Learning Artificial Intelligence at School with Scratch and LearningML

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KGBL-III

https://kgblll.github.io/

KinderGarten and Beyond and LifeLong Learning

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What I’m going to talk about

01. Some reasons to teach AI at school

02. Machine Learning in a nutshell

03. But... ¿can we teach AI and ML at school?. LearningML can help us

04. LearningML Research
Some reasons to teach AI at school
As citizen, we have to know digital technologies as well as possible and demand the development and use of accountable, transparent and fair digital tools.

Knowing the fundamentals of Computer Science will be very helpful.
WE ARE ALL USING ARTIFICIAL INTELLIGENCE

It is all around us, closer that we can imagine.
STRONG IMPACT ON SOCIETY OF AI

AI has a strong impact in every aspect of society ... and will have even more in the near future.
These policy foresight report suggests that in the next years AI will change learning, teaching, and education.


Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development. Education Sector. UNESCO.
TO FOSTER COMPUTATIONAL THINKING

Instrumental competence

Cognitive ability

Unplugged activities

Coding

AI and Data Science

By Juan David Rodríguez García
## NEW DIMENSIONS OF COMPUTATIONAL THINKING

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<th>Brennan &amp; Resnick CT Framework dimensions</th>
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<th>Perspectives</th>
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<td>Data</td>
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<thead>
<tr>
<th>AI extension of Brennan &amp; Resnick CT Framework dimensions</th>
<th>Classification</th>
<th>Training</th>
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02
Machine Learning in a nutshell
AI is not the same than ML

5 BIG IDEAS about AI
AI4K12, CSTA and AAAI

But it is common to use the term AI when we really mean ML


Image by AI4K12.org
When we do not have an algorithm able to be applied to our problem, but we have lots of data related with its solution, we can deal with the problem from another perspective: we can use these data to infer possible solutions.

SO, WHAT'S MACHINE LEARNING

Gather data samples and label it (training dataset)
Feed ML algorithm and run it to build a model
Use the model to classify or predict new samples

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A NEW WAY TO SOLVE COMPUTING PROBLEMS

Traditional programming
- Problem analysis
- Rules deduction
- Program coding

Rules → Data → Solution

ML oriented programming
- Gather and label sample data
- Feed and run ML algorithm
- Use induced rules to code a Program

Data → ML Algorithm → Rules → Solution

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DIFFERENT TYPES OF MACHINE LEARNING

**SUPERVISED**

Data from which an inference model is to be built must be classified manually (by a human being). Afterwards these data are used by the ML algorithm to build a model that serves as well when other data is used.

**UNSUPERVISED**

Those algorithms intended to extract some patterns from a set of unlabeled data. Therefore, a classification “by hand” is not required. Sometimes this kind of algorithms is used to perform an initial automatic data labelling.

**REINFORCED**

Build their models by testing possible solutions; those that maximize some reward function are maintained while those that score low according to that function are eliminated. Here, too, labeled data is not necessary.

Data is the key
03 ¿But... ¿can we teach AI and ML at school?. LearningML can help us
LEARNINGML

A platform to teach and learn ML by doing, designed on the principles of "low floor, high ceiling and wide walls"

K12 (age 10 - 17)  
Undergraduate students and professionals which need to understand ML fundamentals  
People interested in learning ML and other geeks

Easy to use  
No registration required  
But you can register and then cloud storage and project sharing is available

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THE LEARNINGML PLATFORM IS COMPOSED BY

The web site
https://learningml.org

The ML Editor
https://learningml.org/editor

The programming platform
https://learningml.org/scratch/

LearningML research

RESEARCH - FIRST RESULTS

Workshop on December 2019, 14 participants about 20 years old

4 Likert-style questions

- **effect size 0.675**, moderate

3 multiple choice questions

- **effect size 0.852**, big

RESEARCH - NEXT STEPS

Validation

Instructional
Students learn something about ML and AI when using LearningML?

Face
Is LearningML a tool easy to use and engaging enough?

Results of this research will be very helpful to improve the tool.

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# RESEARCH ON-LINE

**SCHEDULE**

<table>
<thead>
<tr>
<th>Activity</th>
<th>1 June - 6 June</th>
<th>8 June</th>
<th>9 June - 16 June</th>
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<tr>
<td>PRE Test</td>
<td>1 June - 6 June</td>
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<td>8 June</td>
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<tr>
<td>Activity</td>
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<td>9 June - 16 June</td>
</tr>
<tr>
<td>Test</td>
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[https://programamos.es/quieres-aprender-a-crear-proyectos-de-inteligencia-artificial-participa-en-esta-investigacion-online/](https://programamos.es/quieres-aprender-a-crear-proyectos-de-inteligencia-artificial-participa-en-esta-investigacion-online/)

By Juan David Rodríguez García
¡Thank you!

I’ll see you in Q&A!

@juandalibaba

https://learningml.org

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LearningML - ML Editor

Textos
Enseña al ordenador a reconocer textos

- Reconocer textos

Imágenes
Enseña al ordenador a reconocer imágenes

- Reconocer imágenes

LearningML, Copyright © 2019 Juan David Rodríguez García & KGBL3
LearningML - ML Editor - Step 1. Gathering training dataset

1. Entrenar
Primero necesito algunas imágenes de ejemplo

   Añadir nueva clase de imágenes

   with cap (10)

   📸 📸 📸

2. Aprender
Llegó el momento de aprender a clasificar imágenes

   Aprender a reconocer imágenes

3. Probar
Introduce términos nuevos y comprueba si se clasifican correctamente

   📸 📸 📸 🐔
1. Entrenar
Primero necesito algunas imágenes de ejemplo

2. Aprender
Aprendiendo a partir de los datos
Espere por favor

3. Probar
Introduce términos nuevos y comprueba si se clasifican correctamente

- with cap (80.80 %)
- without glasses (12.70 %)
- with glasses (6.50 %)
1. Entrenar
Primero necesito algunas imágenes de ejemplo

   with cap (10)

   ![image](https://example.com/with_cap_1.png)
   ![image](https://example.com/with_cap_2.png)
   ![image](https://example.com/with_cap_3.png)
   ![image](https://example.com/with_cap_4.png)
   ![image](https://example.com/with_cap_5.png)
   ![image](https://example.com/with_cap_6.png)
   ![image](https://example.com/with_cap_7.png)
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2. Aprender
Llegó el momento de aprender a clasificar imágenes

   ![image](https://example.com/learn.png)

3. Probar
Introduce términos nuevos y comprueba si se clasifican correctamente

   ![image](https://example.com/prob.png)

   Probably pertenece a la clase with cap

   - with cap (80.80 %)
   - without glasses (12.70 %)
   - with glasses (6.50 %)
LearningML - Programming platform. Building and running a program that uses the ML model
LearningML - Programming platform. Building and running a program that uses the ML model