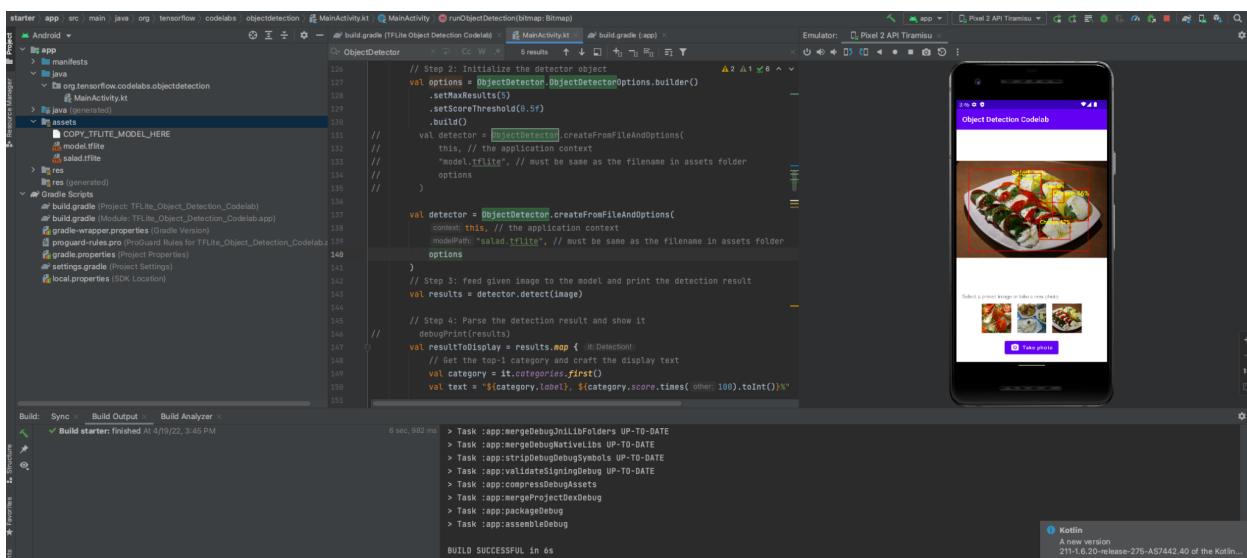
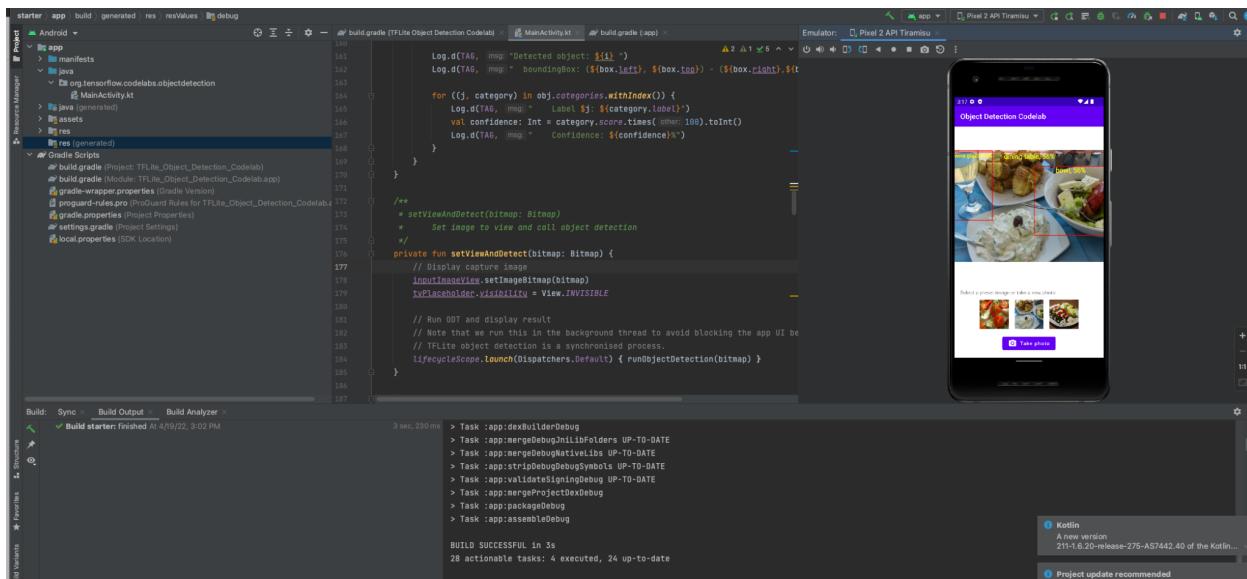


# Assignment-5

## On Device ML

Harika Nalam  
SJSU ID - 015939963

- A) Mobile App and Image training on the device: Build and deploy a custom object detection model using tflite on the android simulator
- Using TensorFlow model to build SDK Android app and detect objects in an image



- B) Mobile app and audio training on device: Build a custom pre-trained Audio Classification model

- a) Using the Tensorflow model an SDK Android app is used to record the audio and classify the audio

The screenshot shows the Android Studio interface with the project structure on the left and the code editor on the right. The code in `MainActivity.kt` is as follows:

```

    // TODO 2: Check if it's a bird sound.
    var filteredModelOutput = output[0].categories.filter { it.score > .5 }

    // TODO 3: given there's a bird sound, which one is it?
    if (filteredModelOutput.isNotEmpty()) {
        Log.i("My Sound Classification", "bird sound detected!")
        filteredModelOutput = output[0].categories.filter {
            it.score > probabilityThreshold
        }
    }

    val outputStr =
        filteredModelOutput.sortedBy { -it.score }
            .joinToString(separator = "\n") { "${it.label} : ${it.score}" }

    if (outputStr.isNotEmpty())
        runOnUiThread {
            textView.text = outputStr
        }
    }
}

```

The emulator on the right shows the app running with the title "My Sound Classification" and the text "Recording". Below it, a toast message says "Hello World". At the bottom, it displays "Number Of Samples: 1" and "Sampling Rate: 10000".

- C) Web app and image training on the device: TensorFlow.js Transfer Learning Image Classifier

- Transfer Learning using Glitch.com
- As a first step, a binary classification dataset is generated
- The second step is to Train and predict the model on the newly generated dataset.
- Class and confidence for the image is the output

Glitch

script.js

pentagonal-developing-indigo

PRETTIER

Settings

Assets

Files

LICENSE.md

README.md

index.html

script.js

style.css

```
1  /*  
2  * @license  
3  * Copyright 2018 Google LLC. All Rights Reserved.  
4  * Licensed under the Apache License, Version 2.0 (the "License"  
5  * you may not use this file except in compliance with the License.  
6  * You may obtain a copy of the License at  
7  *  
8  * http://www.apache.org/licenses/LICENSE-2.0  
9  *  
10 * Unless required by applicable law or agreed to in writing, so  
11 * distributed under the License is distributed on an "AS IS" BA  
12 * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express  
13 * See the License for the specific language governing permissio  
14 * limitations under the License.  
15 * ======  
16 */  
17  
18 // const status = document.getElementById('status');  
19 // if (status) {  
20 //   status.innerText = 'Loaded TensorFlow.js - version: ' + tf.  
21 // }  
22  
23 const STATUS = document.getElementById('status');  
24 const VIDEO = document.getElementById('webcam');  
25 const ENABLE_CAM_BUTTON = document.getElementById('enableCam');  
26 const RESET_BUTTON = document.getElementById('reset');  
27 const TRAIN_BUTTON = document.getElementById('train');  
28 const MOBILE_NET_INPUT_WIDTH = 224;  
29 const MOBILE_NET_INPUT_HEIGHT = 224;  
30 const STOP_DATA_GATHER = -1;  
31 const CLASS NAMES = [];
```

pentagonal-developing-indigo.glitch.me/

Remix

Prediction: Class 2 with 98% confidence



Glitch

script.js

pentagonal-developing-indigo

Settings Assets Files LICENSE.md README.md index.html script.js style.css

```

1  /**
2  * @license
3  * Copyright 2018 Google LLC. All Rights Reserved.
4  * Licensed under the Apache License, Version 2.0 (the "License")
5  * you may not use this file except in compliance with the License.
6  * You may obtain a copy of the License at
7  *
8  * http://www.apache.org/licenses/LICENSE-2.0
9  *
10 * Unless required by applicable law or agreed to in writing, so
11 * distributed under the License is distributed on an "AS IS" BA
12 * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express
13 * See the License for the specific language governing permissio
14 * limitations under the License.
15 * =====
16 */
17
18 // const status = document.getElementById('status');
19 // if (status) {
20 //   status.innerText = 'Loaded TensorFlow.js - version: ' + tf.
21 // }
22
23 const STATUS = document.getElementById('status');
24 const VIDEO = document.getElementById('webcam');
25 const ENABLE_CAM_BUTTON = document.getElementById('enableCam');
26 const RESET_BUTTON = document.getElementById('reset');
27 const TRAIN_BUTTON = document.getElementById('train');
28 const MOBILE_NET_INPUT_WIDTH = 224;
29 const MOBILE_NET_INPUT_HEIGHT = 224;
30 const STOP_DATA_GATHER = -1;
31 const CLASS NAMES = [''];
32

```

Prediction: Class 1 with 99% confidence

## D) Webapp and audio training on the device: TensorFlow.js - Audio recognition using transfer learning

- Audio recognition using transfer learning
- A new audio dataset is generated with two different audio sounds along with noise
- The model is built on the newly generated dataset.
- And model is used to predict the audio signals

Glitch

index.html

beaded-decorous-racer

Settings Assets Files LICENSE.md README.md index.html index.js script.js style.css

```

1
2  <html>
3    <head>
4      <script src="https://cdn.jsdelivr.net/npm/@tensorflow/tfjs"></script>
5      <script src="https://cdn.jsdelivr.net/npm/@tensorflow-models/speech-command"
6    </head>
7    <body>
8      <button id="left" onmousedown="collect(0)" onmouseup="collect(null)">
9        Left
10     </button>
11     <button id="right" onmousedown="collect(1)" onmouseup="collect(null)">
12       Right
13     </button>
14     <button id="noise" onmousedown="collect(2)" onmouseup="collect(null)">
15       Noise
16     </button>
17     <br /><br />
18     <button id="train" onclick="train()">Train</button>
19     <br /><br />
20     <button id="listen" onclick="listen()>Listen</button>
21     <input type="range" id="output" min="0" max="10" step="0.1">
22     <div id="console"></div>
23     <script src="index.js"></script>
24   </body>
25 </html>

```

Left Right Noise

Train

Listen 0

STATIC LOGS TERMINAL TOOLS PREVIEW

The screenshot shows the Glitch web-based development environment. On the left, the file tree includes `beaded-decorous-racer`, `Settings`, `Assets`, `LICENSE.md`, `README.md`, `index.html`, `index.js`, `script.js`, and `style.css`. The `index.html` file is open, displaying a script that handles button events for collecting data ('left', 'right', 'noise') and training a model ('train'). It also includes a range input for output volume and a div for console logs. The right side of the interface shows a preview of the application at `beaded-decorous-racer.glitch.me/`. A real-time audio visualization tool is integrated, showing three tracks labeled 'Left', 'Right', and 'Noise' with a 'Train' button and a slider for volume control.

- E) Using out of box SDK to do ML on-device: Use ML Kit to perform
- The model is built to translate the text into other languages.

The screenshot shows the Android Studio interface with the `TextAnalyzer` project open. The Project tool window displays the app module structure, including `AndroidManifest.xml`, `res` (layout, drawable, mipmap, values), and `src` (MainActivity.kt, MainViewModel.kt, TextAnalyzer.kt). The `TextAnalyzer.kt` file is selected and shown in the code editor, containing Kotlin code for a text analysis class. The `Build Output` tab shows a successful build. On the right, an emulator window displays a camera view with text recognition results overlaid, showing detected text in English and German. The bottom status bar indicates the device is a Pixel 2 API Tiramisu.