

Machine Learning For Kids :: Teachers' notes

Worksheet	Zombie Escape!
Activity	Train a robot to help you escape the zombies.
Objective	Teach a computer to make predictions <ul style="list-style-type: none"> How computers can be trained to make predictions based on experiences. How feature selection is choosing what values the computer should learn from How AI systems make recommendations to assist people making decisions How machine learning systems can be visualised using tree diagrams
Difficulty level	Intermediate
Time estimate	45 minutes - 1 hour
Summary	Students will train a machine learning model to predict how to avoid zombies. They use this in Scratch to make a virtual assistant that will recommend how to play a game.
Topics	supervised learning, decision trees, feature selection

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
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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**.

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

Help

Advice	<ul style="list-style-type: none"> Choosing more than five sensors will work (and can result in a more accurate model) however it makes the Scratch script more complicated to make. Choosing fewer sensors (e.g. 3) will make the Scratch script much simpler, however it may result in ML models performing less well. I wouldn't recommend sharing the following information with students until the end of the lesson, but if it's helpful for you to answer their questions about what they're seeing in their projects, the zombie behaviour is as follows: Lighting – Zombies don't like harsh lighting. They prefer no lighting at all, and like halide lighting least of all. In order (from least likely to have zombies to most): halide, halogen, fluorescent, incandescent, none.
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Humidity – Zombies like it damp. The more humid, the more likely to find a zombie.

Temperature – Zombies prefer room temperature – very cold or very hot temperatures make zombies less likely. The colder/hotter, the less likely they are. This has a big difference on whether you’ll find zombies.

Wall colour – Zombies very slightly prefer dark colours like black or brown, but this only makes a very small difference to which rooms they’re in.

Floor type – Zombies don’t care about floor type. This makes no difference.

Number of chairs – Zombies don’t use chairs. This makes no difference.

Room size – Zombies prefer bigger rooms, but this makes only a small difference.

Number of windows – Zombies can get in through the windows, so more windows do make zombies a bit more likely.

Brightness – Zombies prefer the dark. Darkness makes them much much more likely. This makes a bigger difference than anything else.

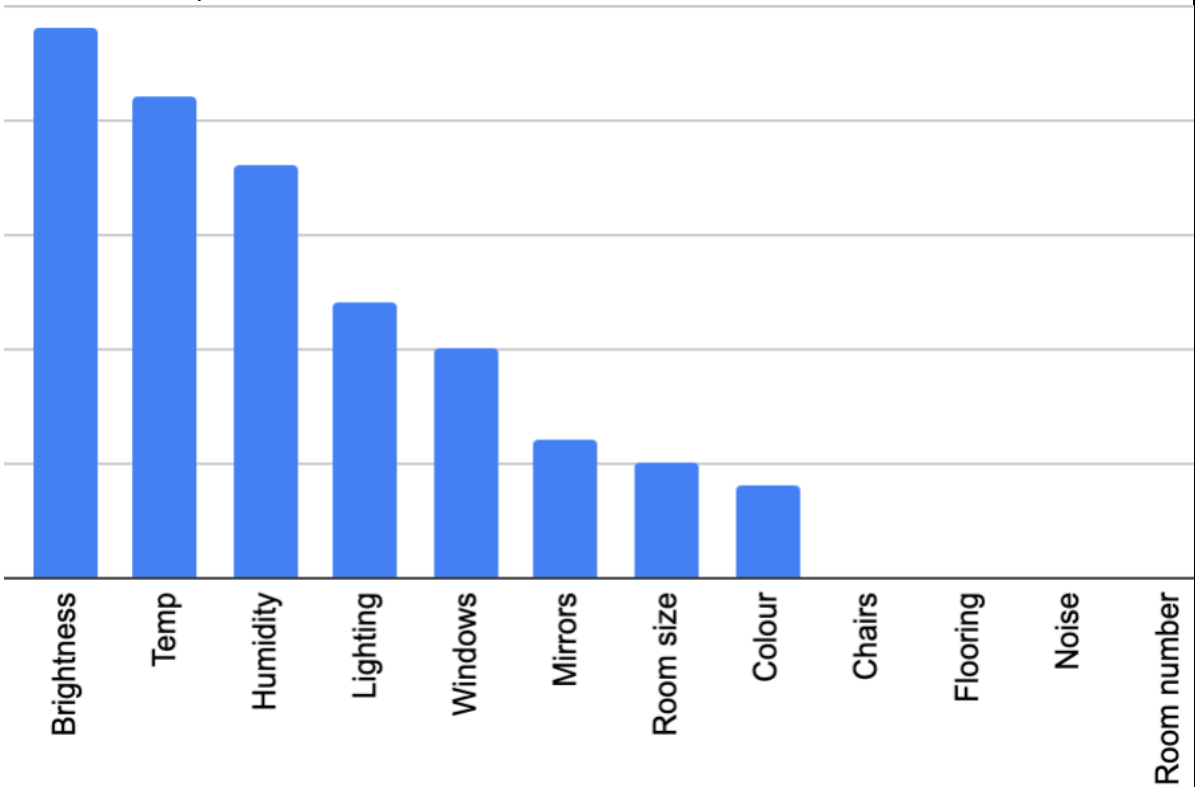
Noise levels – Zombies don’t care about noise. This makes no difference.

Number of mirrors – Mirrors help make you jump when you see a zombie, so a mirror in the room will make a zombie a little more likely, but the number of them doesn’t matter.

Room number – Zombies don’t read, so the hotel room number makes no difference.

There is some correlation between the values – e.g. halide lighting and number of windows can make a higher brightness more likely, whereas no lighting and no windows makes a lower brightness more likely.

The relative impact of the different sensor values can be seen below:



This means a student who picks: “room number”, “noise”, “flooring”, “chairs”, “wall colour” as their five sensors will have a machine learning model that performs very poorly and will probably make mostly inaccurate predictions.

It also means a student who picks: “brightness”, “temperature”, “humidity”, “lighting”, “windows” as their five sensors will have a very accurate machine learning model that allows for a perfect escape.