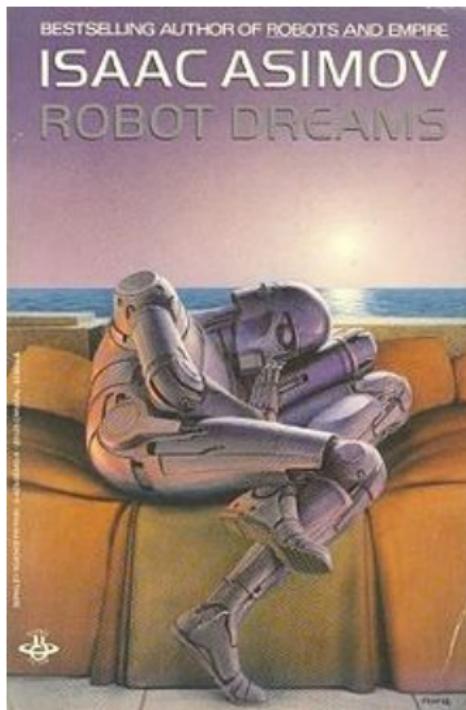
- Developer -JVM, JS-
- Ex becario OAS-GCUB
- Dukes Choice Award 2016
 - GuateJUG-, 2017
 - JEspañol-
- CTO/Founder -Nabenik-
- @tuxtor
- The J*



Inteligencia Artificial

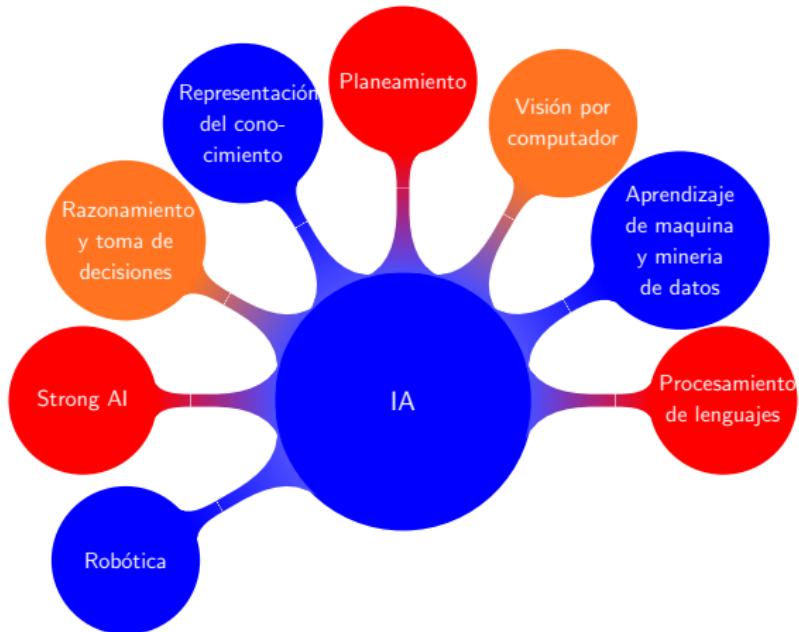


Inteligencia Artificial

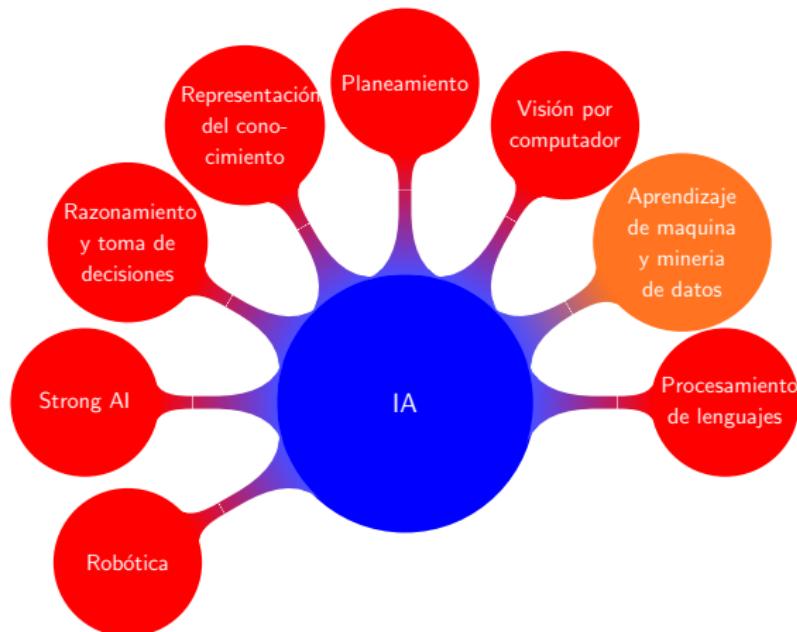


- **Entender y construir** entidades inteligentes.
- Primeros pasos en robótica
- Programas que puedan/sepan reaccionar ante incertezas (CS)

Ramas clásicas



Ramas clásicas



¿Porqué?

Motivación

FORTUNE

NEWS POPULAR VIDEOS FORTUNE 500

Artificial Intelligence OCTOBER 28, 2016

More Chip Sector Consolidation as Macom Buys Applied Micro 8:34 AM EST

What Ashton Kutcher Said in Defense of Airbnb to a Code Pink Protestor 8:30 AM EST

These 'Never Trumpers' Are Now Saying Maybe to White House Jobs 7:35 AM EST

Carrie Underwood: Not Your Typical Athleisure Celeb 7:30 AM EST

Citi and J.P. Morgan Just Topped the Global Regulators List of Important Banks 7:24 AM EST

Facebook Plans to Add 500 New Staff in Britain in 2017 7:09 AM EST

Blackstone Is Reportedly in Talks to Sell \$2.3B in Property to This Chinese Group 6:56 AM EST

India Train Crash Death Toll Hits 142 6:24 AM EST

Machine learning will drop the cost of making predictions, but raise the value of human judgement.

To really understand the impact of artificial intelligence in the modern world, it's best to think beyond the mega-research projects like those that helped Google recognize cats in photos.

According to professor Ajay Agrawal of the University of Toronto, humanity should be pondering how the ability of cutting edge A.I. techniques like **deep learning**—which has boosted the ability for computers to recognize patterns in enormous loads of data—could reshape the global economy.

Making his comments at the Machine Learning and the Market for Intelligence **conference** this week by the Rotman School of Management at the University of Toronto, Agrawal likened the current boom of A.I. to 1995, when the Internet went mainstream. Gaining enough

Photograph by Agilio Mike — Getty Images/Photo Researchers RM

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McDonald's

Motivación

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Artificial intelligence

March of the machines

What history tells us about the future of artificial intelligence—and how society should respond

Jun 25th 2016 | From the print edition

Timekeeper



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Pictorial Press

EXPERTS warn that "the substitution of machinery for human labour" may "render the population redundant". They worry that "the discovery of this mighty power" has come "before we knew how to employ it rightly". Such fears are expressed today by those who

Comment (173)

Timekeeper reading list

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The Economist Events

INNOVATION
SUMMIT 2017

We're all digital now

Motivación

The screenshot shows a dark-themed mobile application interface for a music streaming service. At the top, there is a search bar with a magnifying glass icon and the word "Search". To the right of the search bar is a button labeled "UPGRADE". Below the search bar, a navigation menu is displayed with the following items: "OVERVIEW", "CHARTS", "GENRES & MOODS", "NEW RELEASES", "DISCOVER" (which is underlined in green), and "CONCERTS".

The main content area features a section titled "New Releases For You" with four cards:

- Release Radar**: An album cover with blue wavy lines and the text "Your Release Radar".
- 20... al Mundo de los Sueños (Live)** by **Saurom**: An album cover featuring a man in a red robe standing behind a curtain.
- A Arte De Os Paralamas Do Sucesso**: An album cover featuring three people in a circular frame and the text "A Arte De Os Paralamas Do Sucesso".
- XXI - Klavier** by **Rammstein**: An album cover featuring the Rammstein logo and the word "KLAVIER".

Below these cards is another section titled "Similar to Ximena Sariñana" with four more cards:

- An album cover for "Ximena Sariñana" (partially visible).
- Siddhartha**: An album cover with a blue, abstract background and the title "Siddhartha" in yellow.
- Gustavo Cerati**: An album cover featuring a cocktail glass with cherries and the name "Gustavo Cerati".
- Los Daniels**: An album cover featuring a rooster and the name "Los Daniels".

Motivación

More items to consider [See more](#)



Inspired by your browsing history [See more](#)



Motivación



Aprendizaje



Mejores predicciones

Inferencia

BACKGROUND KNOWLEDGE



NEW INFORMATION



- Estadística inferencial (Excel, BI)
 - Regresión de datos
 - Redes bayesianas
- **Aprendizaje de maquina** (Sistemas de recomendación, chatbots)
 - Perceptrones
 - Redes neurales
 - Clustering
 - KNN
 - SNA

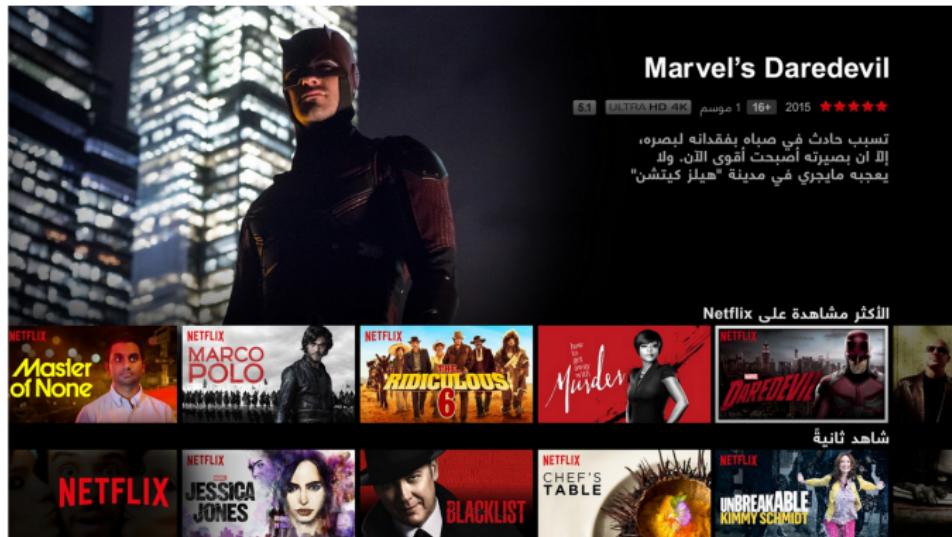
Mejores predicciones

- Venta (Chatbots, sistemas de recomendación)
- Fidelización (Software consciente de contexto, análisis de redes sociales)
- Producción (Redes neurales, redes bayesianas)
- Análisis (Map-Reduce (aka Big Data))

Recommending for the World

#AlgorithmsEverywhere

by [Yves Raimond](#) and [Justin Basilico](#)



The Netflix experience is driven by [a number of Machine Learning algorithms](#): personalized ranking, page generation, search, similarity, ratings, etc. On the 6th of January, we

Inferencia (retos)

- Problema
- Modelo
- Implementación

1-2-3 Machine Learning

1. Normalizar los datos
2. Crear el modelo
3. Entrenar el modelo
4. Comprobar su funcionamiento

- Probabilidad
- Estructura
- Conceptos ocultos (Hidden concepts)

Donde

- Supervised learning (objetivo)
- Unsupervised learning (conceptos ocultos)
- Reinforcement learning (feedback)

Porque/Para que

- Predicciones
- Diagnóstico
- Sumarizaciones

Como

- Pasivo (Observador)
- Activo
- Offline
- Online

Salida

- Clasificación (Binario)
- Regresión (Continuo)

Detalles

- Generativo (Generalizaciones)
- Discriminativo (Distinguir)



Navaja de Occam

"Pluralitas non est ponenda sine necessitate"

"Plurality is not to be posited without necessity"

Navaja de Occam (Español)

Cuando se tienen dos teorías que obtienen las mismas predicciones, generalmente la más simple es la mejor

Bibliotecas

Principales

- DeepLearning4J <https://deeplearning4j.org/>
- BID Data Project
<http://bid2.berkeley.edu/bid-data-project/>
- Neuroph <http://neuroph.sourceforge.net/index.html>
- Smile <http://haifengl.github.io/smile/>

Complementarias

- Commons Math
<http://commons.apache.org/proper/commons-math/>
- Eclipse Collections
<https://www.eclipse.org/collections/>

- AmazonML
<https://aws.amazon.com/machine-learning/>
- Bluemix - Watson <https://www.ibm.com/cloud-computing/bluemix/watson>
- Oracle Advanced Analytics <https://www.oracle.com/database/advanced-analytics/index.html>

Demo



NABENIK

Demo 1 - Panchito

Panchito el Bot Bayesiano

Demo

1. Mamiferos
2. Aves
3. Sangre fria
4. Pez
5. Anfibios
6. Insectos
7. Maritimo

Demo

1. Cabello
2. Plumas
3. Huevos
4. Leche
5. Volador
6. Acuatico
7. Depredador
8. Dientes
9. Columna vertebral
10. Respira
11. Venenoso
12. Aletas
13. Cantidad piernas
14. Cola
15. Domestico

1. Learning rate: Velocidad de aprendizaje
2. Momentum: Controla convergencia hacia mínimos
3. Error: Mientras menor sea el error, mayor la aproximación*

Demo

1. Input: 16
2. Output: 7
3. Middle: 2
4. Error: 0.2, Momentum: 0.7

Demo

1. Input: 16
2. Output: 7
3. Middle: 2
4. Error: 0.3, Momentum: 0.7

Demo

1. Input: 16
2. Output: 7
3. Middle: 6
4. Error: 0.6, Momentum: 0.4

Experiencias previas

- **Problema:** Mejorar las recomendaciones en ISO 27001
- **Modelo:** Clasificación inmediata mediante análisis de redes sociales
- **Implementación:** JGraph + JUNG + Commons Math + Java FX

JRiskSimulator



- **Problema:** Adaptar la recomendación de un profesional de acuerdo a las recomendaciones de mis amigos
- **Modelo:** Clasificación inmediata mediante perceptrones + Análisis de redes sociales
- **Implementación:** Neuroph + Commons Math + Lucene Search + Java EE



- **Problema:** Indexar n cantidad de biblias en un metabuscador que soporte "palabras parecidas"
- **Modelo:** Binary tree + Tokenization + Levenshtein distance + Lazy data fetch
- **Implementación:** Lucene Search + Java EE

The screenshot shows a dark-themed website for "BIBLE GENERATION". At the top right are links for "Cerrar Sesión" and a download icon. The main title "BIENVENIDO A BIBLE GENERATION" is centered in large blue letters. Below it is a subtitle: "Es una generación que vive completamente convencida y apasionada por la Biblia, creyendo que esta, es la Palabra de Dios." A search bar at the bottom left contains the text "jesub". To its right is a blue "BUSCAR" button. The search results list several entries, each starting with "Cndo Jesús" followed by a short summary of a biblical event.

Cndo Jesús ✨tnta gnt, subió a mntaña y c sentó. Los discípulos se le acercaron.

Entonces Jesús c subió a la 🌄 y el viento c calmó. Los discípulos estaban muy asombrados 😱

Después Jesús despidió a la gnt, subió a la 🌄 y c fue al pueblo d Magadán.

Cndo Jesús estaba subiendo a la brk 🌄 y q ahora estaba solo le rogó q lo dejara ir cn él.

Entonces Jesús le dejó, vivió a subir a la brk 🌄 y c fue al otro lado d lgo.

Dspas l diablo 🤢 llevó a Jesús a la ciud d Jerusalén. Allí lo subió a la part ms alta d l templo 🏵

Cndo Ida la gnt c hablo ido, Jesús subió solo a l crro pra orar 🙏. Allí stuvo orando 🙏 hasta q anocheció.

Jesús salió d allí y llegó a la orilla d l Lgo d Galilea. Luego subió a l crro y c sentó.

Fin



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Gracias

- me@vorozco.com
- <http://vorozco.com>
- <http://github.com/tuxtor/slides>



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