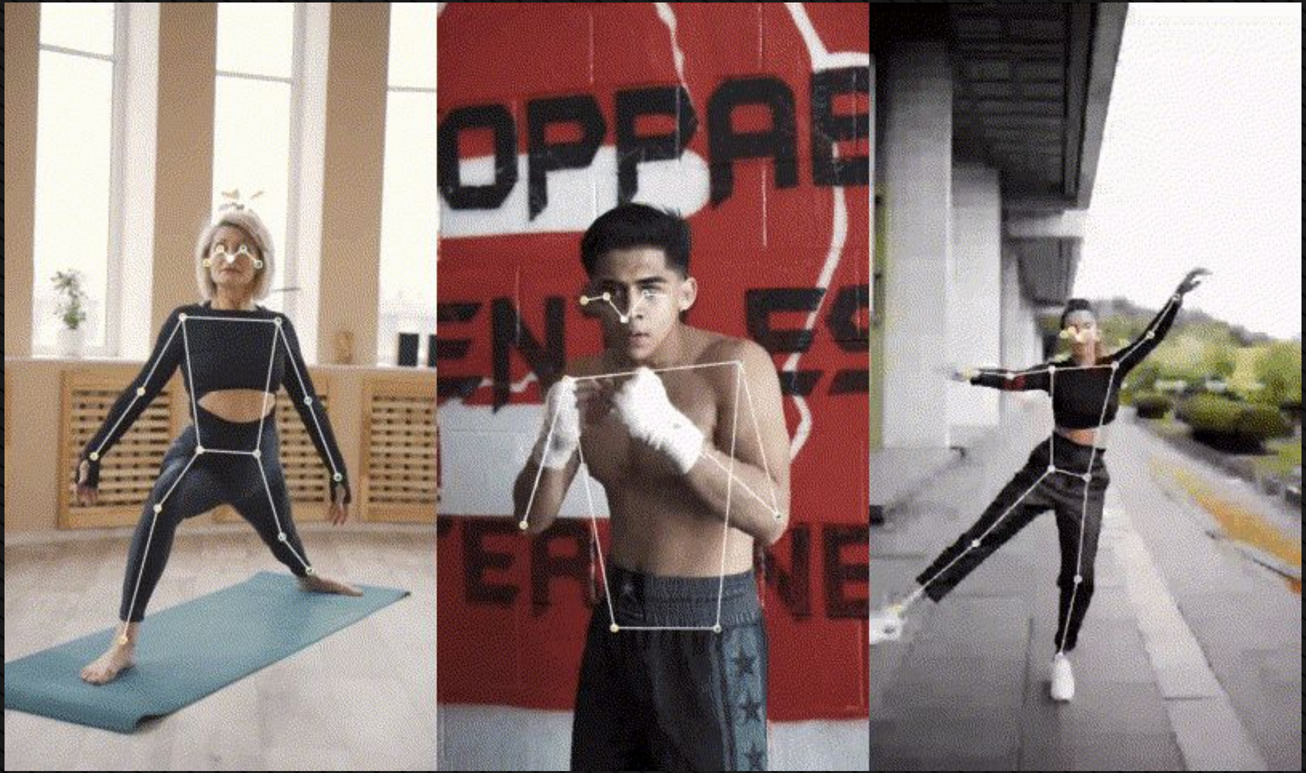
# Tensorflow
# Pose Estimation



# Overview

**What is TensorFlow and how it works**

**Train models from TF (for .js.)**

**Getting to specifics:**
Rendering the overlay using tfjs drawingUtilities and HTML Canvas

# What is TensorFlow and how it works:

**Tensors**
An algebraic object that describes a multilinear relationship between sets of algebraic objects related to a vector space

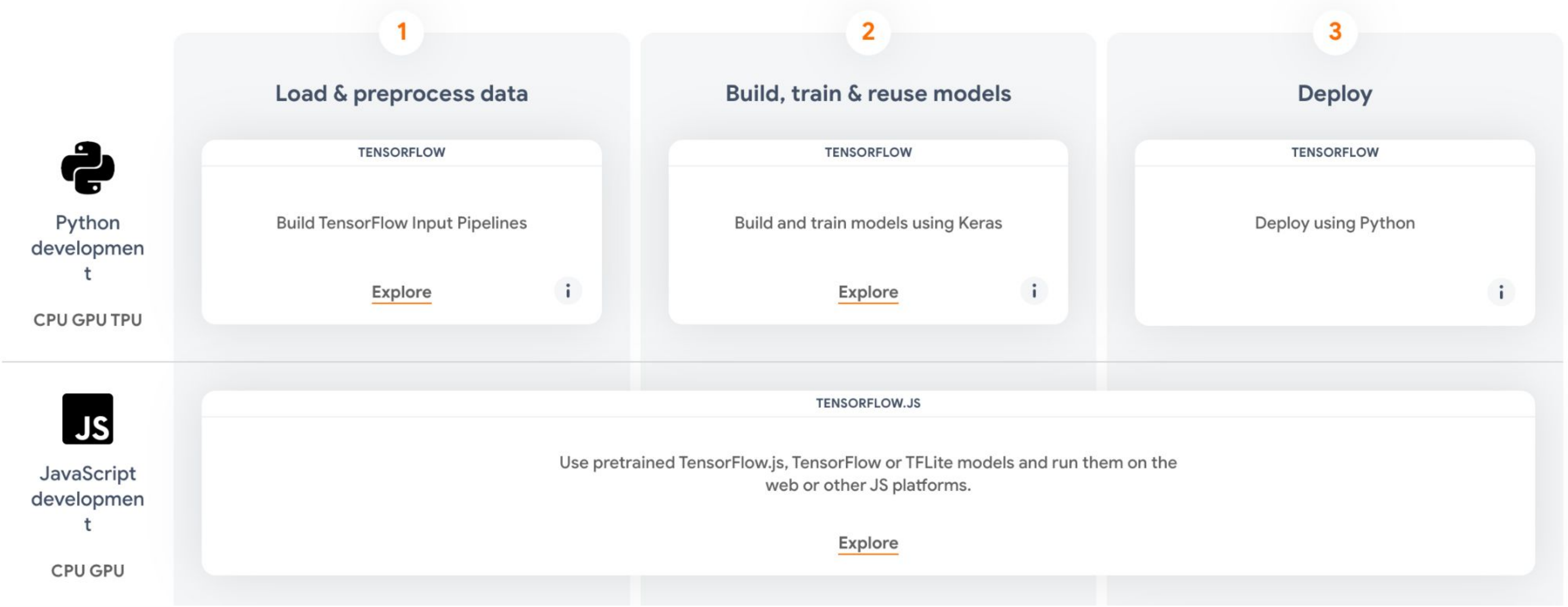
**TensorFlow:**
An open source library for numerical computation & large-scale machine learning
Combines ML and DL models and algos(NN) for use.

**How TensorFlow Works:**
TensorFlow allows developers to create dataflow graphs—structures that describe how data moves through a graph, or a series of processing nodes. Each node in the graph represents a mathematical operation, and each connection or edge between nodes is a multidimensional data array, or tensor.

**Source: What is TF & How it works**

# Trained models from Tensorflow

**.js wasn’t as popular as .py counterparts online**



1

Load & preprocess data

2

Build, train & reuse models

3

Deploy

Python development

CPU GPU TPU

TENSORFLOW

Build TensorFlow Input Pipelines

Explore

TENSORFLOW

Build and train models using Keras

Explore

TENSORFLOW

Deploy using Python

JavaScript development

CPU GPU

TENSORFLOW.JS

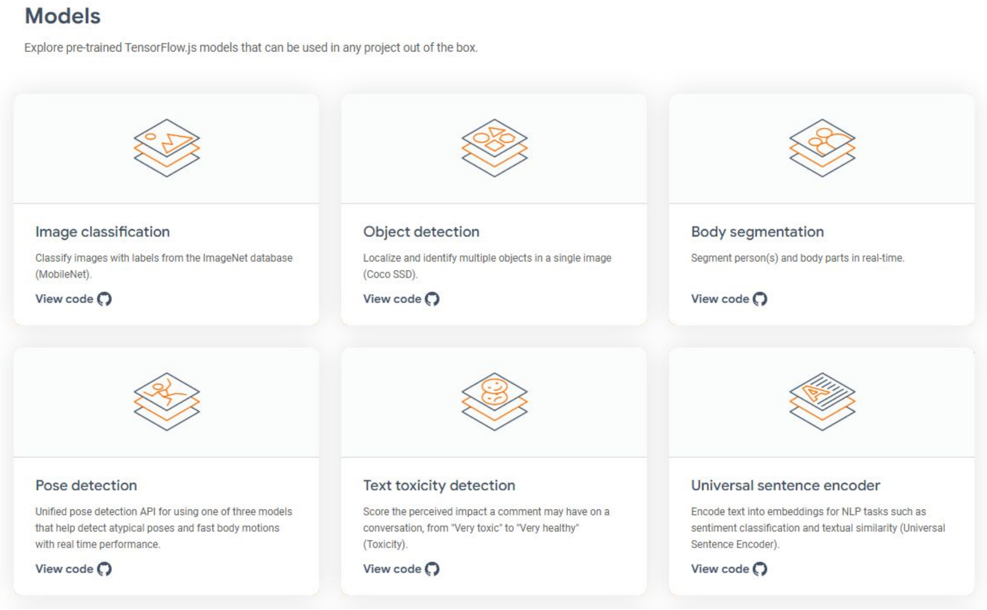
Use pretrained TensorFlow.js, TensorFlow or TFLite models and run them on the web or other JS platforms.

Explore

**…also to convert a py model to js  we tried this (NOT EASY TO DO)... there are other better ways to fetch from py from js**

# TensorFlow.js Models on Github

tfjs-models Github Page



Models

Explore pre-trained TensorFlow.js models that can be used in any project out of the box.

Image classification

Classify images with labels from the ImageNet database (MobileNet).

View code

Object detection

Localize and identify multiple objects in a single image (Coco SSD).

View code

Body segmentation

Segment person(s) and body parts in real-time.

View code

Pose detection

Unified pose detection API for using one of three models that help detect atypical poses and fast body motions with real time performance.

View code

Text toxicity detection

Score the perceived impact a comment may have on a conversation, from "Very toxic" to "Very healthy" (Toxicity).

View code

Universal sentence encoder

Encode text into embeddings for NLP tasks such as sentiment classification and textual similarity (Universal Sentence Encoder).

View code

**Models experimented on:**

PoseNet Pose Estimation

MoveNet.SinglePose.Lighting

- Lower capacity model
- >50FPS on most modern laptops (15,000 arrays for 5min operation)

MoveNet.SinglePose.Thunder

- Higher capacity model
- >30FPS
- Thunder will lag behind Lighting but will pack more of a punch

# Getting to specifics:

Rendering the overlay using tfjs drawing utilities & HTML Canvas

# APPENDIX

# Learnings

**Challenges**

Tensor use in ML very diverse:

- many models
- large repo with many splits/diverges

  - docs on main webpage take broad scope -> ‘incomplete’

  .js not as popular as .py counterparts online

**Demos available for testing on the browser**

pose-detection folder

demos folder

# Quick Start: MoveNet Model

Getting Started for Tfjs in Node
- technical info on which backend to use

MoveNet Component on GH
- which specific which Tf modules to install
- how to import the libraries

Other resources: on pure js and html (can boot up with Live Server)
https://jmablog.com/post/posenet-app/
https://github.com/shamjam/push_up_counter_youtube

Multi-person pose estimator (python implementation)
https://www.section.io/engineering-education/multi-person-pose-estimator-with-python/

Training Models with TensorFlow.js
https://www.tensorflow.org/js/guide/train_models