Fostering Artificial Intelligence at Schools

D5.1 REPORT FOR INTELLECTUAL OUTPUT 5

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Introduction

LearningML aims to be a free/open-source web-based platform aimed to bring Machine Learning (ML) fundamentals in a practical way to children or people interested in the growing field of AI.

This tool provides a platform intended to build ML models from example data, and a Programming Platform allowing to code creative applications using those models. At this point, LearningML is a proof of concept to explore whether machine learning algorithms can be executed locally in the browser in order to avoid the use of an AI cloud service when designing a tool to learn ML. We aim to further develop LearningML so that it becomes a comprehensive free/open-source tool for learning AI at schools in Europe.

There are other AI educational tools. Why another one?. All tools include several burdens that make them difficult to be used in a general school classroom environment that we address. The limitations that we have found are: complex configurations, users need to have accounts in several Internet services, they are black box and do not allow to interfere and understand the inner working of the algorithms. All tools under study had at least two of these limitations. LearningML is designed to circumvent these limitations and offer a school-friendly tool that can be used by non-expert teachers.

Target groups:

Learners and educators.

Given that one of the target groups are children, user registration is not required, as one of the desired goals is to allow a quick start (low floor). Nonetheless, the platform allows learners to register if desired. Registering provides some extra functionalities, but it is not needed to have a complete learning experience. Cloud project storage and sharing are the additional features registration offers. In case the learner decides to register, the only required data are username, email address, gender and birthdate. When registering, learners are recommended to choose a username that has nothing to do with their actual name. Email address is required because the account must be activated and to have some form of communication with the learner in case of problems. Finally, gender and birthdate are asked for research purposes. If a learner decides not to register, she still can download the project to her disk (and in the future load it back to the application).

Expected impact:

We expect min 100 educators per partner country to use this tool, and incorporate it in their lessons.

Web site tool: https://web.learningml.org/

Web site: http://fosteringai.net/

Work done

Software development - 2021

Most of the existing educational programming platforms lack some of the features needed to develop practical AI projects and, consequently, new tools are required. We present LearningML, a new platform aimed at supervised machine learning, one of the most successful AI techniques that is at the base of almost all current AI applications and with which we intend to cover that lack of tools for the practical teaching of AI.
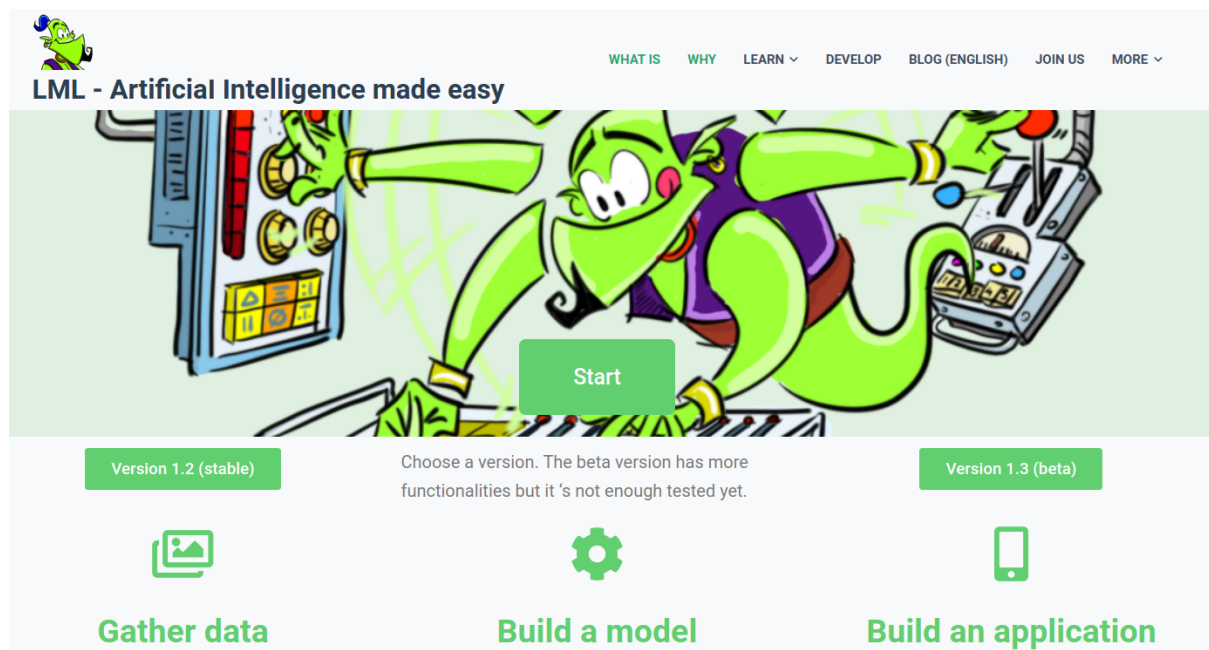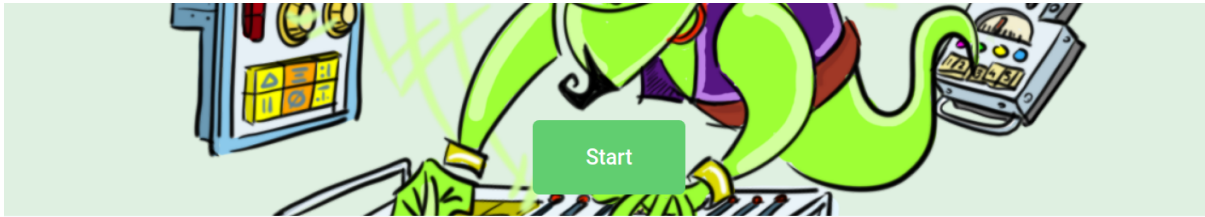

LearningML version 1.2

The following functionalities had been developed in this version:

- **LearningML website**: LearningML is an educational platform for learning content on Artificial Intelligence and promoting Computer Thinking
  https://web.learningml.org/

  LearningML consists of two javascript-based applications:
  - The Machine Learning model editor (learningml-editor): It is the tool with which ML classification models are created by collecting labeled examples.
  - The lml-scratch programming editor: lml-scratch is a modification of the well-known Scratch project. That is to say, I have taken the original Scratch code and added the necessary code to communicate with the ML model editor and to incorporate new blocks.

Start

| Version 1.2 (stable) | Choose a version. The beta version has more functionalities but it 's not enough tested yet. | Version 1.3 (beta) |

Gather data

Collect text or images about something you want to classify automatically and add them to LearningML by indicating which class each one belongs to. This data makes up the training set.

Build a model

Build with LearningML a model capable of correctly classifying other data different from, but similar to, that of the training set.

Build an application

Export your Machine Learning model to Scratch and program an application with the ability to classify data on the topic you have chosen. Congratulations! You have incorporated Artificial Intelligence into your Scratch program!

● **Classification models**

LML | Archive ⌄ | sin nombre | Learn LML ⌄ | | | About | Join us | Log in

Texts
Teach the computer to recognize text

≡ recognize text

Images
Teach your computer to recognize images

🖼 recognize images

-Recognize text

-Recognize images

- **Classification Algorithms**
  -Naive Bayes

- **Language**
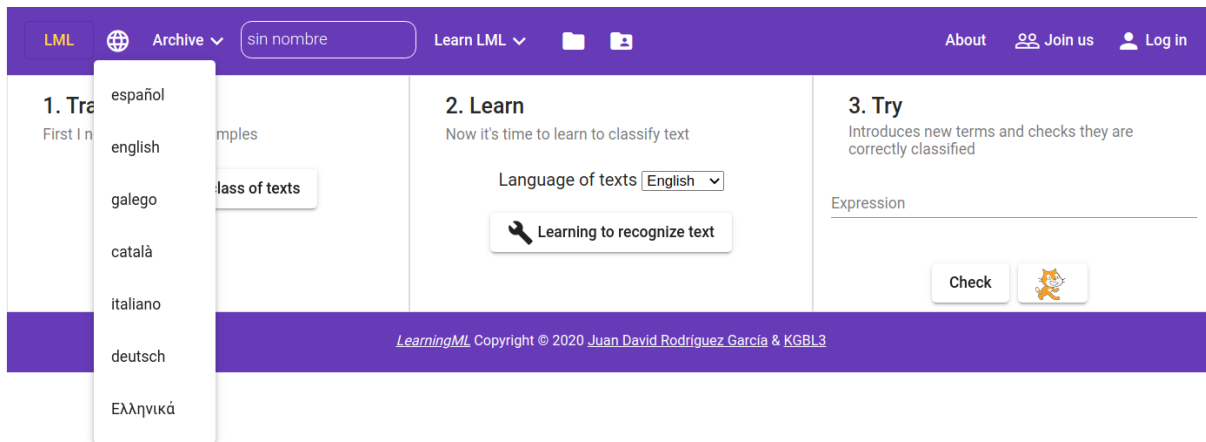
LearningML version 1.3 (available now)

The novelties introduced in this version are the following:

At the code level
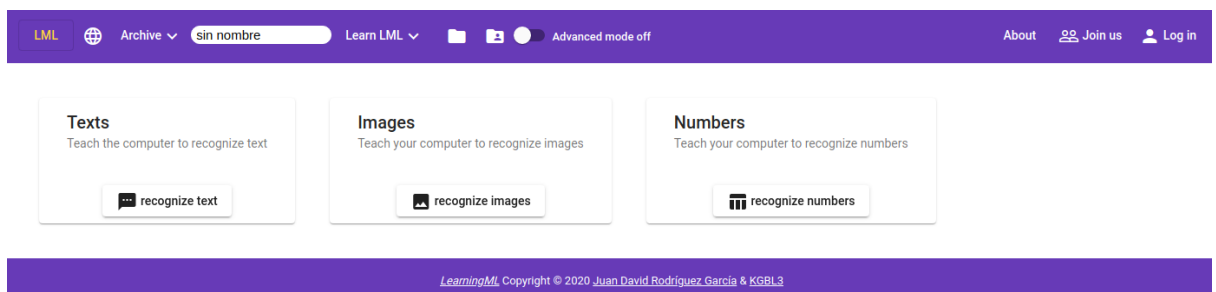- Separation of feature extraction and ML algorithm.
- Update lml-editor to Angular 12.
- Reorganization of the lml-scratch repos to sync with the develop branch of scratch.
- Implementation of a message protocol to request ML services from lml-scratch to lml-editor (lml-message-protocol).
- Simplification of lml-scratch code thanks to lml-message-protocol.

At the level of functionalities:
- Recognition of numerical data sets.

- Advanced mode

- Selection of different Machine Learning algorithms. For now, the algorithms are offered:

- KNN

-Neural networks

- Adjustment of the typical training parameters of each algorithm.
- Definition (optional) of a percentage of training data for the calculation of a confusion matrix with which to evaluate the precision of the constructed model.
- Visualization of a confusion matrix to evaluate the built model.
- Visualization of the learning process for the neural network.
- Visualization of algorithm decision limits for two-dimensional numerical models.

Multiplier Event workshops - 26 November 2021

During our multiplier event in Braga on November 26 2021, we gave two workshops related to Intellectual Output 5: Workshop 3-LearningML tool, and Workshop 4-Moral Machine.

LearningML tool is an open-source web application created to facilitate the learning and teaching of Machine Learning.

The main objective of workshop 3 was to show to teachers how easy it is to create text and image classification models in the LearningML tool and its use to activate students' critical thinking. We want to encourage teachers to use this tool in their classrooms. Also, we talked about how this tool can contribute to improving students' education and how important it is that the students learn about Artificial intelligence tools above all in this digital era. As well, In this workshop we showed to teachers how they can use this tool in their subjects, in order to this purpose we made some real examples on the web site. While we were doing the workshop they could interact with image classifying.

This workshop was presented in Spanish because teachers know this language and they could communicate easily with us.

In workshop4, we explained The Moral Machine. This tool was created by three researchers (Iyad Rahwan, Azim Shariff and Jean-François Bonnefon) as a result of a very successful publication that had a great impact. From that point, they developed with the help of two graduate students of MIT Media Lab a platform that allows them to track the people's decisions in those situations. Collected data is separated in different categories and compared between them, to obtain some important conclusions that help to analyse the biases in the different populations and social collectives.

In addition, we have also raised the importance of transmitting values and education based on critical thinking with this platform related to Artificial Intelligence. Knowing how to understand and evaluate certain events is vital for correct decision making. In this workshop we showed to teachers some examples how The Moral Machine puts us in the extreme situation of the decision making that an autonomous car must make when it is involved in an accident penalizing passengers or pedestrians. With the different cases it presents us with, it opens up certain kinds of debates about whether the user would be willing to buy a car that in a certain circumstance can make decisions that may harm him or whether the common benefit is more important than the individual one.

Next steps

These are features that are under development for the next releases of the LearningML tool:

1. Classification models

Recognition of number sets has been added to version 1.3.0.

In addition, we have been working on the recognition of numerical sets with the possibility of using categorical data.

There is also a new type of ML algorithm developed based on neural networks, but that is still being tested..

These two improvements have not yet been incorporated into the official version of LML.

2. Recognition of sound

The recognition of sounds has been developed. This improvement has not been added yet to the official version of LML and is being currently tested.

3. Internationalisation

The Portuguese and Dutch translations will be available in the next version.

Annexes

Annex 6: Lessons learnt from the M1 event Braga November 2021

During the event the teachers had to choose two out of the four workshops.

Workshop 3:
This workshop was one of the most popular, around thirty teachers turned up and they were really keen on and participated in learning how they can use and introduce LearningML tools in their classrooms.

In this case we learnt that teachers are very interested about how they can introduce AI tools in their subjects and they want to better understand how ML algorithms work . Also, we learnt that the ML tool is intuitive and easy to use for teachers. Teachers are concerned about their students using this tool to solve their homework or exercises and they don't learn how to solve problems by themselves. In order to improve the ML knowledge for teachers, we should teach them a base about algorithms and models of ML.

Workshop 4:
In this workshop, teachers of diverse academic subjects had the opportunity of reconsidering some aspects of the education methods and the values transmitted to their students. Through a webplatform developed by some researchers of MIT, the importance of implementing an education based on critical thinking and moral values was emphasized. This tool was devised to analyze the moral perception of different countries related to autonomous vehicles and the decisions that it has to make. Moral Machine helps the students to learn to weigh the actions in certain circumstances and reflect about the importance of their decisions in extreme situations.