runlinc AI Project 3:
Simple Image Recognition Demonstration
(STEMSEL Version)

Contents

Introduction

Aim

Upload an image and use third party machine learning JavaScript to compute the classification of the image with runlinc

Background and Plan

Image processing with artificial intelligence (AI) is relatively simple. It thinks like a human brain.
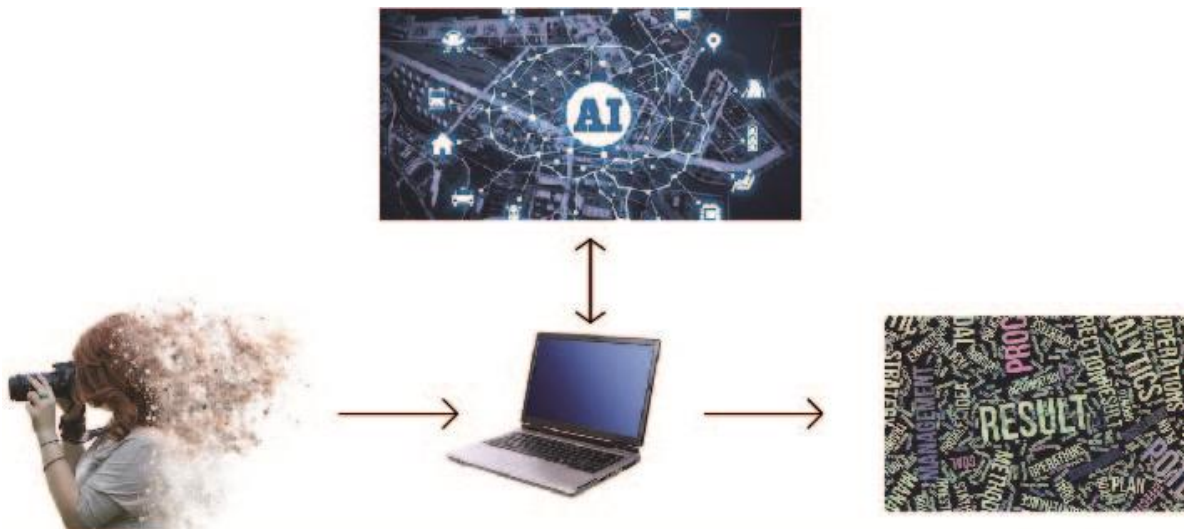

Figure 1 Image loaded into computer and through AI, result is shown at the end

Since we are using the database from a third-party resource, we don't need to insert data ourselves. We only need to know some syntax from that third-party resource for JavaScript. We won't be needing any inputs for the Microchip. Three LEDs will be used to signify that the respective process has been successful while the LED turns on accordingly.
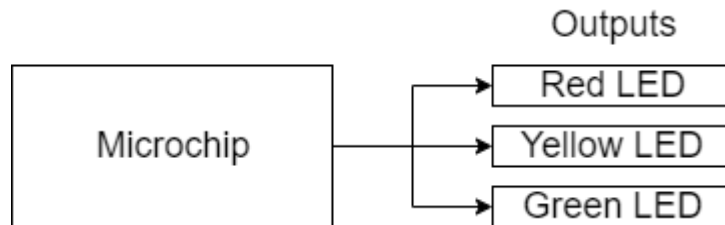

Figure 2 Block diagram of Microchip Outputs

Runlinc Background

Runlinc is a web page inside a Wi-Fi chip. The programming is done inside the browsers compare to programming inside a chip. The runlinc web page inside the Wi-Fi chip will command the microchips to do sensing, control, data logging Internet of Things (IoT). It can predict and command.

Part A: Design the Circuit on runlinc

Note: **refer to runlinc Wi-Fi setup guide document to connect to runlinc**

Set C3, C4 and C5 as DIGITAL_OUT, and name them 'green', 'red' and 'yellow as shown in figure 3 below.

Figure 3 Digital outputs and description
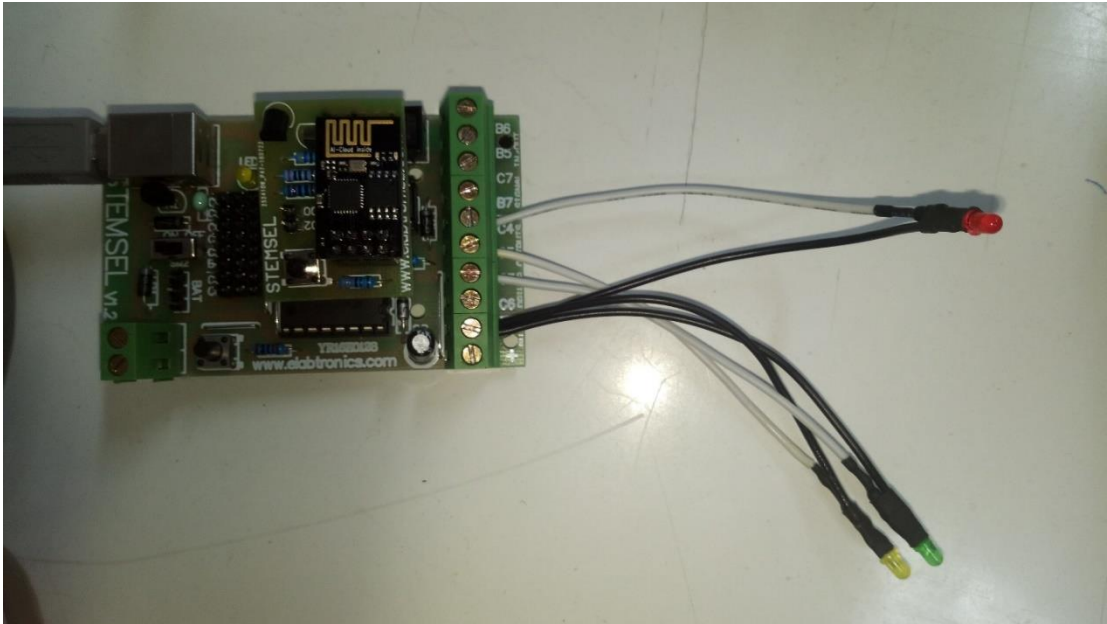
Part B: Build the Circuit

Figure 4 Setup on STEMSEL board

Wiring Instructions

    a) Connect white wires of each respective LED to their respective pin.

        a. green -> C3

        b. yellow -> C5

        c. red -> C4

    b) Connect the black wires to the negative port (-).

Part C: Program the Circuit

As the main purpose of this project is to demonstrate the image recognition capability of the microchip and coding, you'll generally just copy and paste the code, then observe the effects of the code.

HTML:

```
<script src="https://unpkg.com/ml5@0.1.3/dist/ml5.min.js"></script>
<h1>Image classification</h1>
<input id="load">
<input type="submit" onclick="imgProcess()">
<p>This labeled as:
    <span id="result">...</span> <br>with a confidence of
    <span id="probability">...</span></p>
<img src="" crossorigin="anonymous" id="image" width="400">
<p style="font-size:10px">supported by MobileNet</p>
```

Javascript:

```javascript
var type = "";
function imgProcess() {
    // The image we want to classify
    var loadIMG = document.getElementById("load");
    var image = document.getElementById('image');
    image.setAttribute("src", loadIMG.value);
    // The result tag in the HTML
    const result = document.getElementById('result');
    // The probability tag in the HTML
    const probability = document.getElementById('probability');

    // Initialize the Image Classifier method with MobileNet
    const classifier = ml5.imageClassifier('MobileNet', function () {
        console.log('Model Loaded!');
    });

    // Make a prediction with the selected image
    // This will return an array with a default of 10 options with their probabilities
    classifier.predict(image, async function (err, results) {
        result.innerText = results[0].className;
        type = results[0].className;
        probability.innerText = results[0].probability.toFixed(4);
        var utterance = new SpeechSynthesisUtterance(results[0].className);
        speechSynthesis.speak(utterance);
        switch (type) {
            case 'tiger shark, Galeocerdo cuvieri': //example:
https://www.dw.com/image/45601658_401.jpg
                turnOn(red);
                turnOff(green);
                turnOff(yellow);
                break;

            case 'matchstick':
                turnOn(green);
                turnOff(red);
                turnOff(yellow);
                break;

            case value:
                turnOn(yellow);
                turnOff(red);
                turnOff(green);
                break;

            default:
                break;
        }
    });
}
```
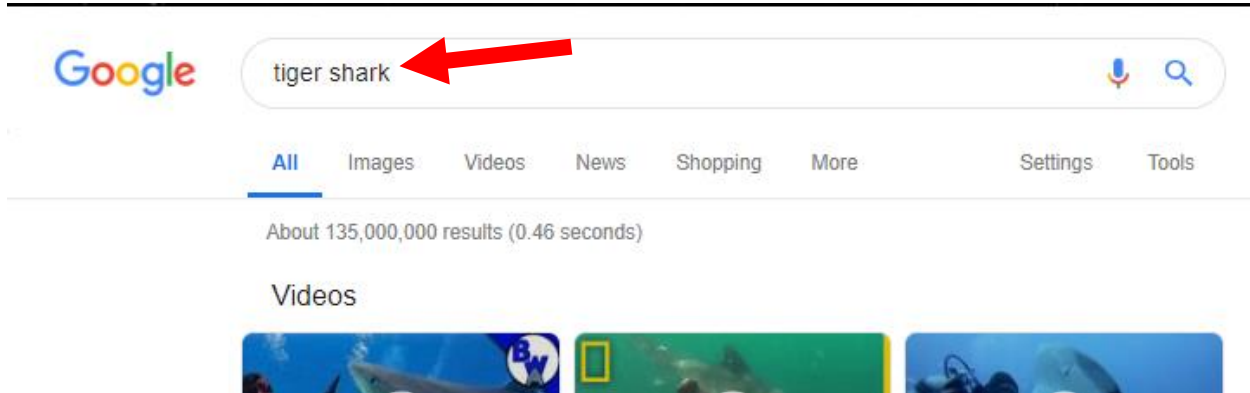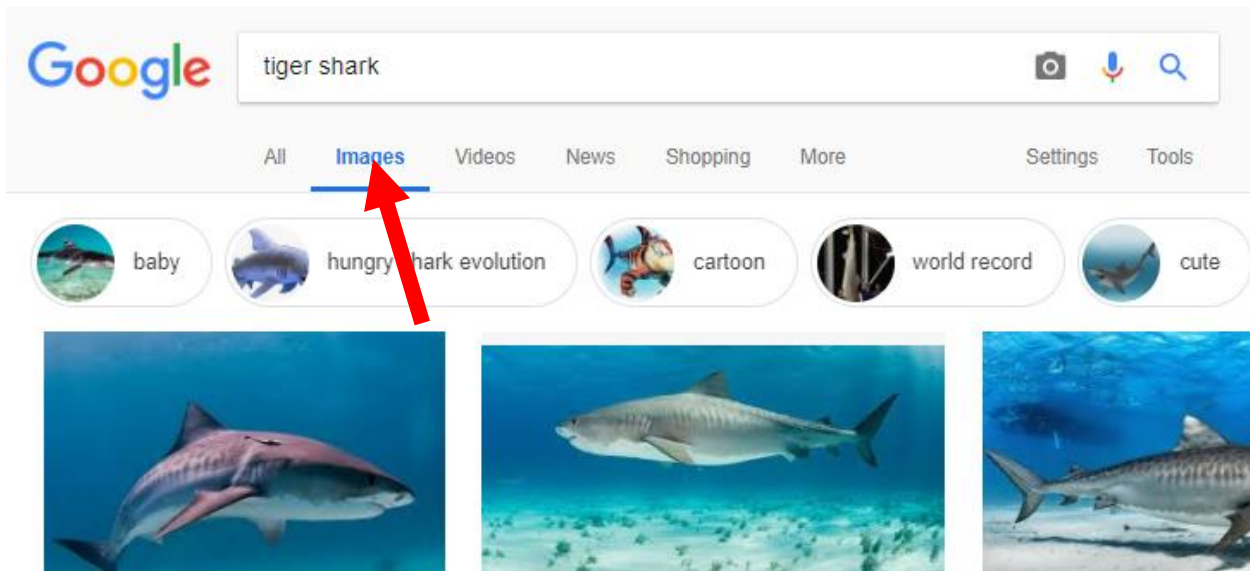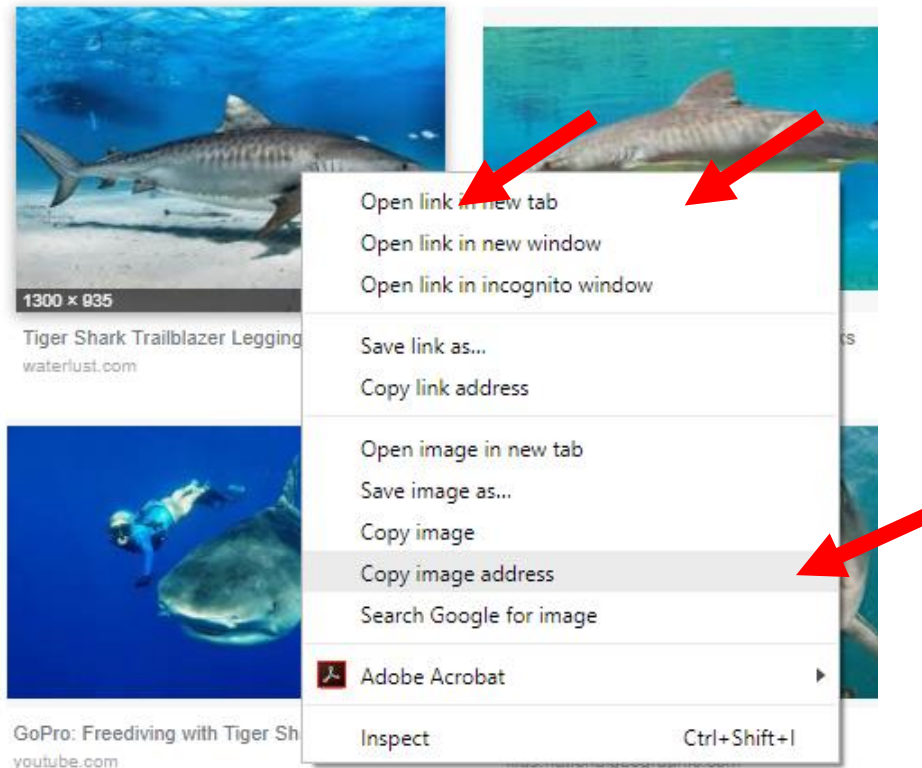
Part D: Run the application

How to get the image link:

Step 1: Search any image you like. Example: tiger shark

Step 2: Click on Image

Step 3: Right-click on the image you like and select "Copy image address"

Step 4: Paste it in the runlinc page and click submit