Machine Learning For Kids :: Teachers' notes

Worksheet	Noughts and Crosses (Scratch)
Activity	Create a noughts and crosses game in Scratch that learns how to beat you.
Objective	**Teach a computer to play a game** • How machines have been taught to play games since the 1960's. • Decision tree learning as a way for computers to learn how to play games.
Difficulty level	Advanced Setting up the project is a little complex, and the script block that needs to be added in Scratch is a little long.
Time estimate	1 hour
Summary	Students will train the computer to play noughts and crosses by playing the game in Scratch. The machine learning model will be trained based on the moves that they make while playing.
Topics	decision tree learning, reinforcement learning, categorical data
Also…	*A demo version of this project is available for use at events like Science Fairs, where each child has only a minute or two to try an activity. The notes below are about the classroom version of the project.*

Setup

Each student will need:

Print-outs	Project worksheet (download from https://machinelearningforkids.co.uk/worksheets) Blocks in Scratch scripts are colour-coded, so printing in colour will make it easier for students.
Access	Username and password for machinelearningforkids.co.uk

Class account will need:

API keys	None

Customizing

If you use **PRIMM** approaches with your class, add a step where students predict how the project template works.
If you want to **increase the amount of coding** involved, delete some of the code from the project template and add steps to the worksheet so students code it themselves.
If you want to **encourage problem solving**, delete some of the detail in the worksheets and provide more general instructions instead.
Project template files & worksheets in MS Word format are available so you can **modify them to suit your class**.

Template	https://github.com/IBM/taxinomitis-docs/tree/master/scratch-templates
Worksheets	https://github.com/IBM/taxinomitis-docs/tree/master/project-worksheets/msword

Help

Potential issues	• Time management is important for this project. Students often lose track of time while playing the game and don't leave enough time for training or coding. It may be helpful to time-box the sections (initial trying out of the game, training the model, testing the model) to keep the class on track. • "https://machinelearningforkids.co.uk" is a long URL to type for some children. You may find it easier to set up a bookmark that they can click on instead. General troubleshooting and help at https://machinelearningforkids.co.uk/help

Machine Learning For Kids :: Teachers' notes

Worksheet	Noughts and Crosses (Python)
Activity	Create a noughts and crosses game in Scratch that learns how to beat you.
Objective	**Teach a computer to play a game** • How machines have been taught to play games since the 1960's. • Decision tree learning as a way for computers to learn how to play games.
Difficulty level	Intermediate Only two new lines need to be added to the sample Python code
Time estimate	1 hour
Summary	Students will train the computer to play noughts and crosses by playing the game in Scratch. The machine learning model will be trained based on the moves that they make while playing.
Topics	decision tree learning, reinforcement learning, categorical data

Setup

Each student will need:

Print-outs	Project worksheet (download from https://machinelearningforkids.co.uk/worksheets) Blocks in Scratch scripts are colour-coded, so printing in colour will make it easier for students.
Access	Username and password for machinelearningforkids.co.uk

Class account will need:

API keys	None

Customizing

If you use **PRIMM** approaches with your class, add a step where students predict how the project template works.
If you want to **increase the amount of coding** involved, delete some of the code from the project template and add steps to the worksheet so students code it themselves.
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Project template files & worksheets in MS Word format are available so you can **modify them to suit your class**.

Template	https://github.com/IBM/taxinomitis-docs/tree/master/scratch-templates
Worksheets	https://github.com/IBM/taxinomitis-docs/tree/master/project-worksheets/msword

Help

Potential issues	• The sample code is available on GitHub but you might find it easier to provide the code for your students • The sample code has been tested with Python 3 but should work with Python 3 • The sample code needs **requests** and **pygame**. You might find it useful to get these installed first. (e.g. `pip3 install pygame`) • If students name things in their project differently to the worksheet, they will see problems with the sample code. Updating the constants at the top of the code should help with this. General troubleshooting and help at https://machinelearningforkids.co.uk/help