Computing Learning Journey
Year 6 Spring Term 1st ½

6.6 We are AI developers

Learning about artificial intelligence and machine learning

Program a self-driving car and consider the ethics of AI

Explore sentiment analysis

Use image recognition

Simulate a neural net

Use speech recognition

Construct decision tree classifiers

Key Vocabulary

- **Artificial intelligence:** the study of automated systems that perform actions which require intelligence when performed by humans
- **Classifier**: machine learning model which assigns an input to one of a number of distinct classes
- **Decision tree**: branching sequence of questions used to determine to which class an item belongs
- **Image recognition**: machine learning application in which images are classified. Examples include facial recognition and optical character recognition
- **Label:** the name given to examples in a group in a machine learning classifier
- **Layer:** group of nodes/'neurons' in a neural network all the same 'distance' away from the input nodes
- **Machine learning**: approach to artificial intelligence in which the relationship between input and output of a computer system is determined by the data provided to the system, rather than by the program directly
- **Model**: the way a machine learning algorithm relates input to corresponding output, based on the training data it is provided with
- **Natural language processing:** machine learning applications concerned with human language, such as identifying the sentiments or emotions in a piece of text or interacting in a conversation
- **Neural network:** group of machine learning algorithms, based loosely on the brain, that recognise patterns. The functions change during the training process to improve the accuracy of the model
- **Node**: individual 'neuron' in an artificial neural network, accepting inputs and using a function to determine output
- **Sentiment analysis**: application of natural language processing which attempts to identify the broad emotional tone of a piece of text
- **Spectrogram**: representation of audio showing the different frequencies present
- **Speech recognition**: application of machine learning in which speech is transcribed to text
- **Test data:** examples given to a machine learning system to determine how good the model is at determining output from input
- **Training data:** data provided to a machine learning system to develop the specific model it uses to relate input and output
- **Watson:** IBM's cloud-based machine learning platform

Software: Scratch (Machine Learning for Kids version), Audacity, Google Chrome **Hardware:** Laptop/desktop/Chromebook computers, iPads, smart speaker (Google Home/Amazon Echo) optional

Online safety:
We know not to share personal information. We discuss: Is facial recognition worthwhile if it helps to identify criminals? Is it an intrusion of privacy? Should personal data be used to train machine learning systems? Should this require permission? Establish ground rules for appropriate training and testing phrases for 'likebot' sentiment analysis.

Switched on Online Safety Unit:
Responsible internet use
Unit 6.3 – We are safe social networkers
Understanding that internet safety skills must

Unit overview:
The children will learn:
- how decision trees can be trained automatically to classify data
- how speech recognition works
- how a neural net recognises images
- to train a neural net to classify images
- to train a machine learning system to identify sentiments
- to consider some ethical principles in designing AI

In Key Stage 1:
- Pupils encountered classification trees and image recognition in **Unit 2.6: We are zoologists.**

In Key Stage 2:
- Pupils encountered the self-driving car Scratch program in **Unit 3.2: We are bug fixers.**

In Key Stage 2:
- Some pupils may have made use of speech recognition in **Unit 6.3: We are publishers.**