

# 인공지능 체험하기

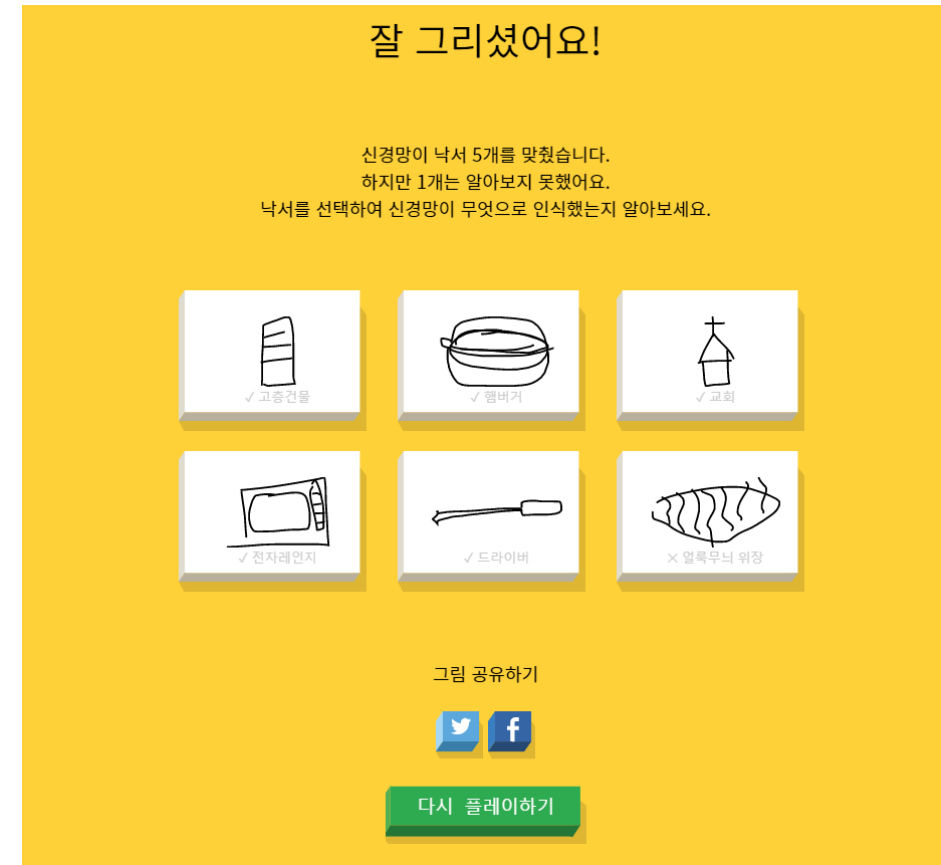
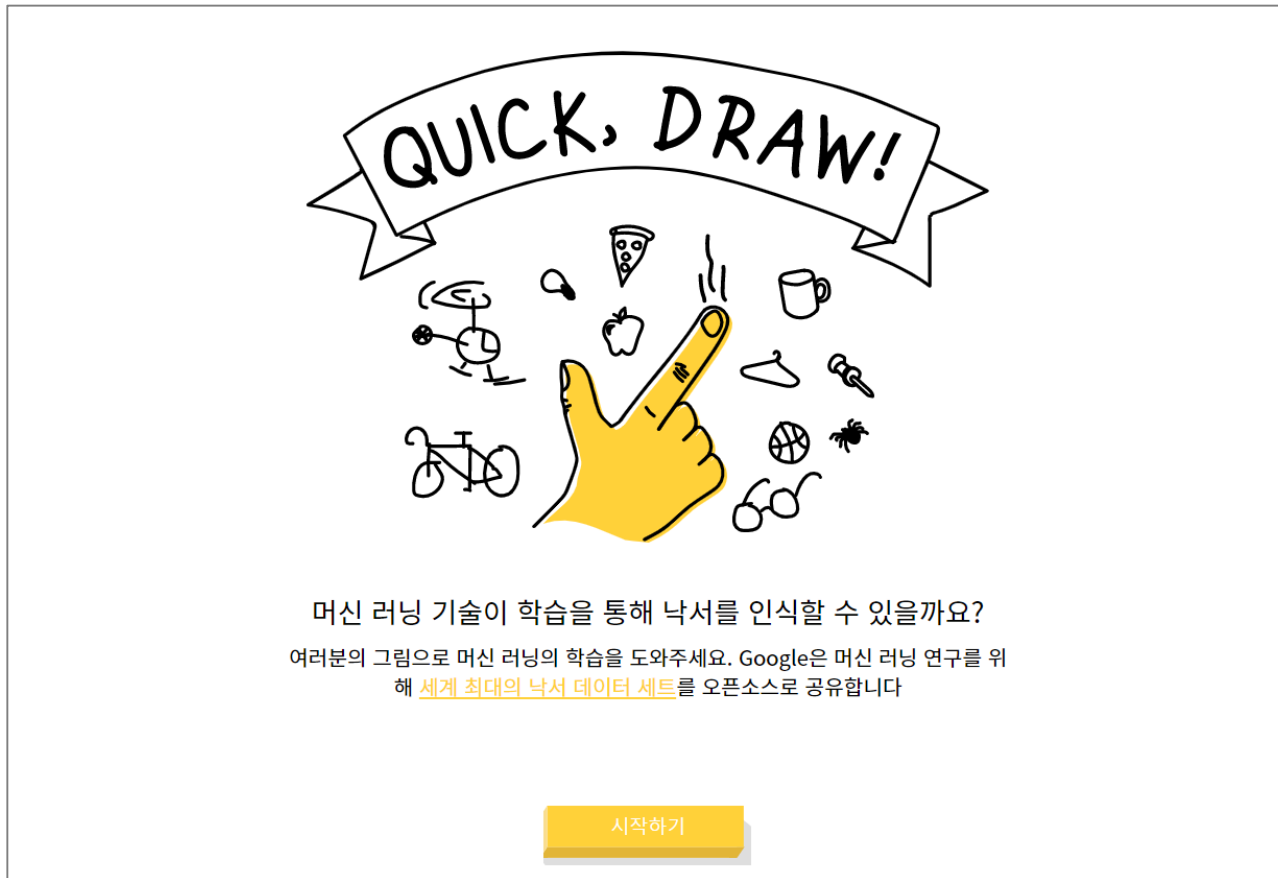
동의과학대학 컴퓨터정보과  
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# 학습 내용

- 퀵 드로우(Quick Draw)
- 오토 드로우
- Machine Learning for kids
- **Teachable Machine**
  1. 이미지 인식 모델
  2. 포즈 인식 모델
  3. 소리 인식 모델
- **이미지 인식 모델 활용하기**

# 퀵 드로우(Quick Draw):

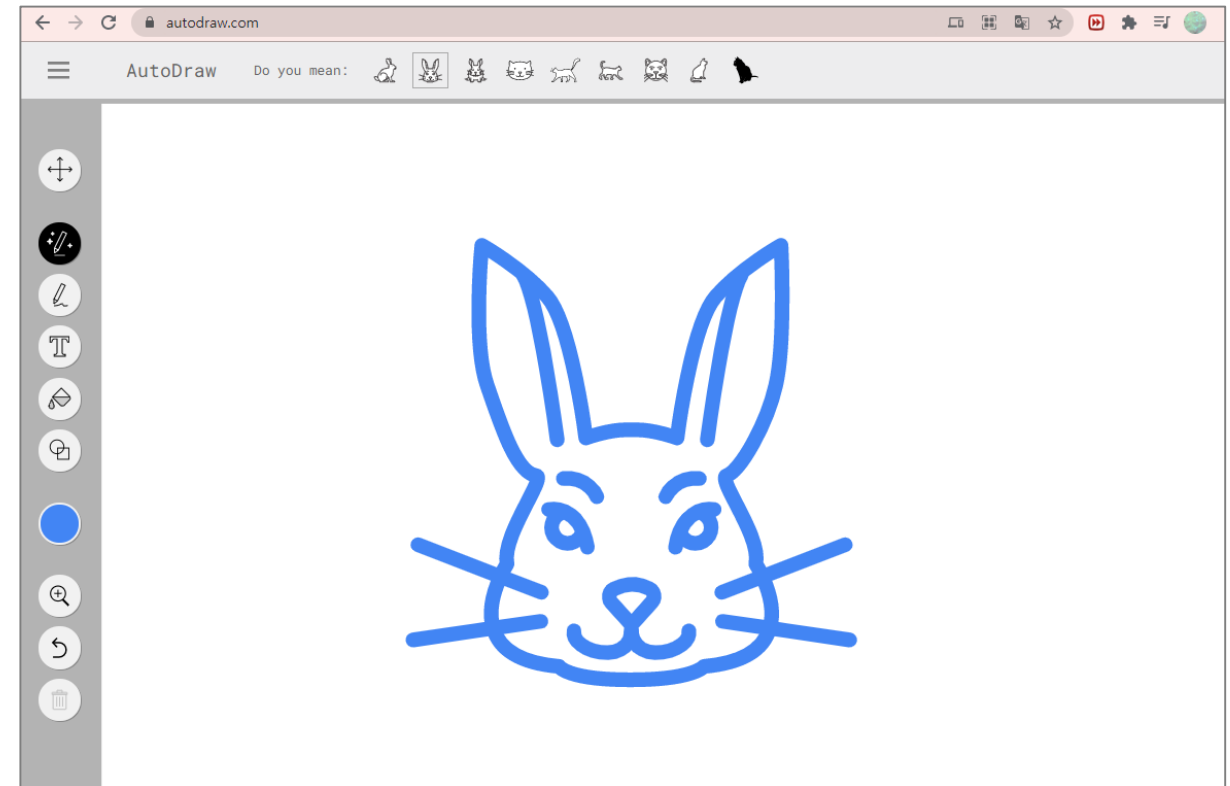
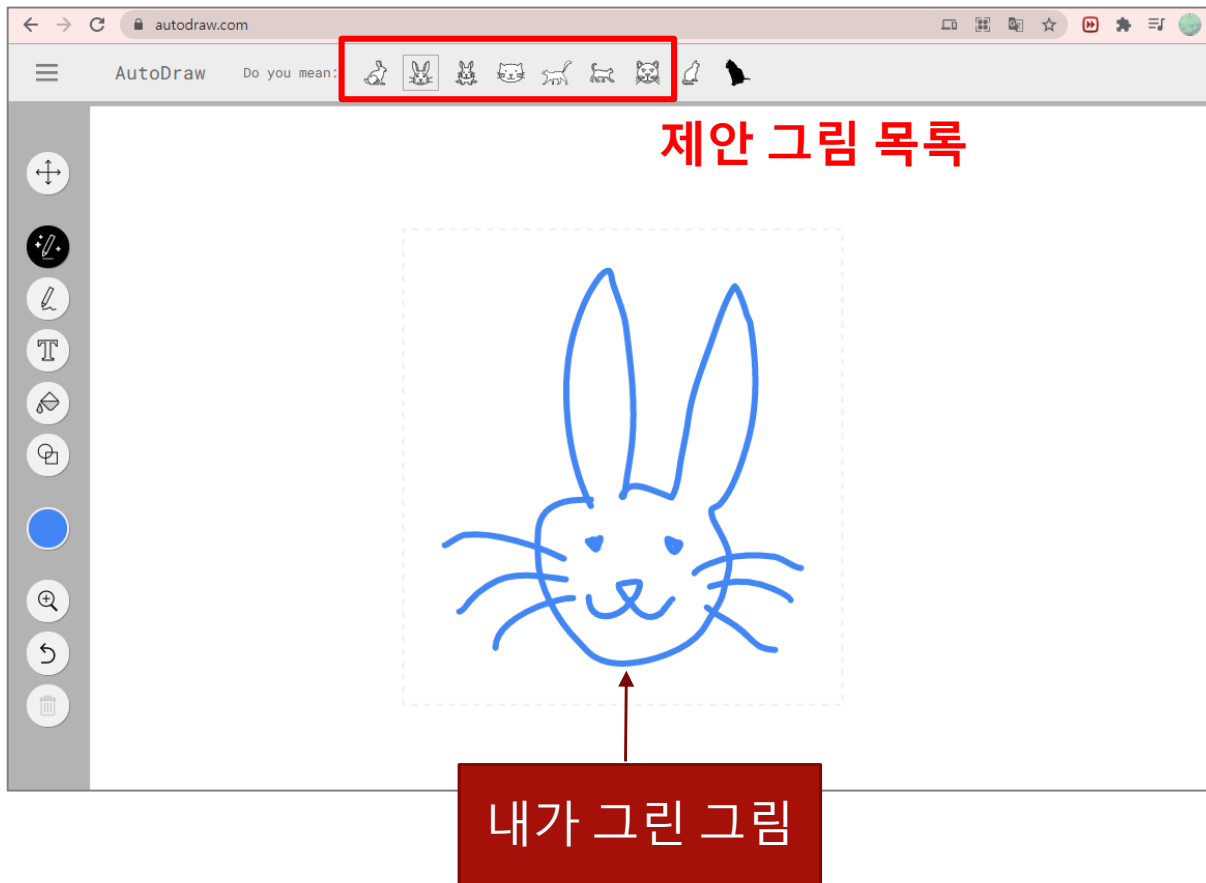
- 지도 학습 방법으로 학습하여 낙서를 인식할 수 있는 인공지능
- <https://quickdraw.withgoogle.com/>



# 오토 드로우(AutoDraw)

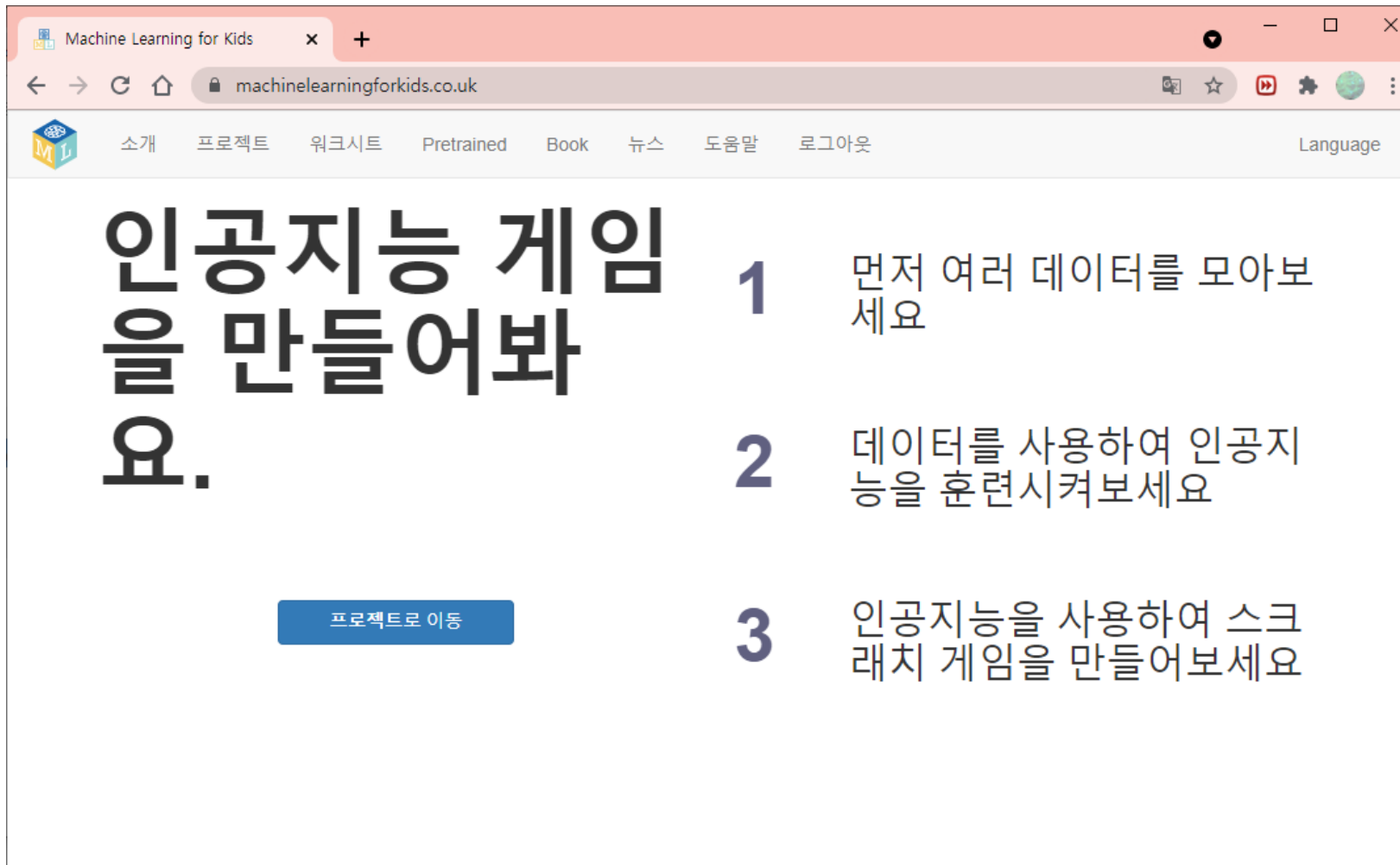
- 이용자가 그린 그림을 업그레이드 해주는 기능
- <https://www.autodraw.com/>

<https://experiments.withgoogle.com/autodraw>




# MachineLearning for kids

- <http://machinelearningforkids.co.uk/>



# MachineLearning for kids

 소개 프로젝트 워크시트 학습된 책 새소식 도움말 로그아웃 Language

"aiProj"

## 훈련

컴퓨터가 훈련할 수 있도록 다양한 데이터를 준비하세요.

훈련

## 학습 & 평가

데이터를 사용하여 컴퓨터를 학습시키세요. images

학습 & 평가

## 만들기

당신이 게임이나 앱을 만들기 위해 훈련시킨 머신러닝 모델을 스크래치, 파이선, 앱 인벤터에서 사용해 보세요.

만들기

# MachineLearning for kids



소개 프로젝트 워크 시트 사전 훈련 도서 뉴스 도움말 로그 아웃

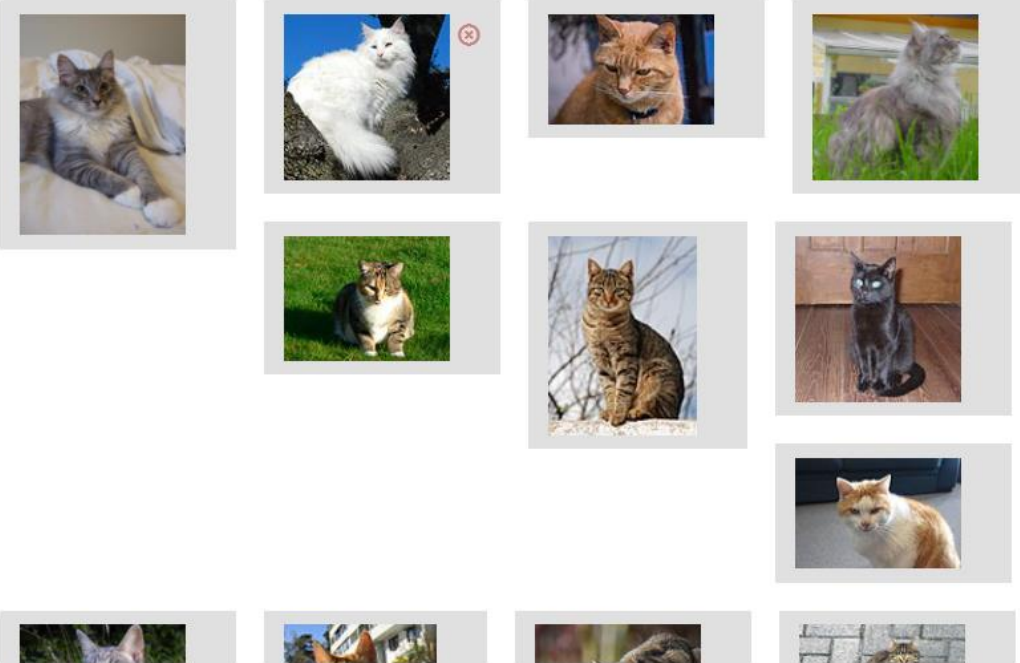
언어

인식 **이미지** 로 **고양이 또는 개**

[프로젝트로 돌아 가기](#)

+ 새로운 레이블 추가

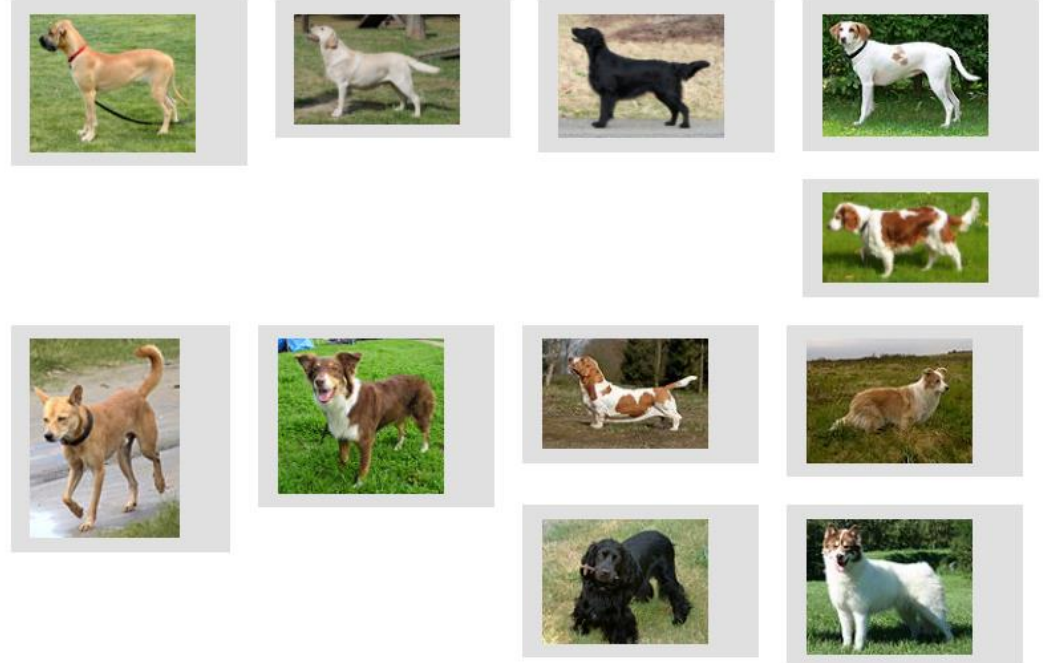
**고양이**



웹 웹캠 그리기

20

**개**



웹 웹캠 그리기


21

# github.com 에 저장소 만들기

- 프로젝트 웹 게시를 위한 준비
  - 각자 github에 로그인
  - 새로운 repository 생성

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)

Owner \*  aicsdit / Repository name \* aicsdit.github.io ✓

Great repository names are short and memorable. Need inspiration? [How about reimagined broccoli?](#)

Description (optional)

2022년 AI를 활용한 무인이동체 개발 교육

☒ Public  
Anyone on the internet can see this repository. You choose who can commit.

☐ Private  
You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

☒ Add a README file  
This is where you can write a long description for your project. [Learn more.](#)

Add .gitignore


Choose which files not to track from a list of templates. [Learn more.](#)

.gitignore template: None ▾

Choose a license

A license tells others what they can and can't do with your code. [Learn more.](#)

License: None ▾

This will set  main as the default branch. Change the default name in your [settings](#).

① You are creating a public repository in your personal account.

Create repository

반드시 username.github.io로  
저장소 이름을 정해야 web  
서비스가 됨



# github.com 에 저장소 만들기

## ■ index.html 파일 작성

The image illustrates the process of creating a website on GitHub. It is composed of three overlapping screenshots:


- Top Screenshot (Repository View):** Shows the GitHub repository page for `aicsdit / aicsdit.github.io`. The `main` branch is selected. The `Add file` button is highlighted with a red box.
- Bottom-Left Screenshot (File Editor):** Shows the 'Edit new file' interface for `index.html` in the `main` branch. The file content is:


```
1 <!DOCTYPE html>
2 <html>
3   <head>
4     <meta charset="utf-8">
5     <title>나의 AI 프로젝트</title>
6   </head>
7   <body>
8     <h2> Hello, World!!! </h2>
9   </body>
10 </html>
11 |
```
- Bottom-Right Screenshot (Browser Preview):** Shows a web browser displaying the website at `aicsdit.github.io/index.html`. The address bar and the text `Hello, World!!!` are highlighted with red boxes. Red text annotations point to these elements: **웹사이트 주소** (Website address) points to the address bar, and **만들어진 웹사이트** (Created website) points to the displayed text.

# Teachable Machine

- 머신러닝 **모델**들을 만들기 위한 웹 기반 도구
- <https://teachablemachine.withgoogle.com/>

## New Project

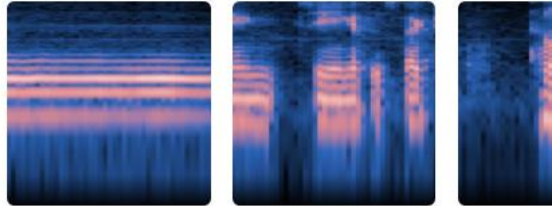
 Open an existing project from Drive.

 Open an existing project from a file.



### Image Project

Teach based on images, from files or your webcam.



### Audio Project

Teach based on one-second-long sounds, from files or your microphone.



### Pose Project

Teach based on images, from files or your webcam.

# Teachable Machine

## How do I use it?

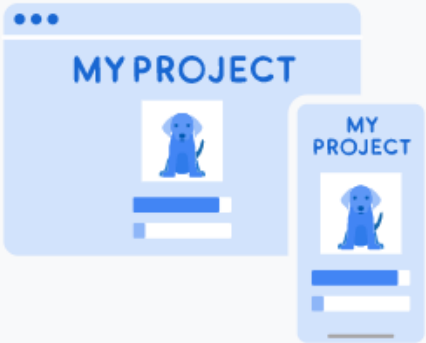
Class 1



Class 2



TRAIN MODEL



### 1 Gather

Gather and group your examples into classes, or categories, that you want the computer to learn.

[Video: Gather samples](#) ▶

### 2 Train

Train your model, then instantly test it out to see whether it can correctly classify new examples.

[Video: Train your model](#) ▶

### 3 Export

Export your model for your projects: sites, apps, and more. You can download your model or host it online for free.

[Video: Export your model](#) ▶

# Teachable Machine으로 모델 생성하기

## ■ 모델 만들기 단계

1. 자료수집
2. 학습
3. 인식(판별)

The screenshot displays the Teachable Machine web interface. On the left, there are two class configuration panels, 'Class 1' and 'Class 2', each with 'Webcam' and 'Upload' buttons for adding image samples. In the center, the 'Training' panel is active, showing a 'Train Model' button and an 'Advanced' settings dropdown. This dropdown is expanded, revealing three parameters: 'Epochs' set to 50, 'Batch Size' set to 16, and 'Learning Rate' set to 0.001. These three parameters are enclosed in a red rectangular box. Below the training settings are buttons for 'Reset Defaults' and 'Under the hood'. On the right, a 'Preview' panel shows a message: 'You must train a model on the left before you can preview it here.' and an 'Export Model' button.

- **Epochs** : 전체 데이터 학습 횟수
- **Batch Size** : 전체 데이터를 총 16개로 나누어 학습(연산)
- **Learning Rate** : 학습율

# Teachable Machine으로 모델 생성하기

## ■ Class

- 서로 연관된 것들을 모아서 그룹핑(분류) 한 것이라는 의미
- 해당 클래스에 들어갈 자료를 수집

## ■ Training

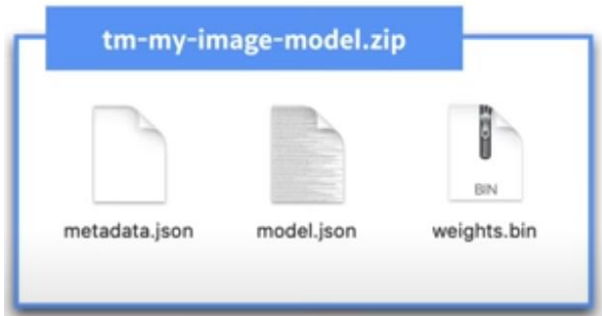
- 기계에게 학습을 시키는 단계

## ■ Preview

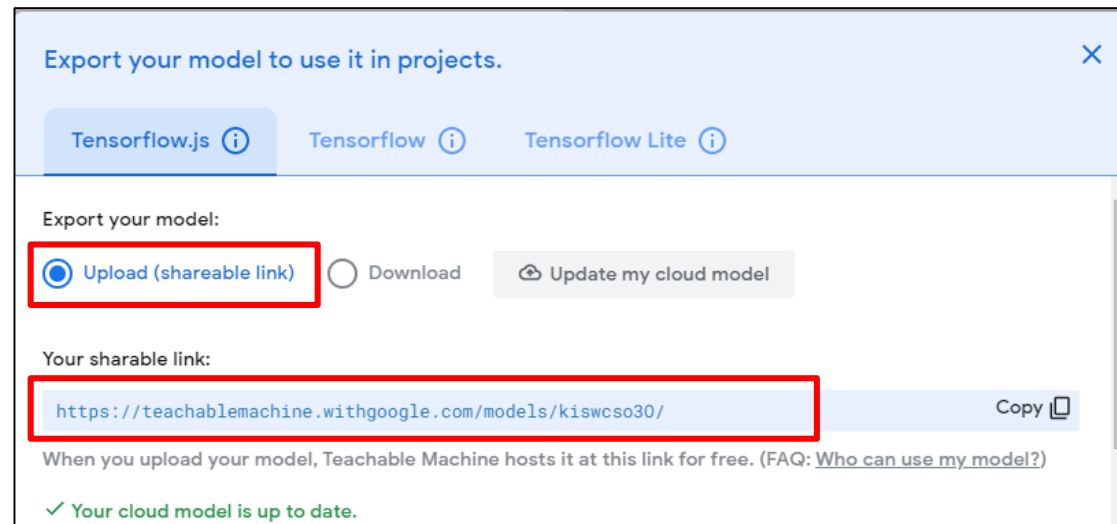
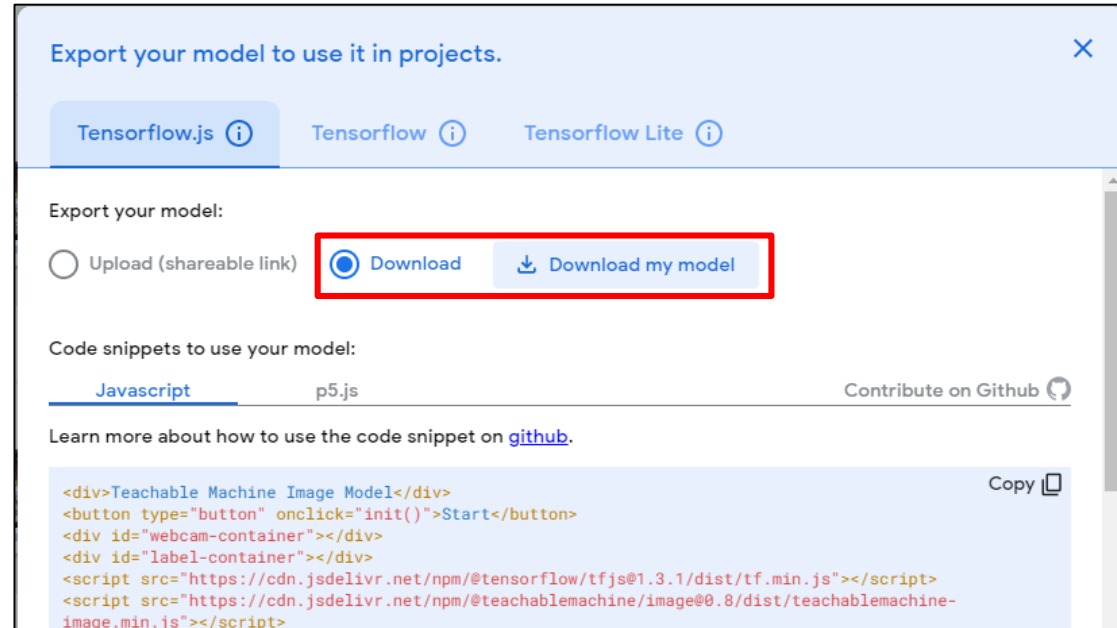
- 학습된 모델을 통해 현재 이미지를 판별
- 기계가 학습을 제대로 했는지 평가
- 학습 상태를 보고 Class의 자료들을 재정리
  - 부정확하거나 Class에 속하지 않은 자료 삭제

# 학습 모델 Export

- 학습 모델(판단력) 활용
  - 로컬에 다운로드



- 클라우드에 업로드
  - 링크 사용



# 1. 이미지 인식 모델

## 1. 곰과 하마 인형 자료 수집

The screenshot displays the Teachable Machine web application. The interface is divided into three main sections: a left sidebar with the 'Teachable Machine' logo, a central workspace, and a right sidebar with 'Training' and 'Preview' tabs.

The central workspace contains three data collection panels, each with a red border:

- bear**: 114 Image Samples. Includes 'Webcam' and 'Upload' buttons, followed by a row of 8 image thumbnails showing teddy bears.
- hippo**: 119 Image Samples. Includes 'Webcam' and 'Upload' buttons, followed by a row of 8 image thumbnails showing hippo plushies.
- none**: 86 Image Samples. Includes 'Webcam' and 'Upload' buttons, followed by a row of 8 image thumbnails showing various background scenes.

The right sidebar contains two tabs: 'Training' and 'Preview'. The 'Training' tab is active, showing a 'Training...' button and the text 'Preparing training data...'. The 'Preview' tab is inactive, showing an 'Export Model' button and a message: 'You must train a model on the left before you can preview it here.'

# 1. 이미지 인식 모델

학습하기 전에 잘못 들어간 영상, 흔들린 영상 등 부정확한 영상은 제거한다.

## 2. 곰과 하마 인형 자료 학습

Teachable Machine

Don't switch tabs!  
You must leave this tab open to train your model. [Don't show again](#) [OK](#)

**bear**

103 Image Samples

**hippo**

109 Image Samples

**none**

80 Image Samples

Add a class

**Training**

[Training...](#)

00:08 - 34 / 50

Advanced

**Preview** [Export Model](#)

You must train a model on the left before you can preview it here.



# 1. 이미지 인식 모델

## 3. 곰과 하마 인형 이미지 인식(판별)

Teachable Machine

**bear**

103 Image Samples

Webcam Upload

**hippo**

109 Image Samples

Webcam Upload

**none**

80 Image Samples

Webcam Upload

Add a class

**Training**

Model Trained

Advanced

**Preview** Export Model

Input ON Webcam

Switch Webcam

**Output**

**bear** 100%

**hippo**

**none**

# 1. 이미지 인식 모델

## 4. 곰과 하마 이미지 인식 모델 저장 및 웹 게시

Export your model to use it in projects.

Tensorflow.js ⓘ Tensorflow ⓘ Tensorflow Lite ⓘ

Export your model:

☒ Upload (shareable link) ☐ Download

Your sharable link:

[https://teachablemachine.withgoogle.com/models/\[...\]](https://teachablemachine.withgoogle.com/models/[...])

When you upload your model, Teachable Machine hosts it at this link for free. (FAQ: [Who can use my model?](#))

Code snippets to use your model:

Javascript p5.js [Contribute on GitHub](#)

Open up the code snippet below directly in the [p5.js Web Editor](#).

```
<div>Teachable Machine Image Model - p5.js and ml5.js</div>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/p5.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/addons/p5.dom.min.js"></script>
<script src="https://unpkg.com/ml5@latest/dist/ml5.min.js"></script>
<script type="text/javascript">
  // Classifier Variable
  let classifier;
  // Model URL
  let imageModelURL = './my_model/';

  // Video
  let video;
  let flippedVideo;
```

Export your model to use it in projects.

Tensorflow.js ⓘ Tensorflow ⓘ Tensorflow Lite ⓘ

Export your model:

☒ Upload (shareable link) ☐ Download

Your sharable link:

<https://teachablemachine.withgoogle.com/models/bxHAcmpmb/> [Copy](#)

When you upload your model, Teachable Machine hosts it at this link for free. (FAQ: [Who can use my model?](#))

✓ Your cloud model is up to date.

Code snippets to use your model:

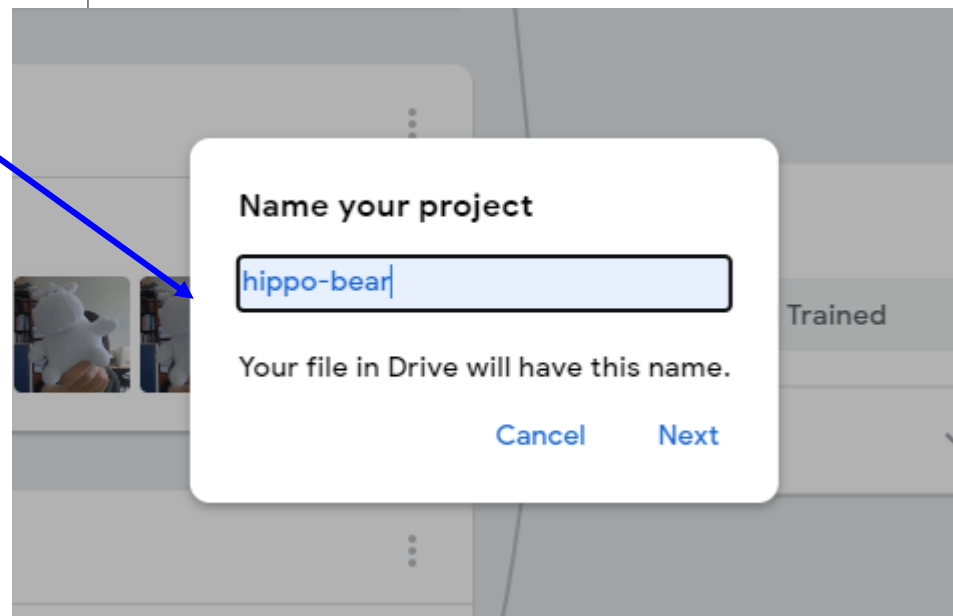
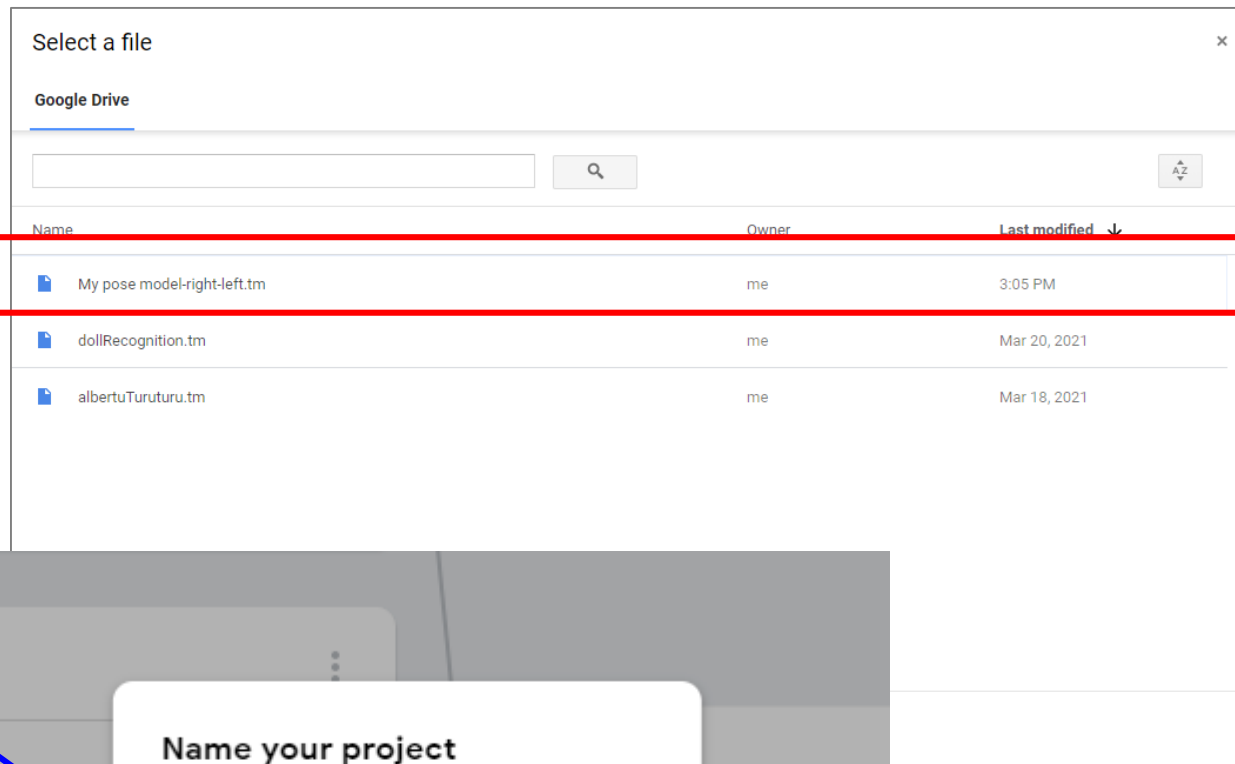
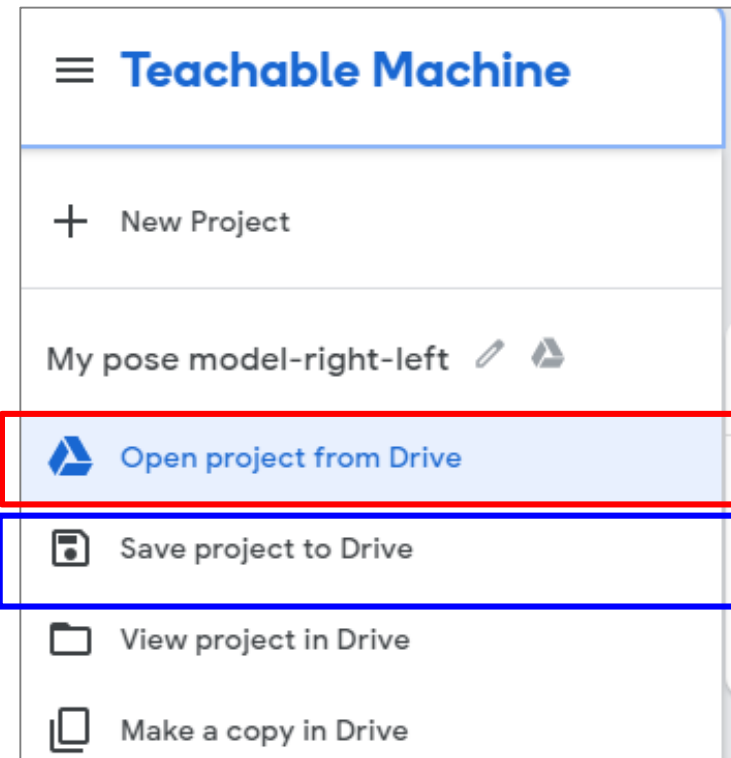
Javascript p5.js [Contribute on GitHub](#)

Open up the code snippet below directly in the [p5.js Web Editor](#).

```
<div>Teachable Machine Image Model - p5.js and ml5.js</div>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/p5.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/addons/p5.dom.min.js"></script>
<script src="https://unpkg.com/ml5@latest/dist/ml5.min.js"></script>
<script type="text/javascript">
  // Classifier Variable
  let classifier;
  // Model URL
  let imageModelURL = 'https://teachablemachine.withgoogle.com/models/bxHAcmpmb/';
```

<https://teachablemachine.withgoogle.com/models/bxHAcmpmb>

# 구글 드라이브에 프로젝트 저장하고 불러오기



[teachablemachine.withgoogle.com/models/JV9gQZ-A0/](https://teachablemachine.withgoogle.com/models/JV9gQZ-A0/)

**모델을 다운로드하여 확인해 본다.**

[illegible]

# github 웹에 게시하기

<https://teachablemachine.withgoogle.com/models/bxHAcpmpb>

jskim83.github.io / index.html in main

<> Edit file Preview changes

```
1 <html>
2   <head>
3     <title>나의 AI </title>
4     <meta charset="utf-8">
5   </head>
6   <body>
7     <h1>나의 인공지능</h1>
8     <hr>
9     <p>
10      <a href ="https://teachablemachine.withgoogle.com/models/bxHAcpmpb">하마와 곰 구별하기</a>
11    </p>
12  </body>
13 </html>
14
```

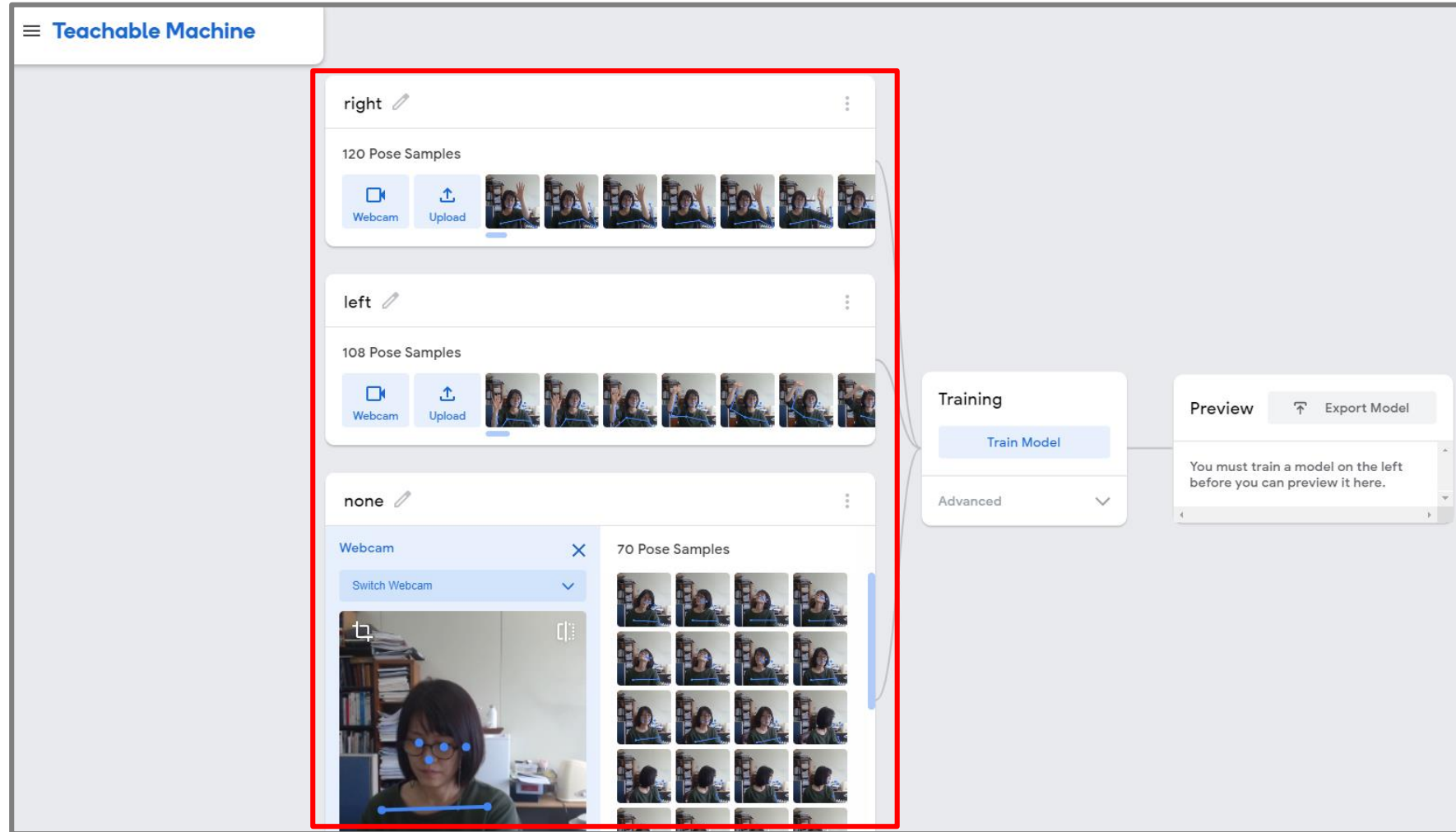
HTML 파일 작성

Commit new file



## 2. 포즈 인식 모델

### 1. 오른손 왼손 포즈 자료 수집



## 2. 포즈 인식 모델

### 2. 오른손 왼손 포즈 자료 학습

Teachable Machine

Don't switch tabs!  
You must leave this tab open to train your model. [Don't show again](#) [OK](#)

right

120 Pose Samples

Webcam Upload

left

108 Pose Samples

Webcam Upload

none

70 Pose Samples

Webcam Upload

Add a class

**Training**

[Training...](#)

00:03 - 0 / 50

Advanced

**Preview** Export Model

You must train a model on the left before you can preview it here.










## 2. 포즈 인식 모델

### 3. 오른손 왼손 포즈 인식

Teachable Machine








right

120 Pose Samples

Webcam Upload       








left

108 Pose Samples

Webcam Upload       

none

70 Pose Samples

Webcam Upload       

⊞ Add a class

Training

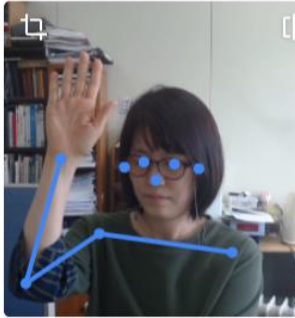
Model Trained

Advanced


Preview Export Model


Input ☐ ON Webcam


Switch Webcam



Output

right 

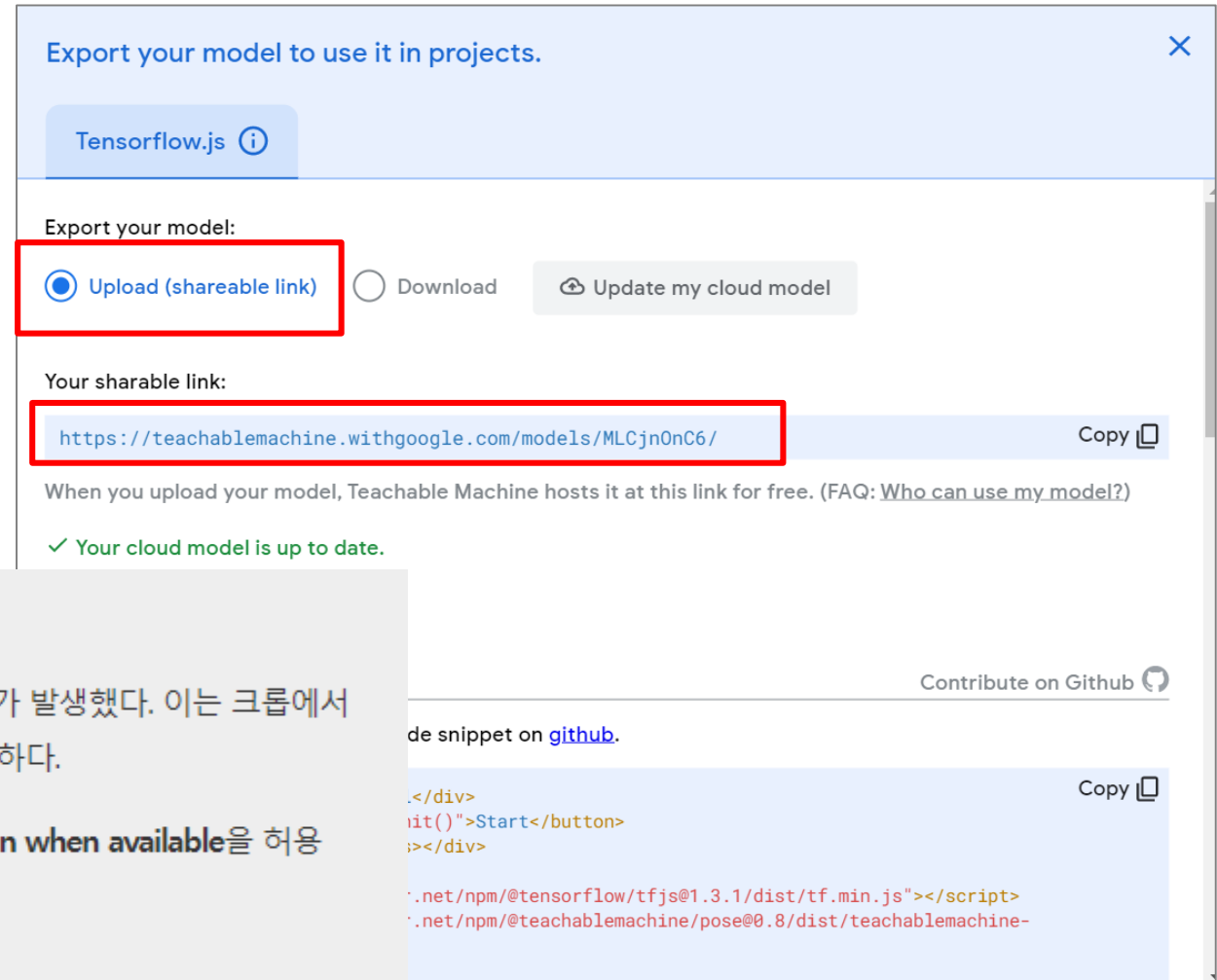
left  100%

none 



## 2. 포즈 인식 모델

### 4. 모델 링크 github에 게시



#### ✓ WebGL 오류

Teachable Machine 코드를 실행할 때 WebGL이 실행되지 않는다는 오류가 발생했다. 이는 크롬에서 WebGL이 허용되어 있지 않은 경우 발생하는 문제로, 간단하게 해결 가능하다.

- chrome://settings - Advanced - System에서 Use hardware acceleration when available을 허용
- chrome://flags - Disable WebGL을 Activate

<https://teachablemachine.withgoogle.com/models/MLCjnOnC6/>

### 3. 소리 인식 모델

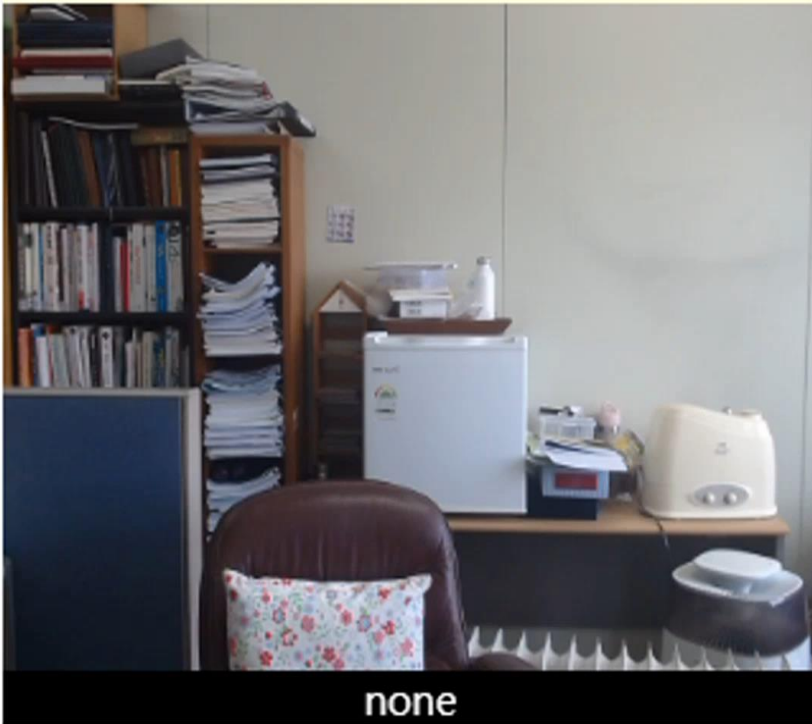
- 다음의 순서로 소리 인식 모델 만들기
  1. 박수 소리와 '안녕'을 말하는 목소리 자료 **수집**
  2. 소리 자료 **학습**
  3. 소리 **인식**

마이크가 활성화되어 있어야 하고 소리에 잡음이 너무 들어가면 안되기 때문에 모두 조용한 장소에서 실험해 보시기 바랍니다.

# 이미지 인식 모델 활용

## Teachable Machine Image Model coded by me

아무도 없네요!!?



# 이미지 인식 모델 활용

Export your model to use it in projects. X

Tensorflow.js ⓘ   TensorFlow ⓘ   TensorFlow Lite ⓘ

JavaScript   p5.js   Contribute on Github

Open up the code snippet below directly in the p5.js Web Editor.

```
<div>Teachable Machine Image Model - p5.js and ml5.js</div>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/p5.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/addons/p5.dom.min.js"></script>
<script src="https://unpkg.com/ml5@latest/dist/ml5.min.js"></script>
<script type="text/javascript">
  // Classifier Variable
  let classifier;
  // Model URL
  let imageModelURL = 'https://teachablemachine.withgoogle.com/models/bxHAcmpmb/';
  // Video
  let video;
  let flippedVideo;
  // To store the classification
  let label = "";

  // Load the model first
  function preload() {
    classifier = ml5.imageClassifier(imageModelURL + 'model.json');
  }

  function setup() {
    createCanvas(320, 260);
    // Create the video
    video = createCapture(VIDEO);
    video.size(320, 240);
    video.hide();

    flippedVideo = ml5.flipImage(video);
    // Start classifying
```

p5.js로 작성된 기본 템플릿 있음

복사하여 index.html에 붙여 넣기

복사하여 sketch.js에 붙여 넣기

# 이미지 인식 모델 활용

- 웹 에디터 열기

- <https://editor.p5js.org/> 가입을 하게되면 프로젝트 저장 등 다양한 작업이 가능

- 파일 변경하기

- index.html



```
Sketch Files < index.html*  
index.html  
sketch.js  
style.css  
1 <!DOCTYPE html>  
2 <html lang="en">  
3   <head>  
4     <script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/p5.min.js"></script>  
5     <script src="https://cdnjs.cloudflare.com/ajax/libs/p5.js/0.9.0/addons/p5.dom.min.js"></script>  
6     <script src="https://unpkg.com/ml5@latest/dist/ml5.min.js"></script>  
7     <link rel="stylesheet" type="text/css" href="style.css">  
8     <meta charset="utf-8" />  
9  
10  </head>  
11  <body>  
12    <h2>Teachable Machine Image Model coded by me</h2>  
13    <hr>  
14    <script src="sketch.js"></script>  
15    <div_id='hi'></div>  
16  </body>  
17 </html>
```

문자열 출력할 위치

# 이미지 인식 모델 활용

- 파일 변경하기
  - sketch.js :

```
Sketch Files < sketch.js
index.html
sketch.js
style.css
29 function draw() {
30   background(0);
31   // Draw the video
32   image(flippedVideo, 0, 0);
33
34   // Draw the label
35   fill(255);
36   textSize(16);
37   textAlign(CENTER);
38   text(label, width / 2, height - 4);
39 }
40
```

```
< sketch.js
29 function draw() {
30   background(0);
31   // Draw the video
32   image(flippedVideo, 0, 0);
33
34   // Draw the label
35   fill(255);
36   textSize(16);
37   textAlign(CENTER);
38
39   //인식된 레이블에 따라 다른 메시지가 화면에 출력됨
40   if(label=='bear'){
41     document.getElementById("hi").innerHTML="곰이네요^^ 반가워요!";
42     text(label, width / 2, height - 4);
43   }else if(label=='hippo'){
44     document.getElementById("hi").innerHTML="하마네요^^ 반가워요!";
45     text(label, width / 2, height - 4);
46   }else{
47     document.getElementById("hi").innerHTML="다들 어디가셨나요!!";
48     text(label, width / 2, height - 4);
49   }
50 }
```

# 이미지 인식 모델 활용

- 변경한 파일들을 다운로드하여 github에 게시
  - github에 폴더 업로드

p5.js 에디터에서 다운로드한 폴더를 업로드

The screenshot shows the GitHub repository interface for 'jskim83'. The 'Add file' dropdown menu is open, showing options: 'Go to file', 'Create new file', and 'Upload files'. The 'Upload files' option is highlighted. A red box highlights the 'hippo-bear' folder in the file list. A red arrow points from the 'Upload files' button to the 'Commit changes' dialog on the right. The dialog shows a list of files to be committed: /mask/index.html, /mask/ml5.min.js, /mask/p5.dom.min.js, /mask/p5.min.js, and /mask/sketch.js. The 'Commit changes' button is highlighted.

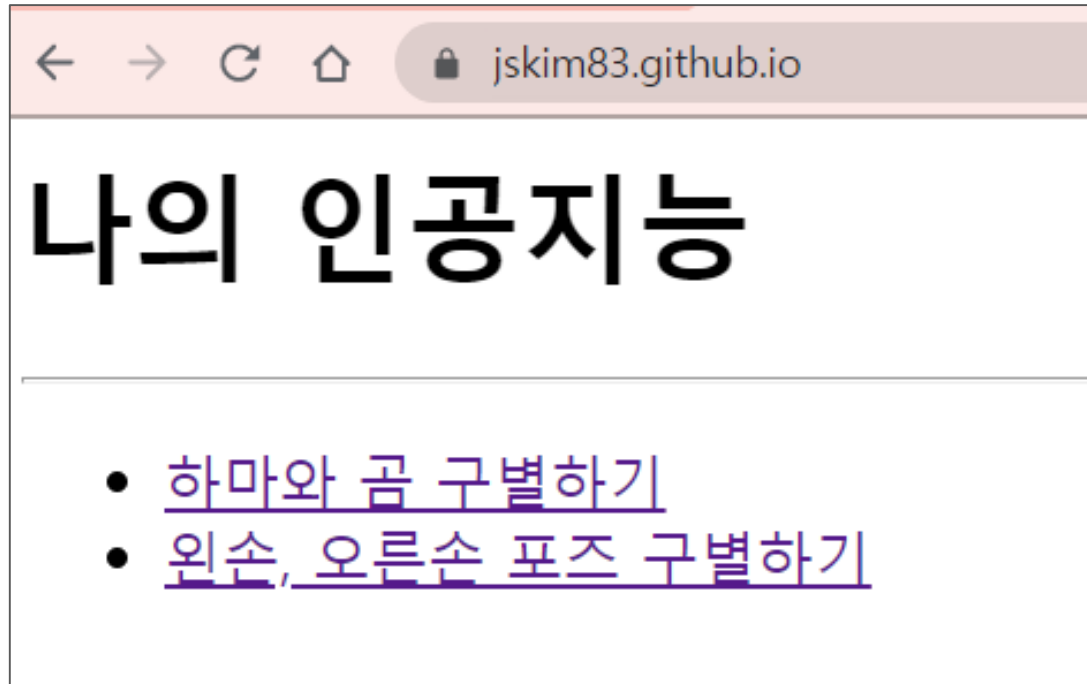
# 이미지 인식 모델 활용

## ■ index.html파일 변경

```
6   <body>
7   <h1>나의 인공지능</h1>
8   <hr>
9   <ul>
10  <li><a href = "hippo-bear/index.html">하마와 곰 구별하기</a></li>
11  <li><a href = "https://teachablemachine.withgoogle.com/models/MLCjnOnC6/">왼손, 오른손 포즈 구별하기</a></li>
12 </ul>
13 </body>
```



# github 웹페이지에서 확인



# 실습-1

- 자신이 가지고 있는 물건 2가지 이상을 인식하는 모델 작성해 보세요!

## 실습-2

- 자신의 포즈 중 2가지 이상을 인식하는 모델 작성해 보세요!

**Thank you for your  
attention!!**