# Machine Learning For Kids :: Teachers' notes

| Worksheet | Noughts and Crosses |
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| **Activity** | Create a noughts and crosses game in Scratch that learns how to beat you. |
| **Objective** | **Teach a computer to play a game**<br>• How machines have been taught to play games since the 1960's.<br>• Decision tree learning as a way for computers to learn how to play games. |
| **Difficulty level** | Advanced<br>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 )<br><br>Blocks in Scratch scripts are colour-coded, so printing in colour will make it easier for students. |
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| | **Access** | Username and password for machinelearningforkids.co.uk |

Class account will need:

| | API keys | None |
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## 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 |
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| **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.<br>• "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.<br><br>General troubleshooting and help at https://machinelearningforkids.co.uk/help |
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