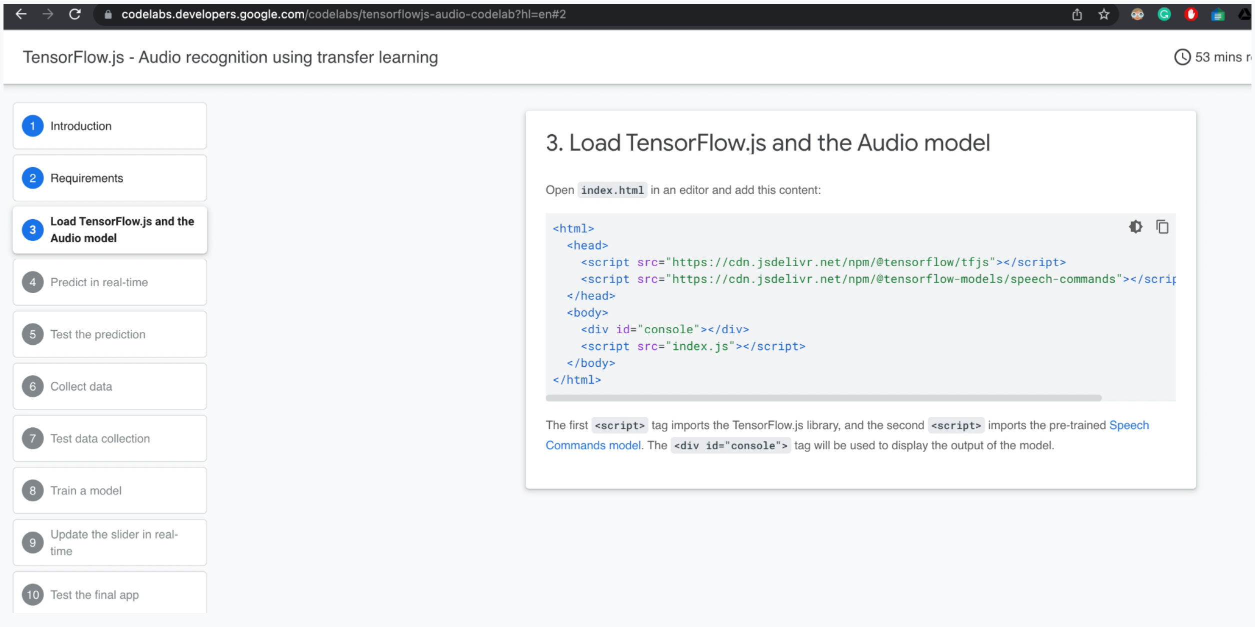
D- TensorFlow.js - Audio recognition using transfer learning



codelabs.developers.google.com/codelabs/tensorflowjs-audio-codelab?hl=en#2

TensorFlow.js - Audio recognition using transfer learning

53 mins r

1 Introduction

2 Requirements

3 Load TensorFlow.js and the Audio model

4 Predict in real-time

5 Test the prediction

6 Collect data

7 Test data collection

8 Train a model

9 Update the slider in real-time

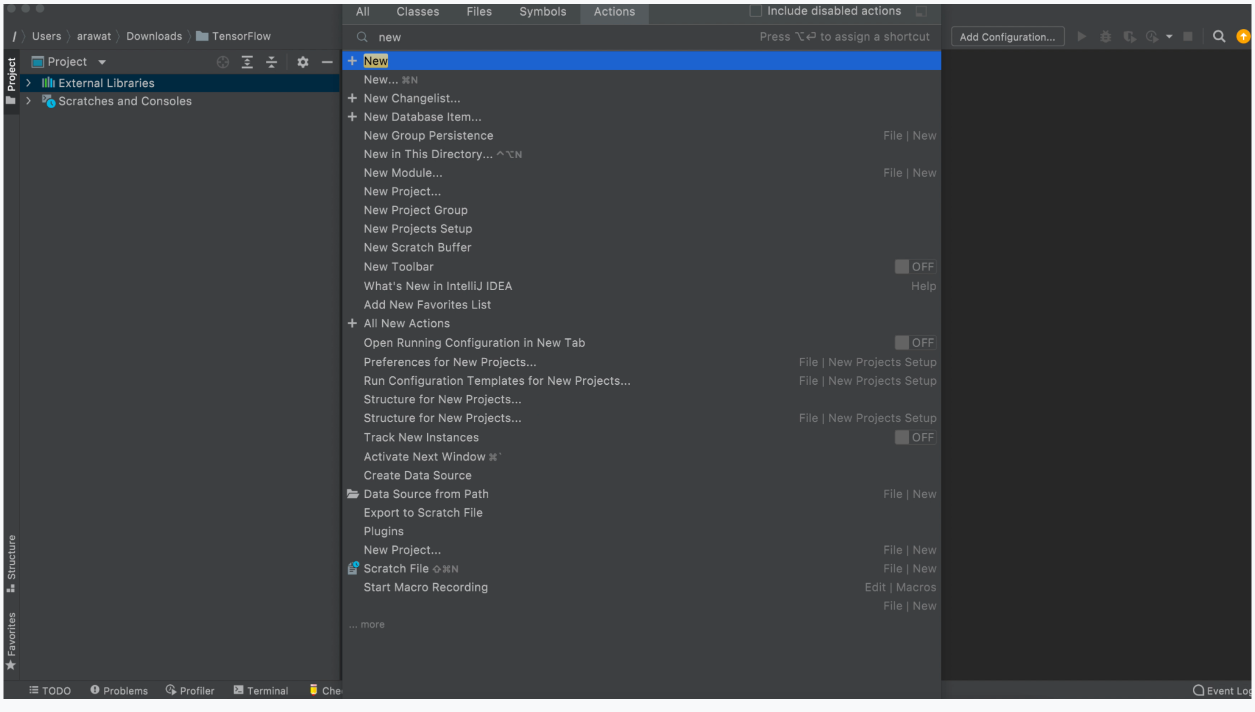
10 Test the final app

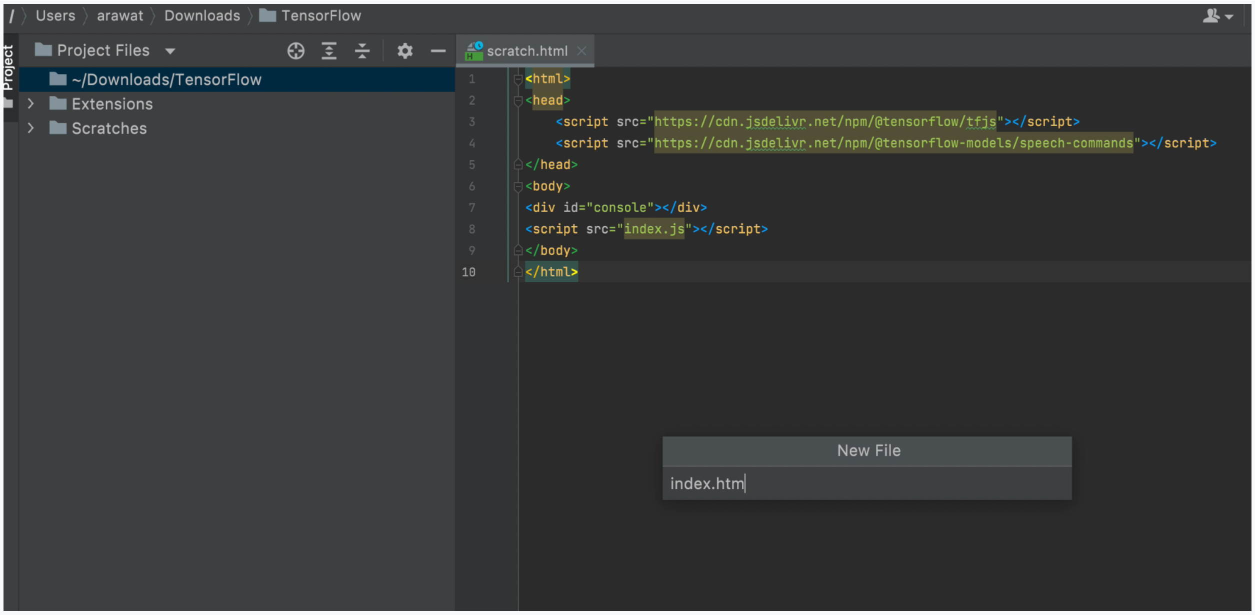
3. Load TensorFlow.js and the Audio model

Open `index.html` in an editor and add this content:

```
<html>
  <head>
    <script src="https://cdn.jsdelivr.net/npm/@tensorflow/tfjs"></script>
    <script src="https://cdn.jsdelivr.net/npm/@tensorflow-models/speech-commands"></scrip
  </head>
  <body>
    <div id="console"></div>
    <script src="index.js"></script>
  </body>
</html>
```

The first `<script>` tag imports the TensorFlow.js library, and the second `<script>` imports the pre-trained Speech Commands model. The `<div id="console">` tag will be used to display the output of the model.

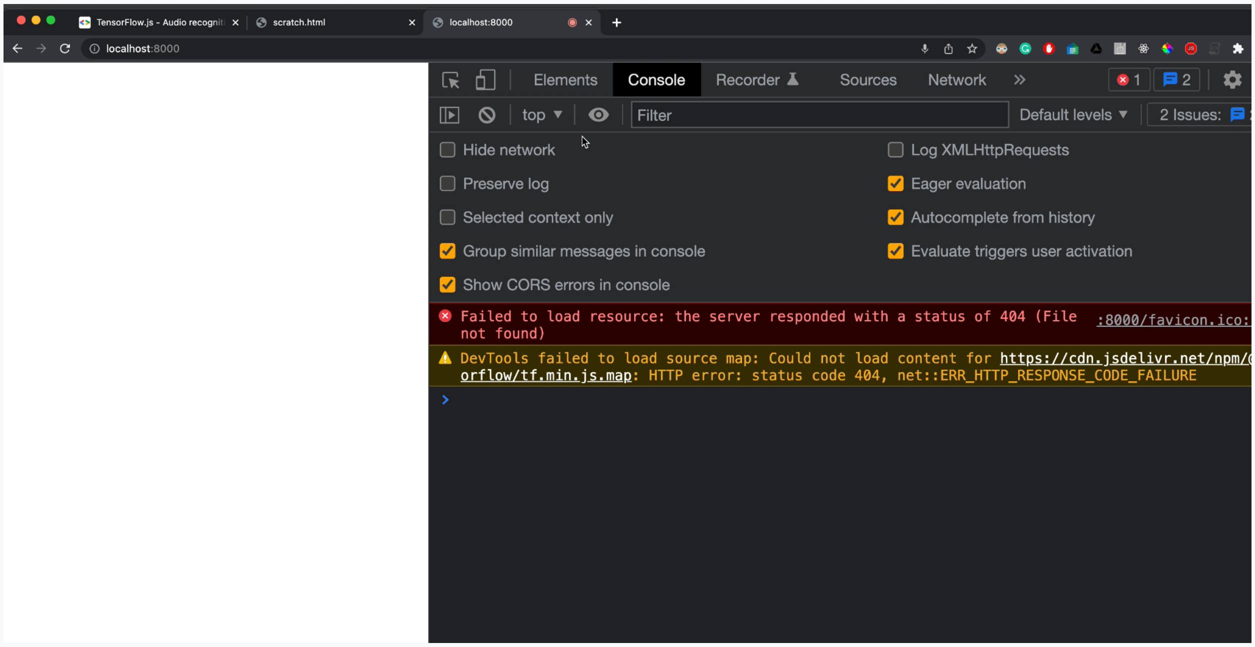

All
Classes
Files
Symbols
Actions
Include disabled actions
/ Users arawat Downloads TensorFlow
new
Press ⌥↩ to assign a shortcut
Add Configuration...
Project
External Libraries
Scratches and Consoles
New
New... ⌘N
New Changelist...
New Database Item...
New Group Persistence File | New
New in This Directory... ^⌥N
New Module... File | New
New Project...
New Project Group
New Projects Setup
New Scratch Buffer
New Toolbar OFF
What's New in IntelliJ IDEA Help
Add New Favorites List
All New Actions
Open Running Configuration in New Tab OFF
Preferences for New Projects... File | New Projects Setup
Run Configuration Templates for New Projects... File | New Projects Setup
Structure for New Projects...
Structure for New Projects... File | New Projects Setup
Track New Instances OFF
Activate Next Window ⌘`
Create Data Source
Data Source from Path File | New
Export to Scratch File
Plugins
New Project... File | New
Scratch File ⇧⌘N File | New
Start Macro Recording Edit | Macros
File | New
... more
Structure
Favorites
TODO
Problems
Profiler
Terminal
Che
Event Log



```html
<html>
<head>
    <script src="https://cdn.jsdelivr.net/npm/@tensorflow/tfjs"></script>
    <script src="https://cdn.jsdelivr.net/npm/@tensorflow-models/speech-commands"></script>
</head>
<body>
<div id="console"></div>
<script src="index.js"></script>
</body>
</html>
```

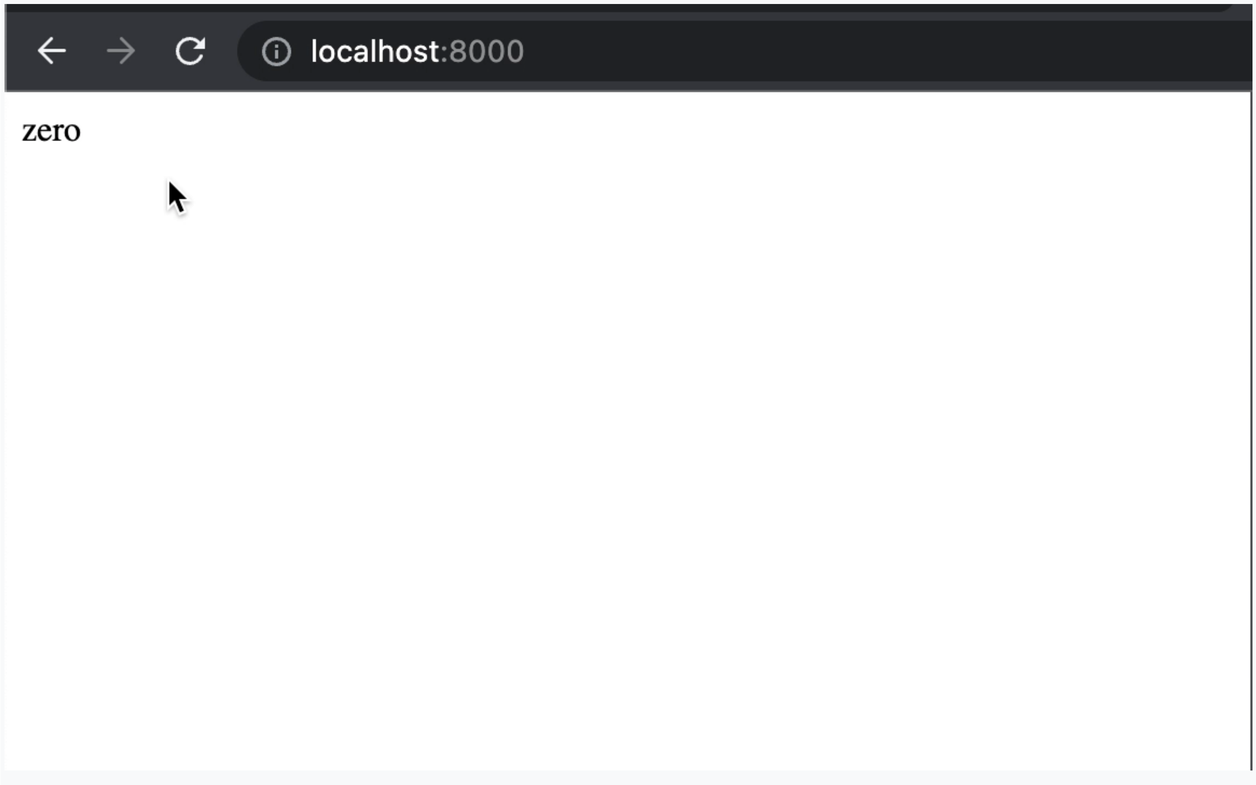
New File

index.htm

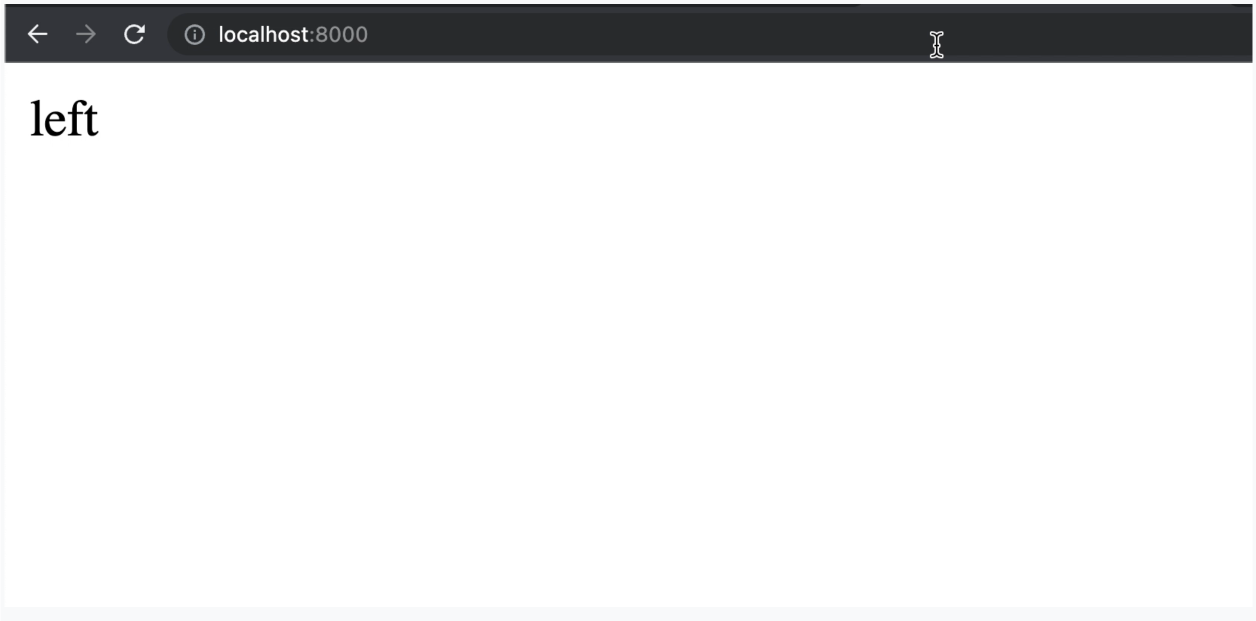


□ Hide network
□ Preserve log
□ Selected context only
☑ Group similar messages in console
☑ Show CORS errors in console
□ Log XMLHttpRequests
☑ Eager evaluation
☑ Autocomplete from history
☑ Evaluate triggers user activation

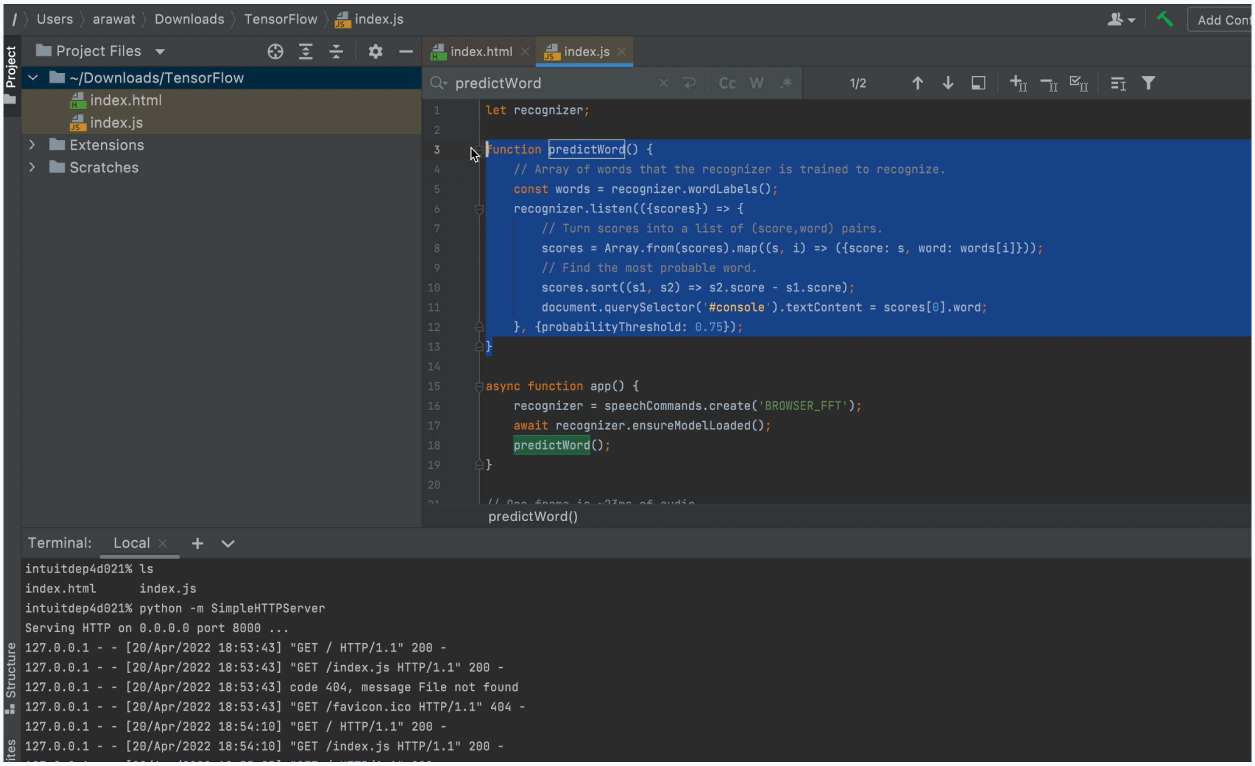
```
Failed to load resource: the server responded with a status of 404 (File    :8000/favicon.ico:
not found)
DevTools failed to load source map: Could not load content for https://cdn.jsdelivr.net/npm/(
orflow/tf.min.js.map: HTTP error: status code 404, net::ERR_HTTP_RESPONSE_CODE_FAILURE
```



zero

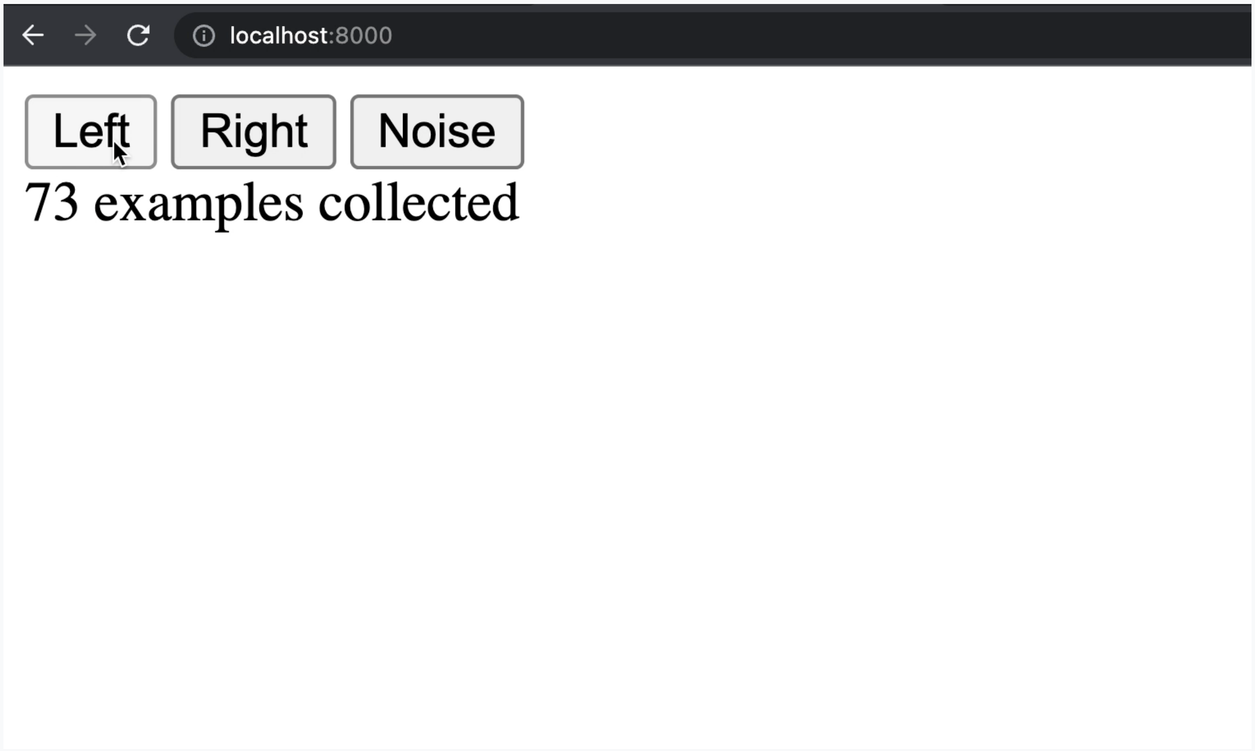


left

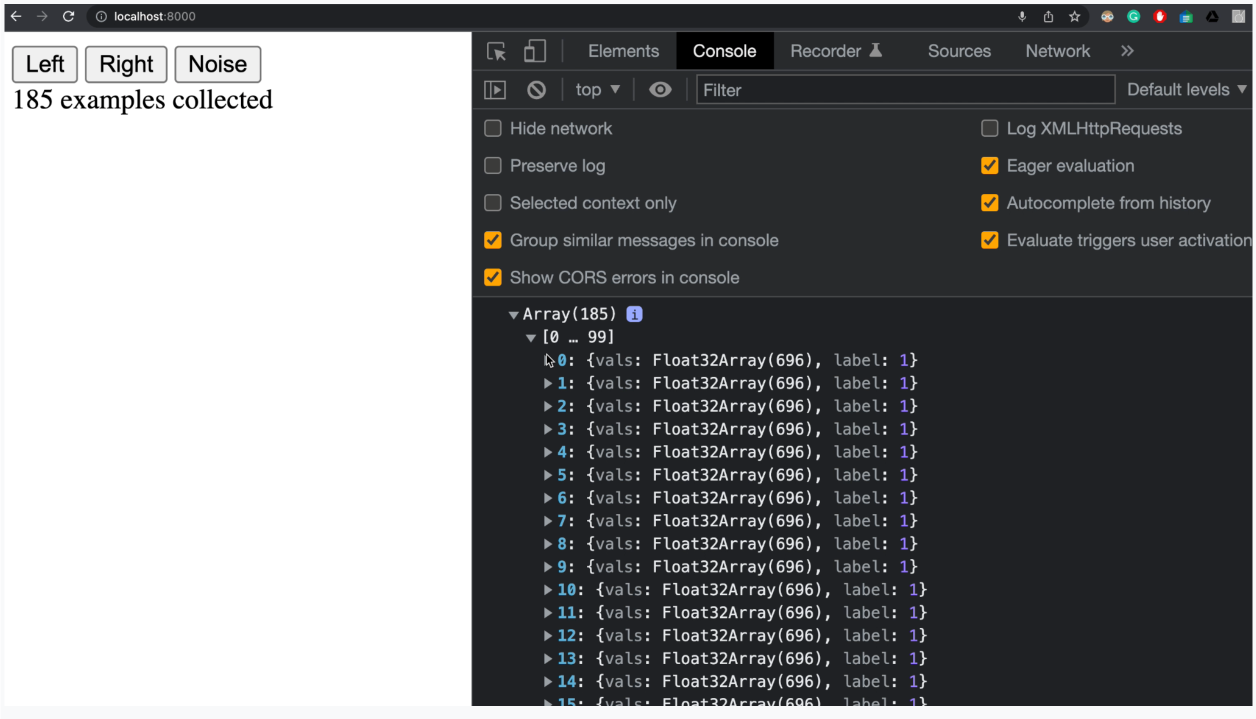


```
let recognizer;

function predictWord() {
    // Array of words that the recognizer is trained to recognize.
    const words = recognizer.wordLabels();
    recognizer.listen(({scores}) => {
        // Turn scores into a list of (score,word) pairs.
        scores = Array.from(scores).map((s, i) => ({score: s, word: words[i]}));
        // Find the most probable word.
        scores.sort((s1, s2) => s2.score - s1.score);
        document.querySelector('#console').textContent = scores[0].word;
    }, {probabilityThreshold: 0.75});
}

async function app() {
    recognizer = speechCommands.create('BROWSER_FFT');
    await recognizer.ensureModelLoaded();
    predictWord();
}

// One frame is ~23ms of audio
```

```
intuitdep4d021% ls
index.html      index.js
intuitdep4d021% python -m SimpleHTTPServer
Serving HTTP on 0.0.0.0 port 8000 ...
127.0.0.1 - - [20/Apr/2022 18:53:43] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:53:43] "GET /index.js HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:53:43] code 404, message File not found
127.0.0.1 - - [20/Apr/2022 18:53:43] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [20/Apr/2022 18:54:10] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:54:10] "GET /index.js HTTP/1.1" 200 -
```



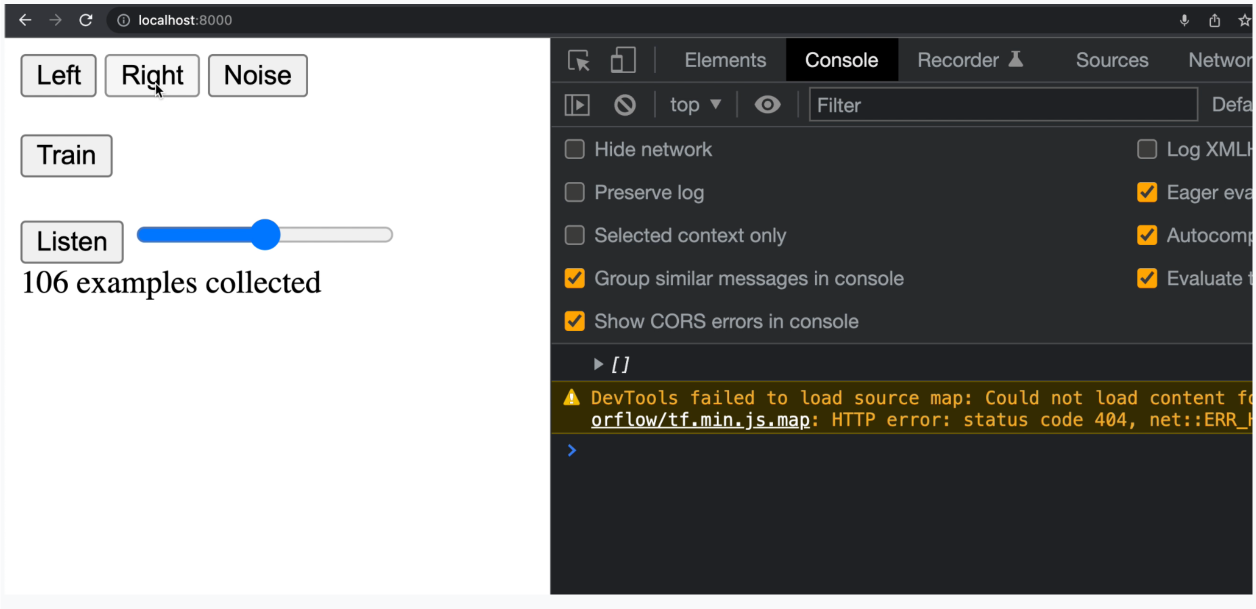
73 examples collected



185 examples collected

- ☐ Hide network
- ☐ Log XMLHttpRequests
- ☐ Preserve log
- ☑ Eager evaluation
- ☐ Selected context only
- ☑ Autocomplete from history
- ☑ Group similar messages in console
- ☑ Evaluate triggers user activation
- ☑ Show CORS errors in console

```
▼Array(185)
  ▼[0 … 99]
    ▶0: {vals: Float32Array(696), label: 1}
    ▶1: {vals: Float32Array(696), label: 1}
    ▶2: {vals: Float32Array(696), label: 1}
    ▶3: {vals: Float32Array(696), label: 1}
    ▶4: {vals: Float32Array(696), label: 1}
    ▶5: {vals: Float32Array(696), label: 1}
    ▶6: {vals: Float32Array(696), label: 1}
    ▶7: {vals: Float32Array(696), label: 1}
    ▶8: {vals: Float32Array(696), label: 1}
    ▶9: {vals: Float32Array(696), label: 1}
    ▶10: {vals: Float32Array(696), label: 1}
    ▶11: {vals: Float32Array(696), label: 1}
    ▶12: {vals: Float32Array(696), label: 1}
    ▶13: {vals: Float32Array(696), label: 1}
    ▶14: {vals: Float32Array(696), label: 1}
    ▶15: {vals: Float32Array(696), label: 1}
```

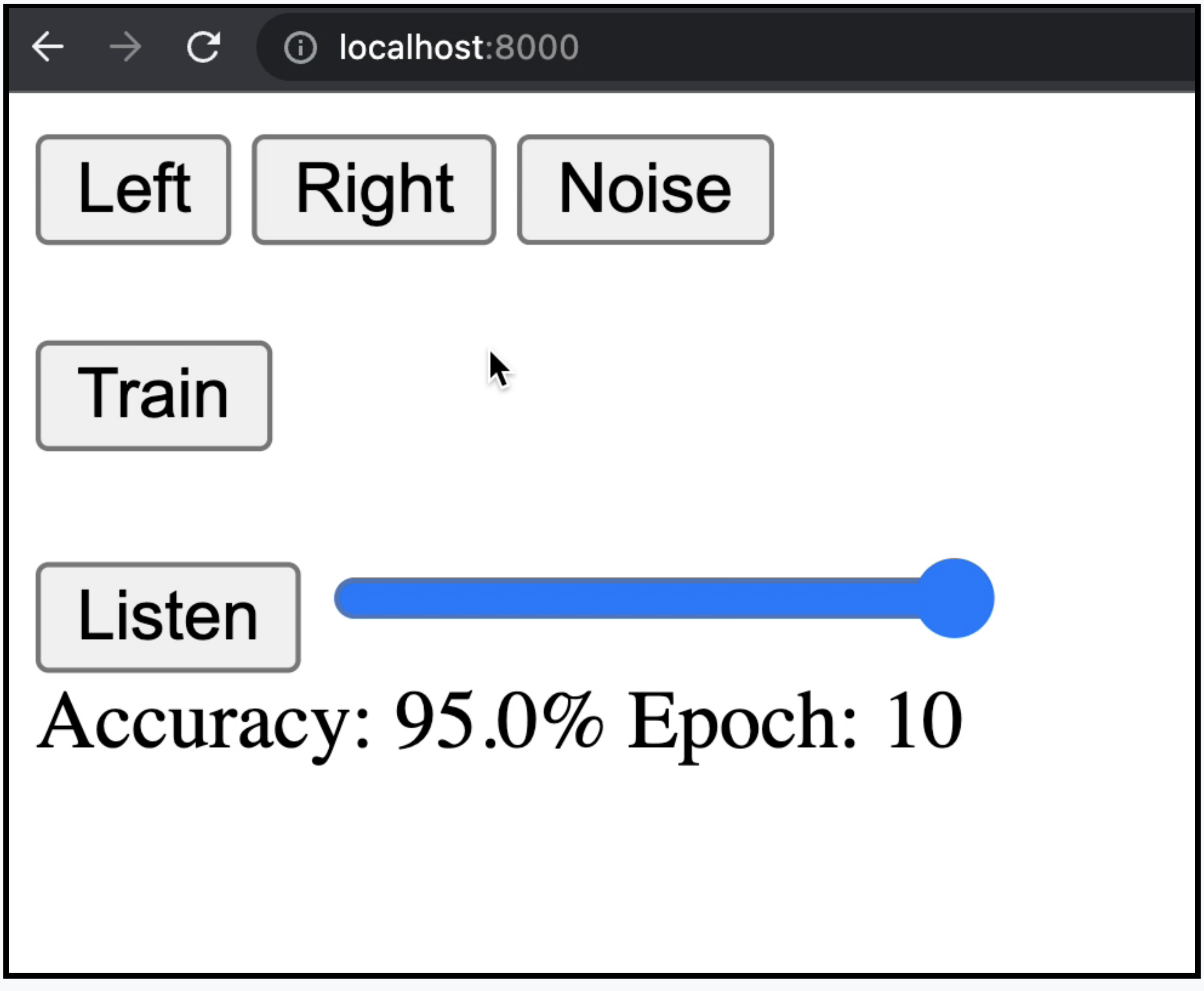


106 examples collected

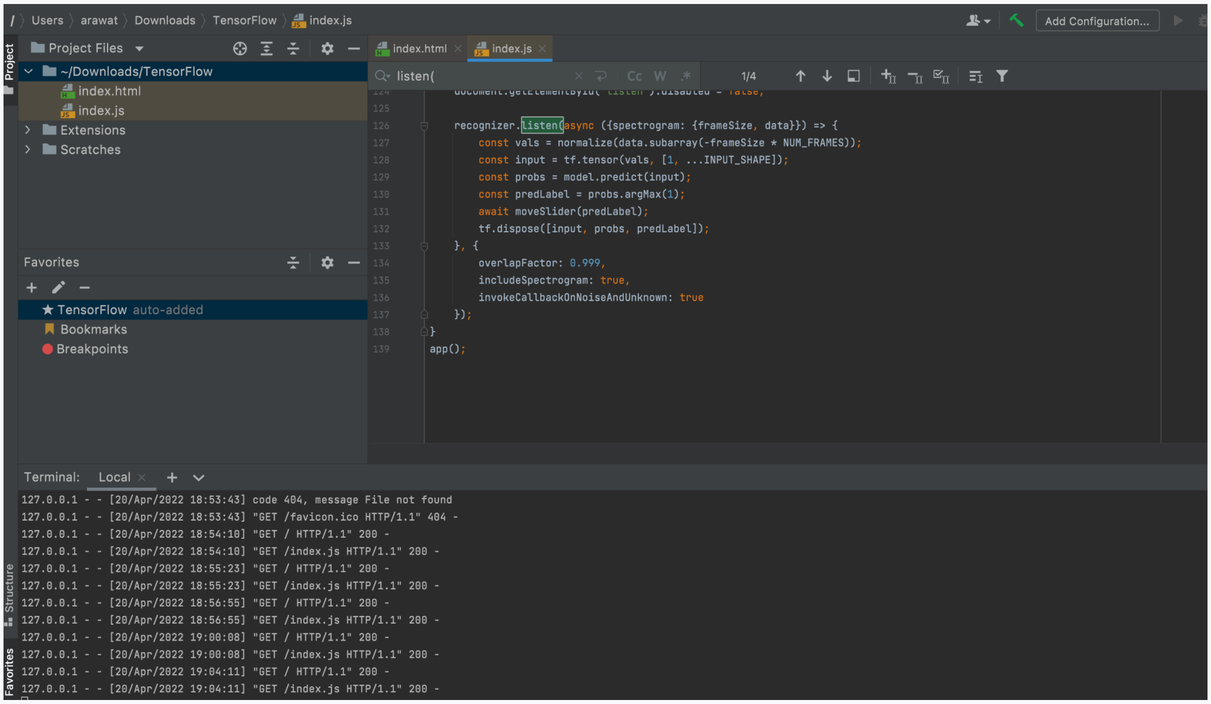
- ☐ Hide network
- ☐ Log XMLH
- ☐ Preserve log
- ☑ Eager eva
- ☐ Selected context only
- ☑ Autocomp
- ☑ Group similar messages in console
- ☑ Evaluate t
- ☑ Show CORS errors in console

```
▶ []
⚠ DevTools failed to load source map: Could not load content fo
  orflow/tf.min.js.map: HTTP error: status code 404, net::ERR_H
>
```

Result :



Accuracy: 95.0% Epoch: 10



```
    document.getElementById('listen').disabled = false;

    recognizer.listen(async ({spectrogram: {frameSize, data}}) => {
        const vals = normalize(data.subarray(-frameSize * NUM_FRAMES));
        const input = tf.tensor(vals, [1, ...INPUT_SHAPE]);
        const probs = model.predict(input);
        const predLabel = probs.argMax(1);
        await moveSlider(predLabel);
        tf.dispose([input, probs, predLabel]);
    }, {
        overlapFactor: 0.999,
        includeSpectrogram: true,
        invokeCallbackOnNoiseAndUnknown: true
    });
}
app();
```

```
127.0.0.1 - - [20/Apr/2022 18:53:43] code 404, message File not found
127.0.0.1 - - [20/Apr/2022 18:53:43] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [20/Apr/2022 18:54:10] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:54:10] "GET /index.js HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:55:23] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:55:23] "GET /index.js HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:56:55] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 18:56:55] "GET /index.js HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 19:00:08] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 19:00:08] "GET /index.js HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 19:04:11] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Apr/2022 19:04:11] "GET /index.js HTTP/1.1" 200 -
```