Machine Learning For Kids :: Teachers' notes

Worksheet	Noughts and Crosses
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 The Scratch script is long and complex. Most of it is provided in a starter project file, but finding the right places to make changes needs care.
Time estimate	1.5 hours
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

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. • The most common bug in student Scratch scripts is to make the wrong choice in orange drop-down blocks (e.g. choosing "history nought top-right" instead of "history cross top-right"). Encourage students to copy carefully. Working in pairs can help avoid mistakes. • It is important to close and re-open the Scratch browser window after each time a machine learning model is trained, otherwise Scratch will keep using previous moves. • "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