Machine Learning for the Web: an Introduction to Tensorflow.JS

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MLH Fellow
GSoC Mentor
Open-source contributor

Previous Experience:

MLH MAJOR LEAGUE HACKING

genpact

LAYER5

Chapter04
Session 4
Step Up. Speak Up. Go Up

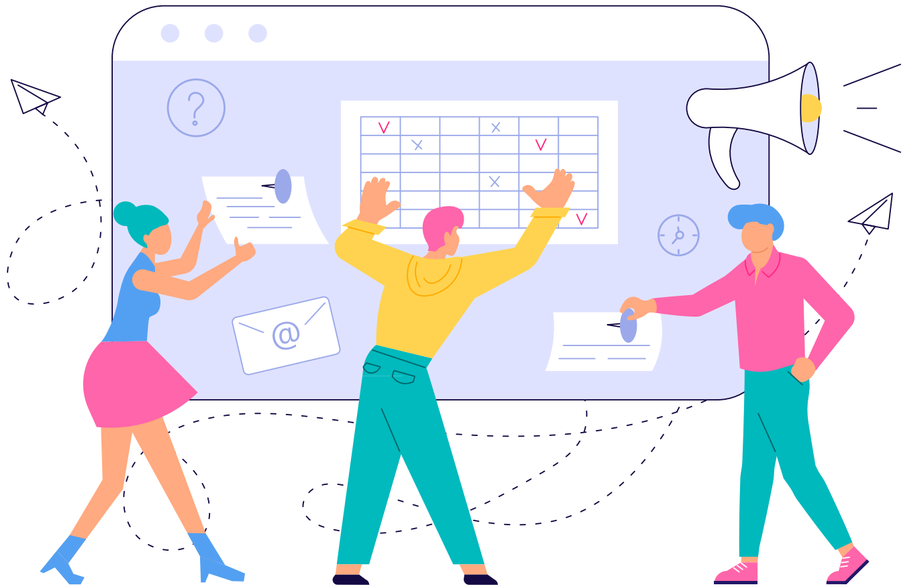
June 13th 10AM PST

zoom.goupaz.com

Hosted by

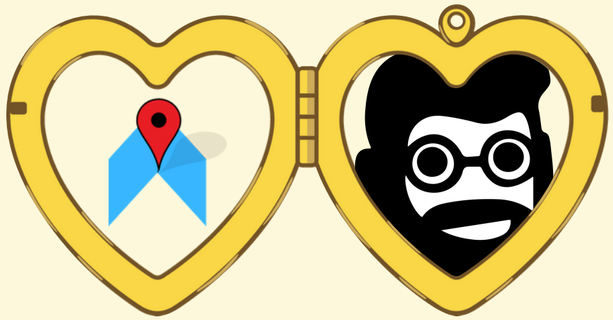
Metabob

Agenda



- **10:00–10:10 | Kickoff**
  - Introduction
  - Chit Chat
- **10:10-11:10 | Presentation**
  - Speaker
- **11:10-11:15 | Break**
  - Pre Q&A
- **11:15-11:30 | Q&A**
  - Discussion
- **11:30-11:35 | Wrap Up**
  - Contact Speaker

Chapter04
Session 04



Hosted by

Axel Lönnfors

Digital Marketing Specialist | Community Manager

Enthusiastic sports fan originally from Finland, passionate about technologies enhancing employee productivity

Metabob

It's the fast, easy, and visual way of debugging code.

https://metabob.com

GOUP

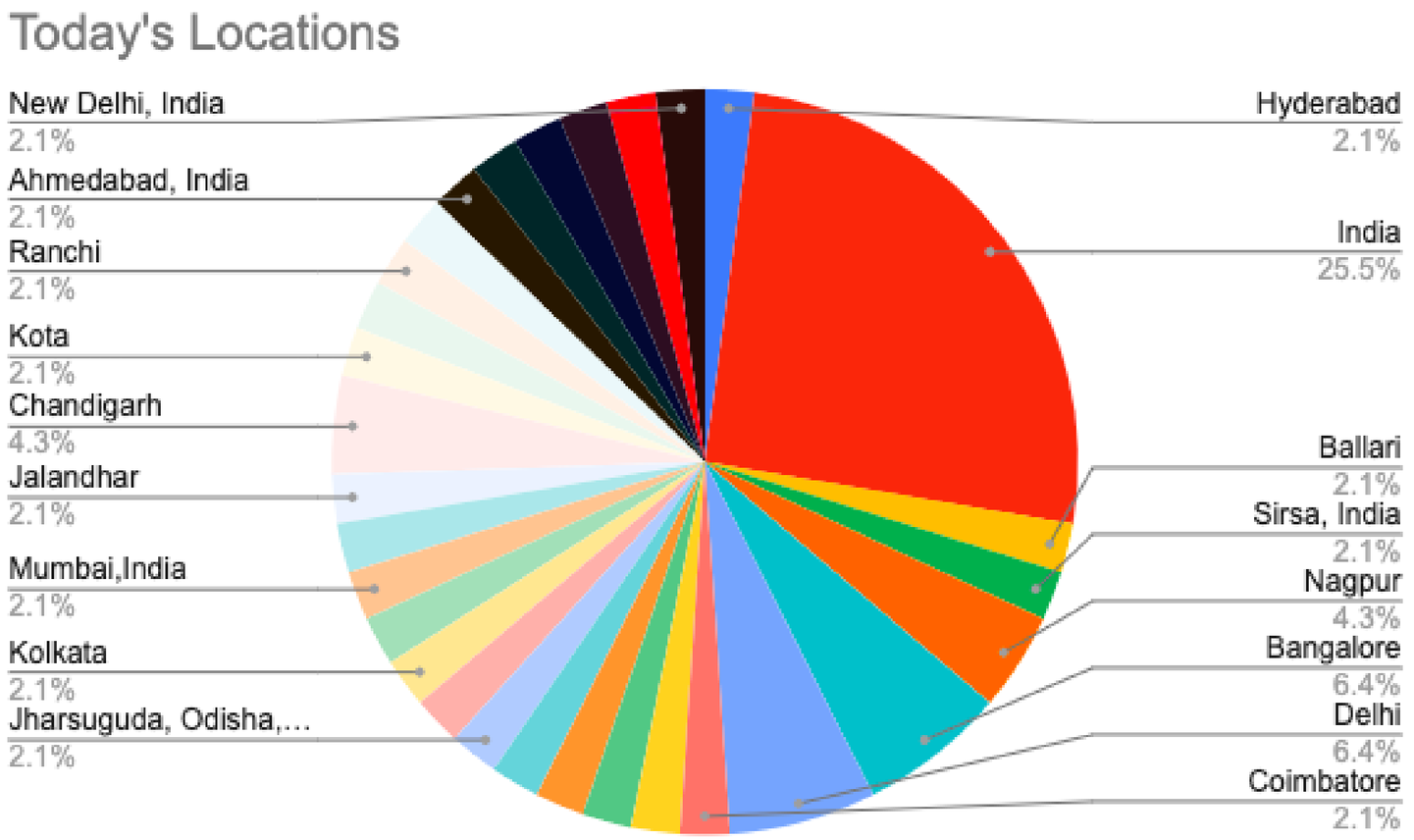
Community driven Open source accelerator!
https://goupaz.com

Are you ready?

Let's Begin!

CHITCHAT

Audience


Today's Locations
New Delhi, India
2.1%
Ahmedabad, India
2.1%
Ranchi
2.1%
Kota
2.1%
Chandigarh
4.3%
Jalandhar
2.1%
Mumbai,India
2.1%
Kolkata
2.1%
Jharsuguda, Odisha,...
2.1%
Hyderabad
2.1%
India
25.5%
Ballari
2.1%
Sirsa, India
2.1%
Nagpur
4.3%
Bangalore
6.4%
Delhi
6.4%
Coimbatore
2.1%

Code of Conduct

1. Learn, benefit, contribute
2. No marketing, selling, competing
3. Equality despite roles & bg

Photo Shoot Time

Please turn on your camera :D

Presentation

TensorFlow.js

Superpowers For Next Gen Web Apps : ML/AI For Web

Shivay Lamba

TensorFlow.js SIG & Working Group Member

TFUG New Delhi Mentor, Google Code In Mentor for TensorFlow

@howdevelop on Twitter!

Machine Learning in JavaScript

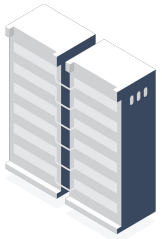
Why?

What is Tensorflow :

TensorFlow is a free and open-source software library for dataflow and differentiable programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks.

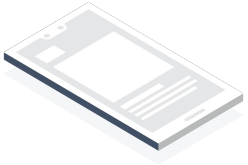
Use ML anywhere JavaScript can run

Browser

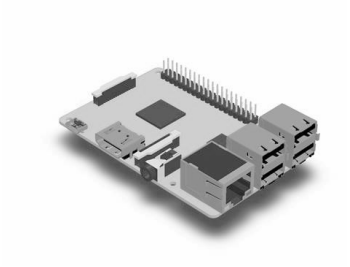


Server

Desktop



Mobile



IoT

Browser

Server

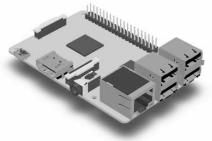
Mobile

React Native

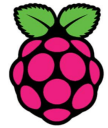
WeChat

Desktop

Electron



IoT

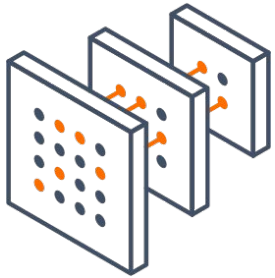


RaspberryPi

(via Node)

Run, Retrain, Write

Reuse existing models, or create your own

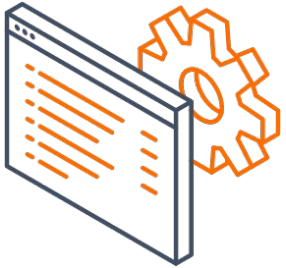


Run existing models

Pre-packaged JavaScript **or**
Converted from Python

Retrain existing models

With transfer learning



Write models in JS

Train from scratch

For anything you may dream up

Augmented Reality

Gesture-based interaction

Sound recognition

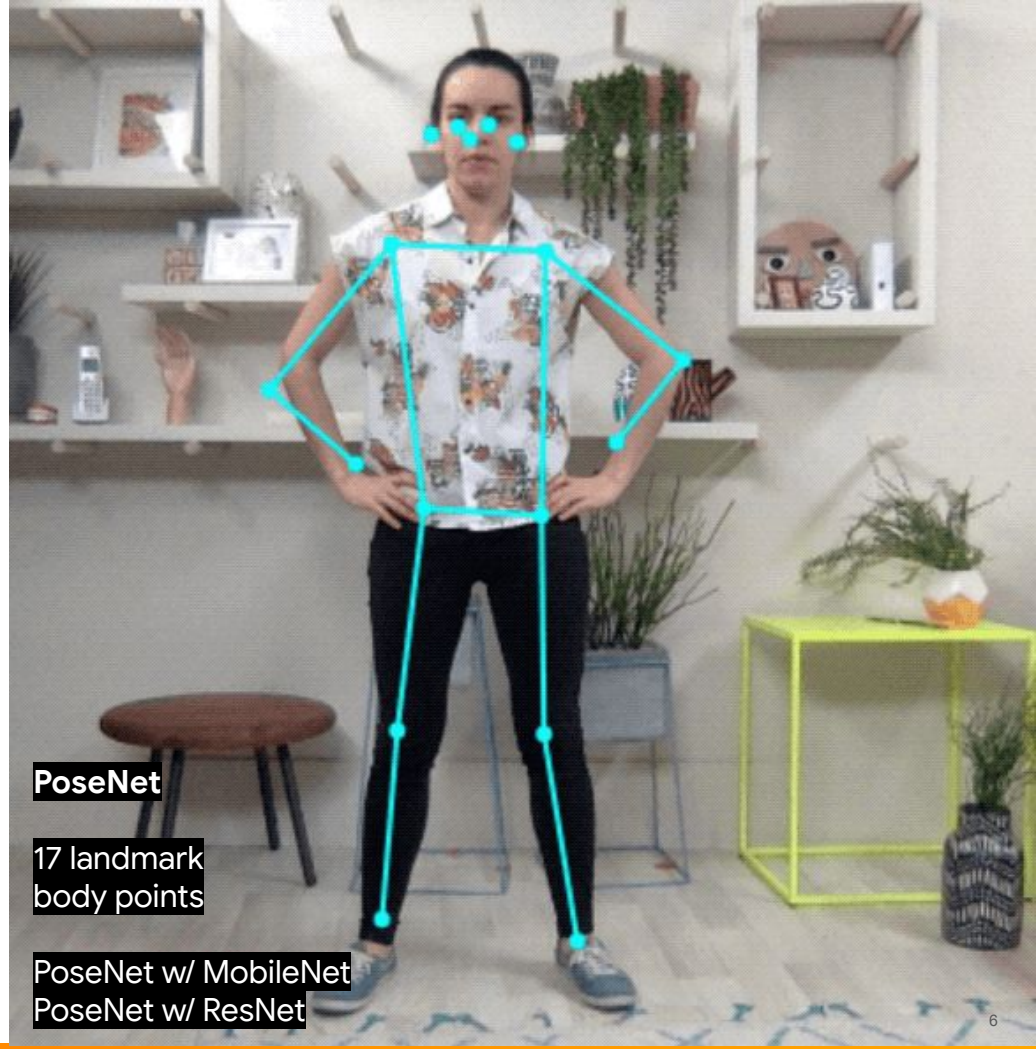
Accessible web apps

Sentiment analysis, abuse detection, NLP

Conversational AI

Web-page optimization

And much more...



Pre trained models

Easy to use JavaScript classes for common use cases

We have several...

And continually expanding our collection.

+ Image classification

+ Object detection

+ Body Segmentation

+ Pose Estimation

+ Text Toxicity

+ Sentence encoding

+ Speech Commands

+ KNN Classifier

New models added:

+ Face Mesh
+ Hand Pose
+ BERT Q&A

Let's check some out...

tensorflow.org/js/models

Object Recognition

Using COCO-SSD

Trained on 90 object classes

Demo

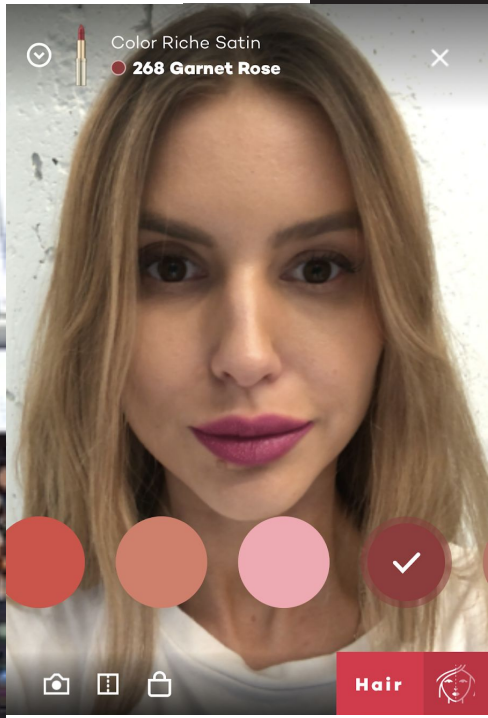
Face Mesh

Just **3MB** in size

Recognize **468** facial landmarks

L'ORÉAL

MODI FACE



Demo

Body Segmentation

Distinguish **24** body areas, across multiple bodies, real time.

With a little bit of creativity...

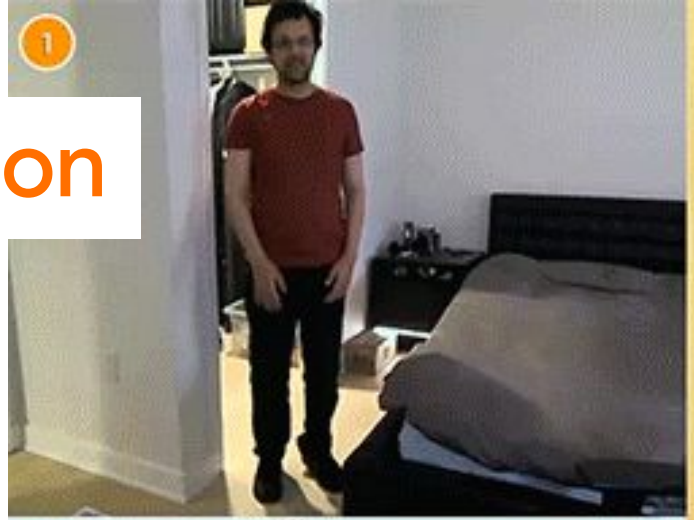
We can emulate the superpowers we were promised in the movies which we should have by now!

Lasers

WebGL Shaders
+ TensorFlow.js

Created by Ricky Reusser (@rickyreusser) + Max Bittker (@maxbittker), USA

Teleportation

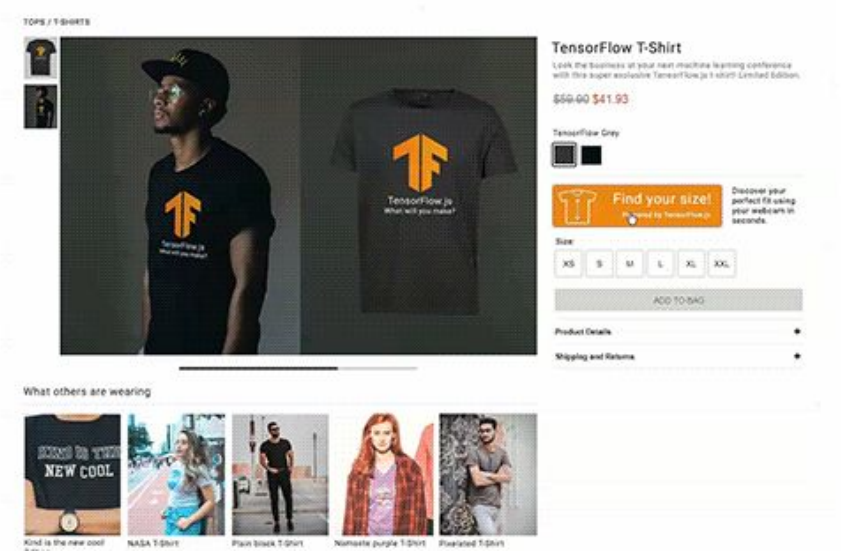


WebRTC + AFrame +
Three.js + TensorFlow.js

Created by Jason Mayes (@jason_mayes)

Or other delightful creations

Such as clothing size estimation



Created by Jason Mayes (@jason_mayes)

Combine with other web tech

Web XR + WebGL + TensorFlow.js

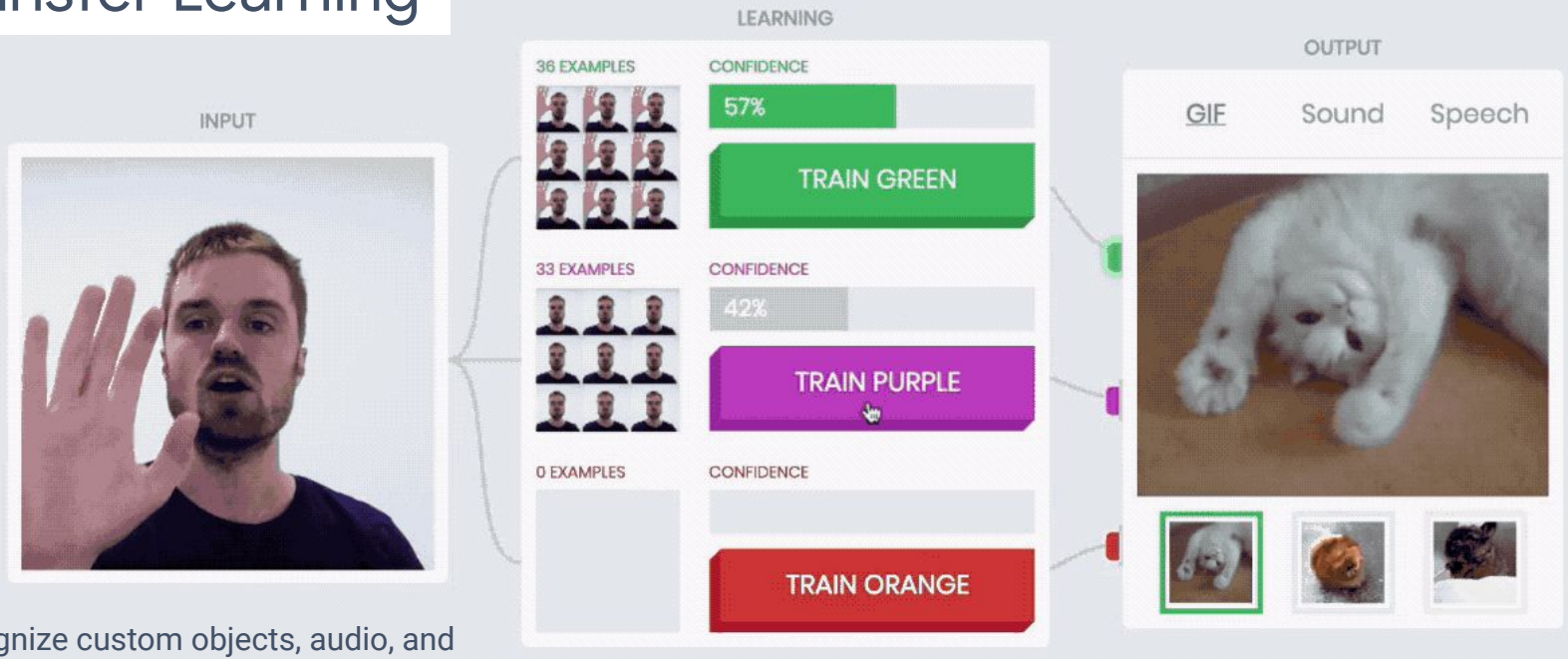
Created by Alexandre Devaux (@AlexandreDevaux), France

Transfer Learning

Retrain existing models to work with your own data

Teachable Machine

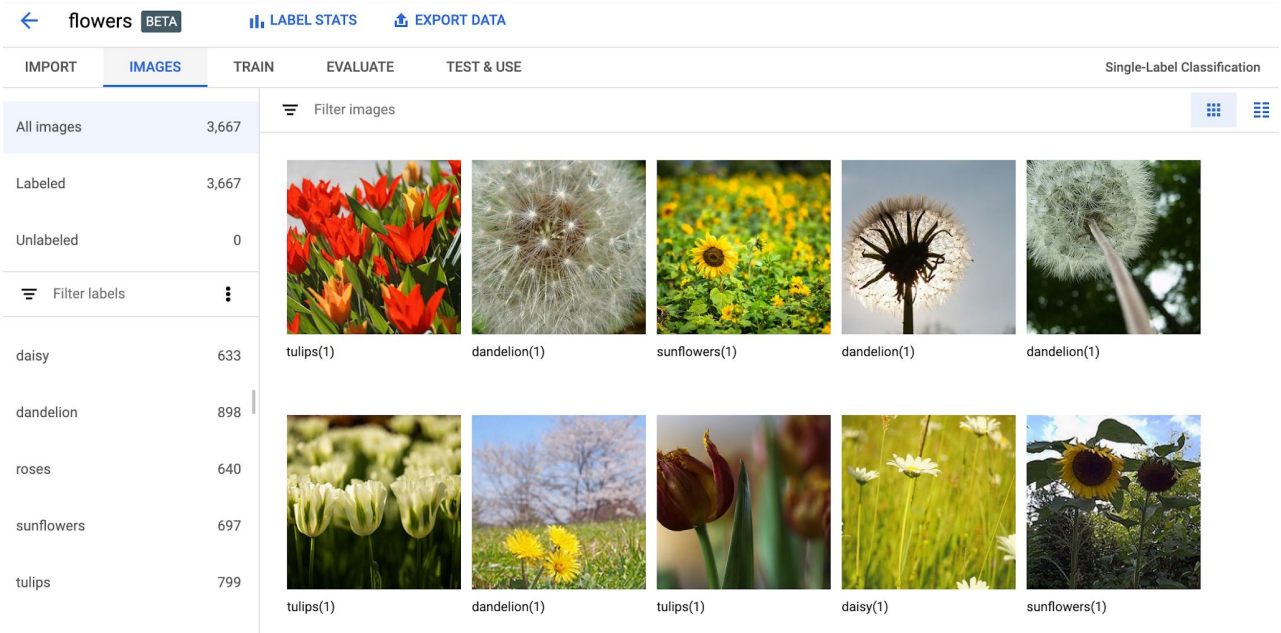
Transfer Learning



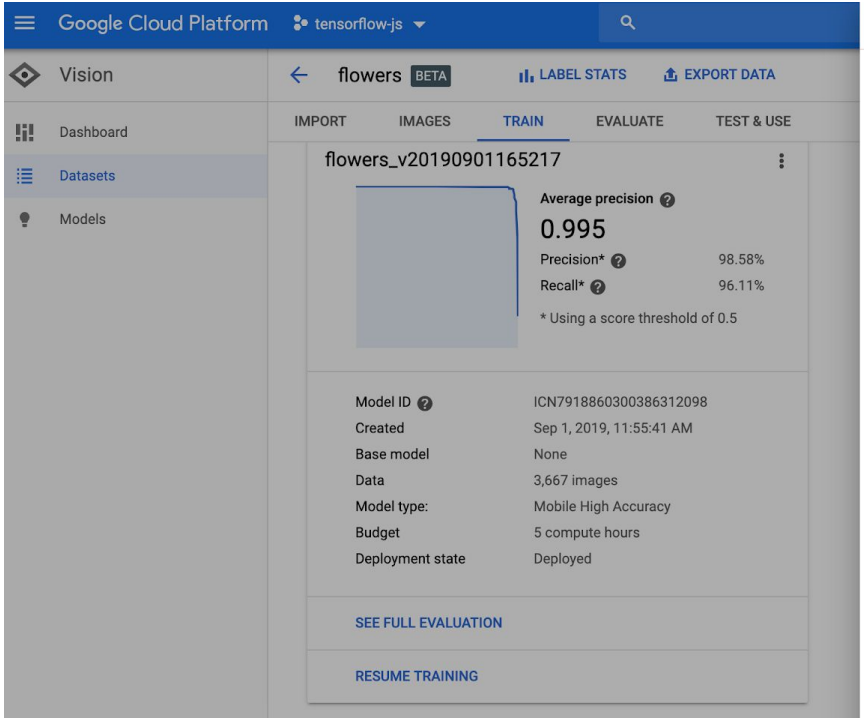
Recognize custom objects, audio, and poses in the browser in minutes. Demo.

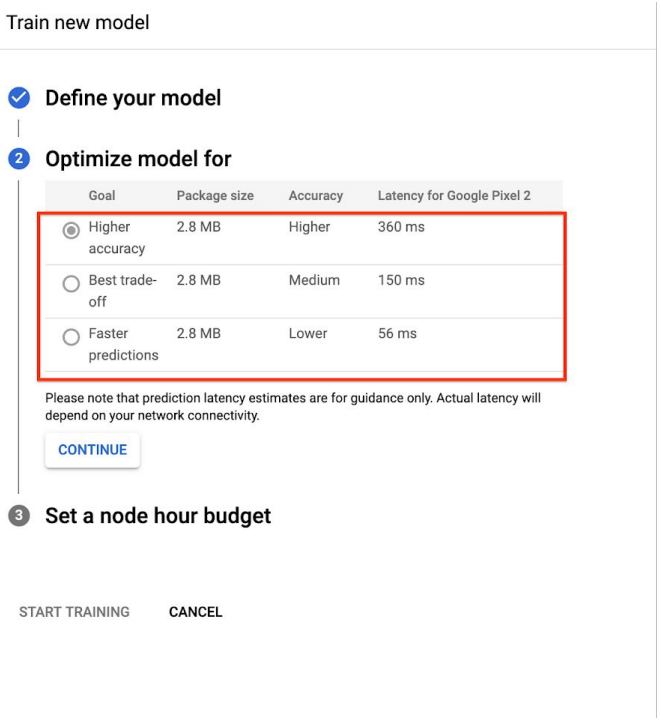
Cloud Auto ML

Train custom vision models in the cloud + deploy to TF.js

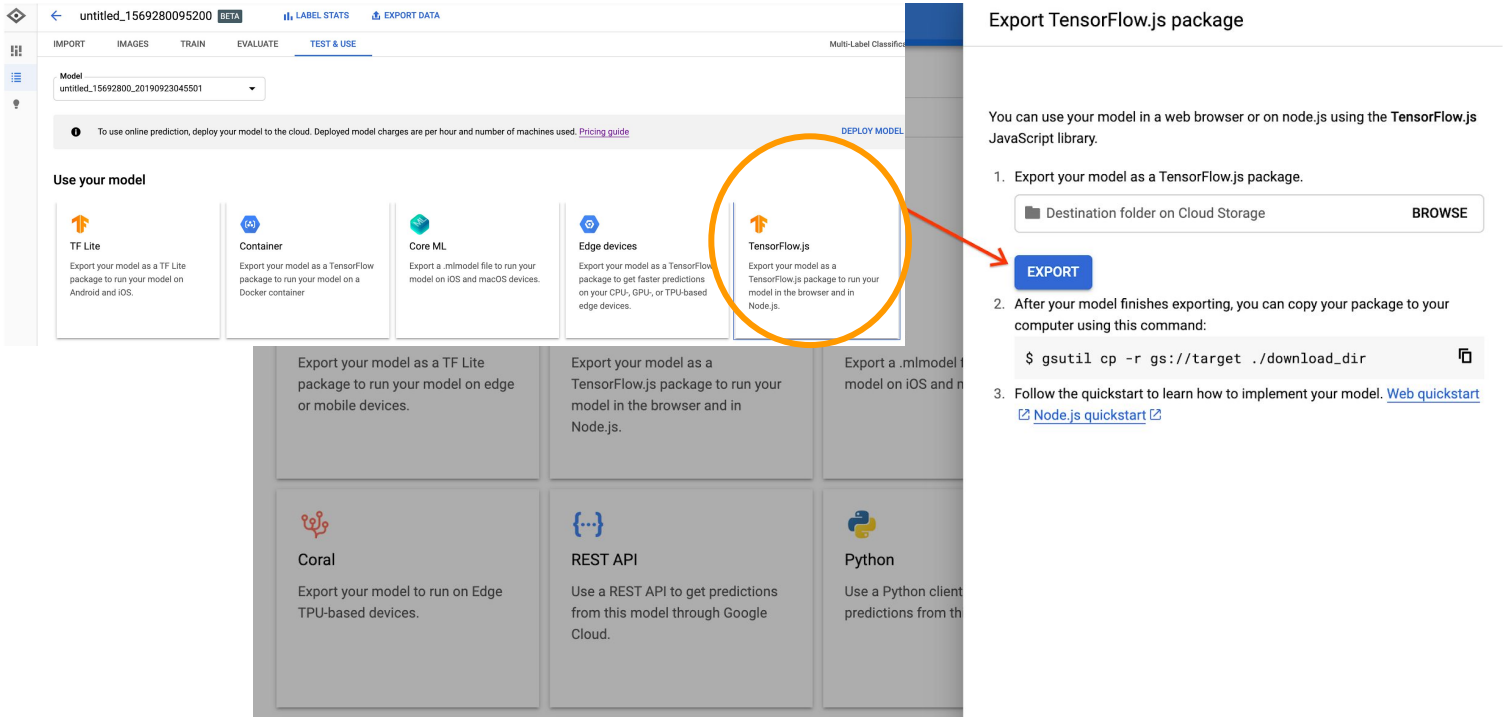


Cloud Auto ML





Cloud Auto ML



Code

```
<script src="//cdn.jsdelivr.net/npm/@tensorflow/tfjs/dist/tf.min.js"></script>
<script src="//cdn.jsdelivr.net/npm/@tensorflow/tfjs-automl/dist/tf-automl.min.js"></script>

<img id="daisy" crossorigin="anonymous"
src="//storage.googleapis.com/tfjs-testing/tfjs-automl/img_classification/daisy.jpg">

<script>
  async function run() {
   const model = await tf.automl.loadImageClassification('model.json');
   const image = document.getElementById('daisy');
   const predictions = await model.classify(image);
  }
  run();
</script>
```

TensorFlow.js: Write your own code

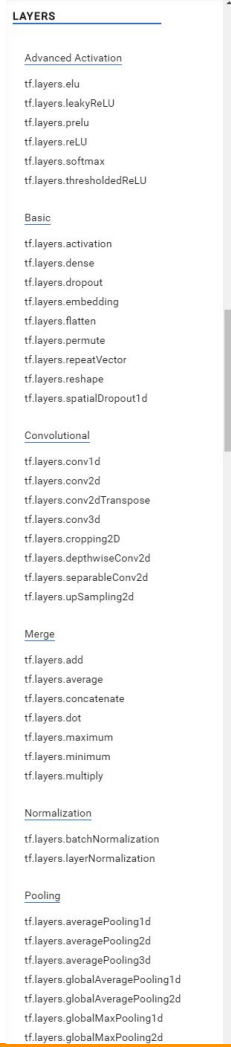
Super powers and performance

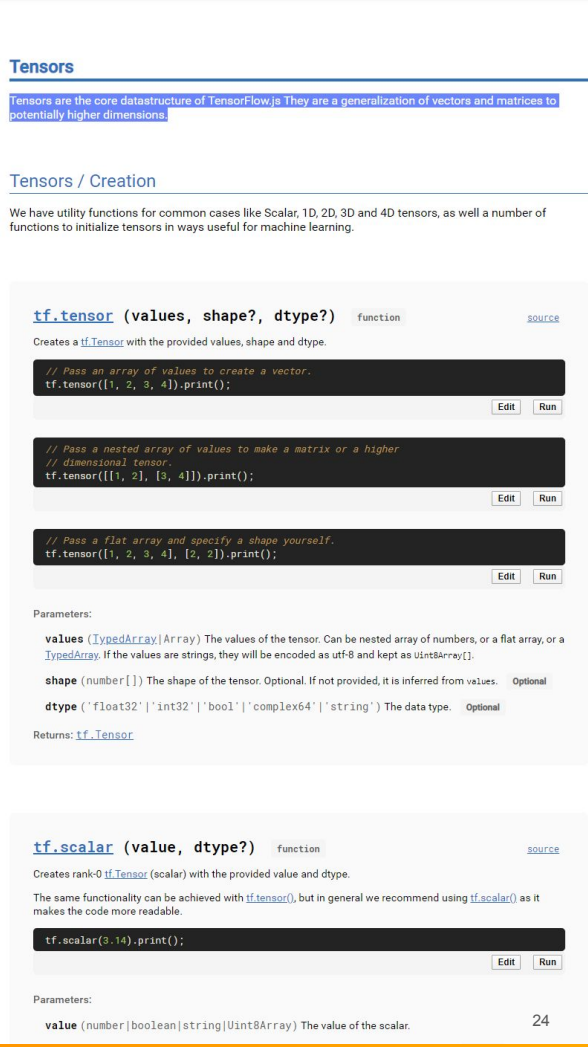
TensorFlow.js APIs

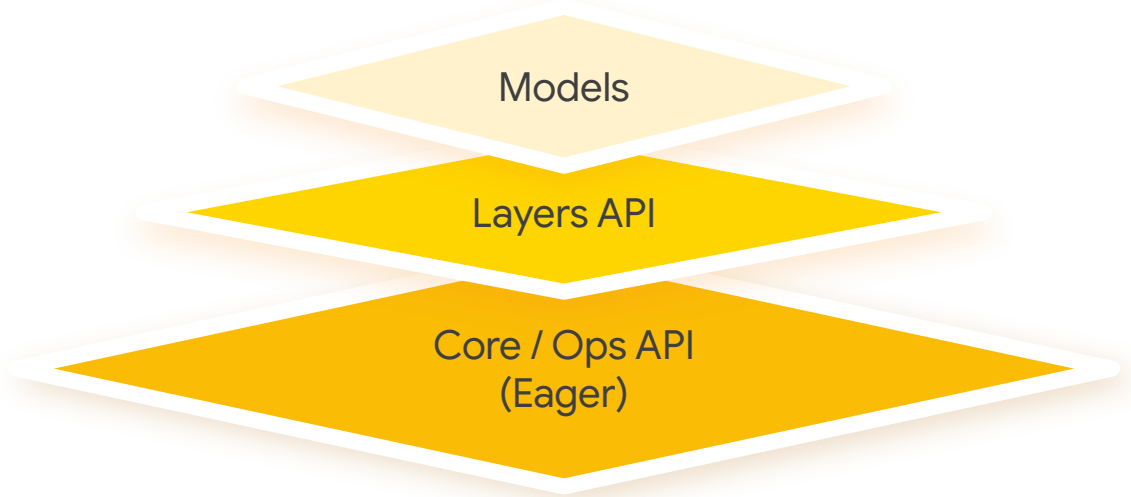
Create your own models with our APIs

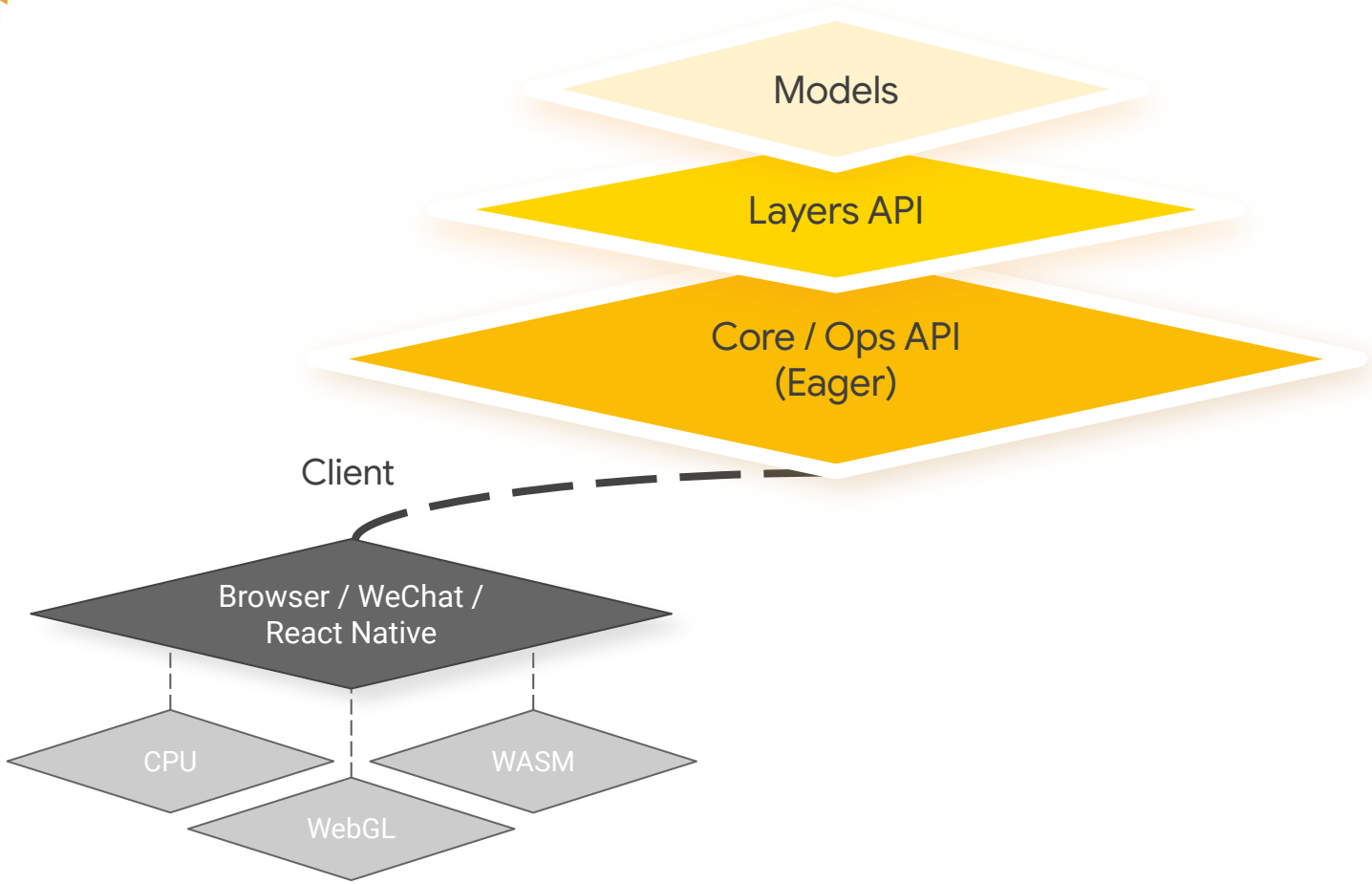
Pick your flavour:

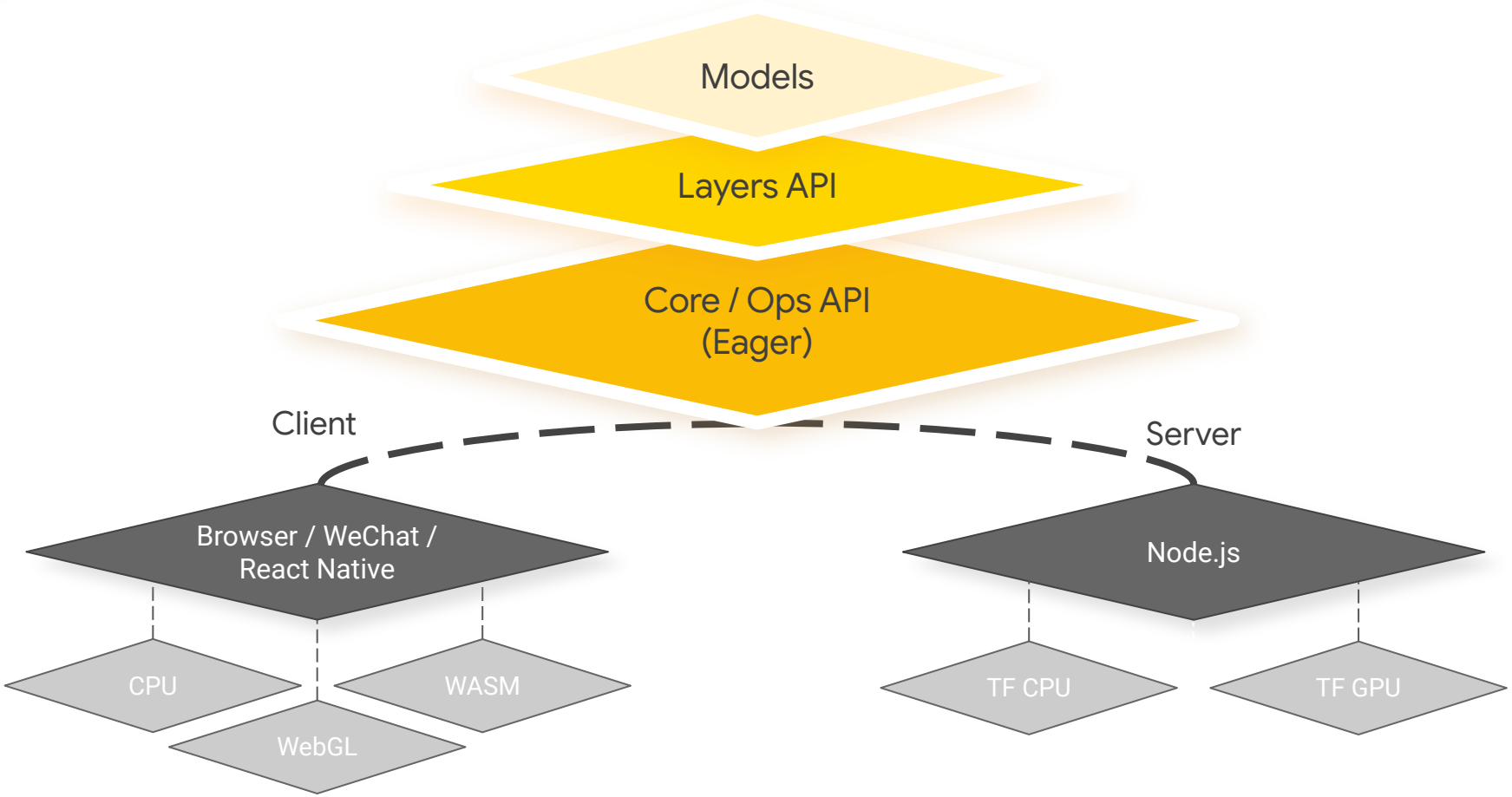
- High level **Layers API** (like Keras)
- Low level **Ops API** (mathematical)

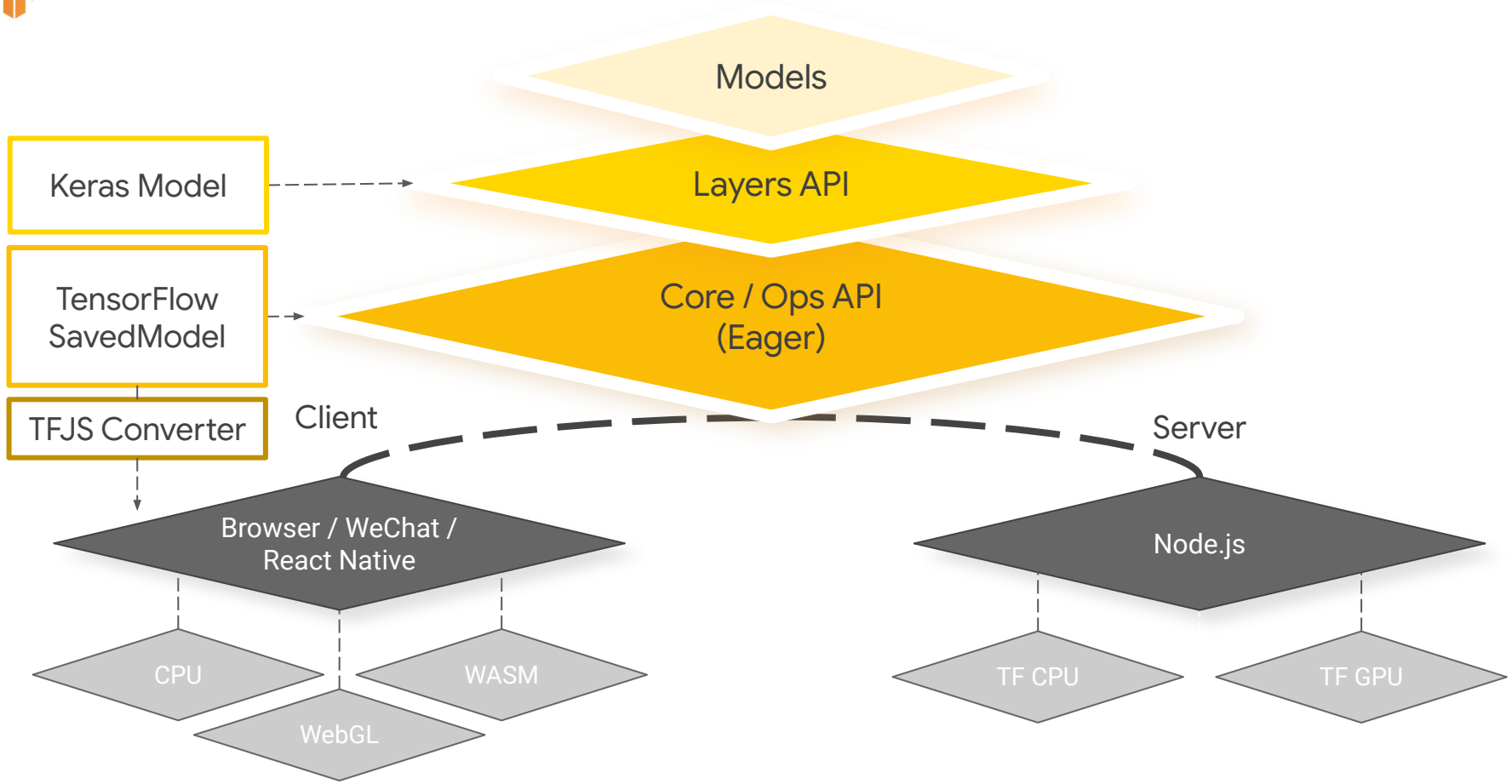





Models
Layers API
Core / Ops API
(Eager)

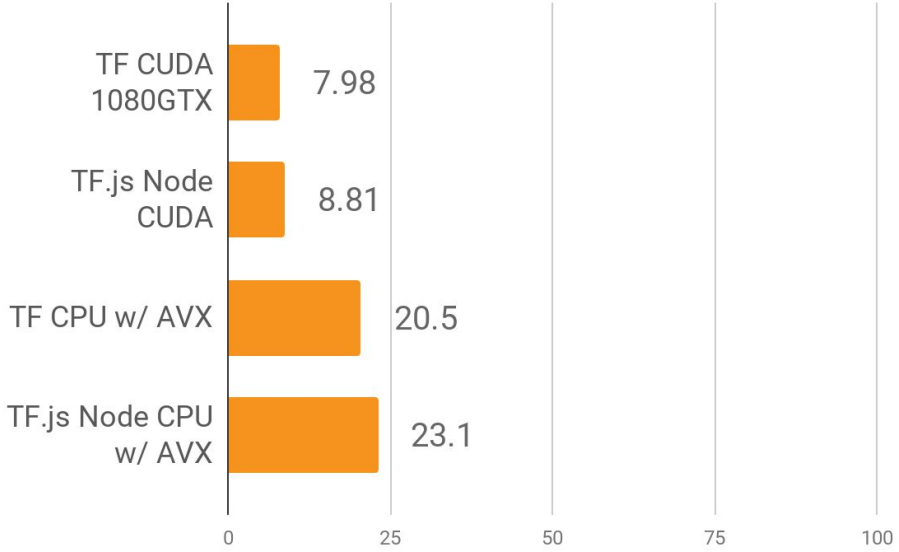

Models
Layers API
Core / Ops API
(Eager)
Client
Browser / WeChat /
React Native
CPU
WASM
WebGL


Models
Layers API
Core / Ops API
(Eager)
Client
Server
Browser / WeChat /
React Native
Node.js
CPU
WASM
WebGL
TF CPU
TF GPU


Models
Keras Model
Layers API
TensorFlow SavedModel
Core / Ops API (Eager)
TFJS Converter
Client
Server
Browser / WeChat / React Native
Node.js
CPU
WASM
WebGL
TF CPU
TF GPU

Model Inference Performance Only

Server

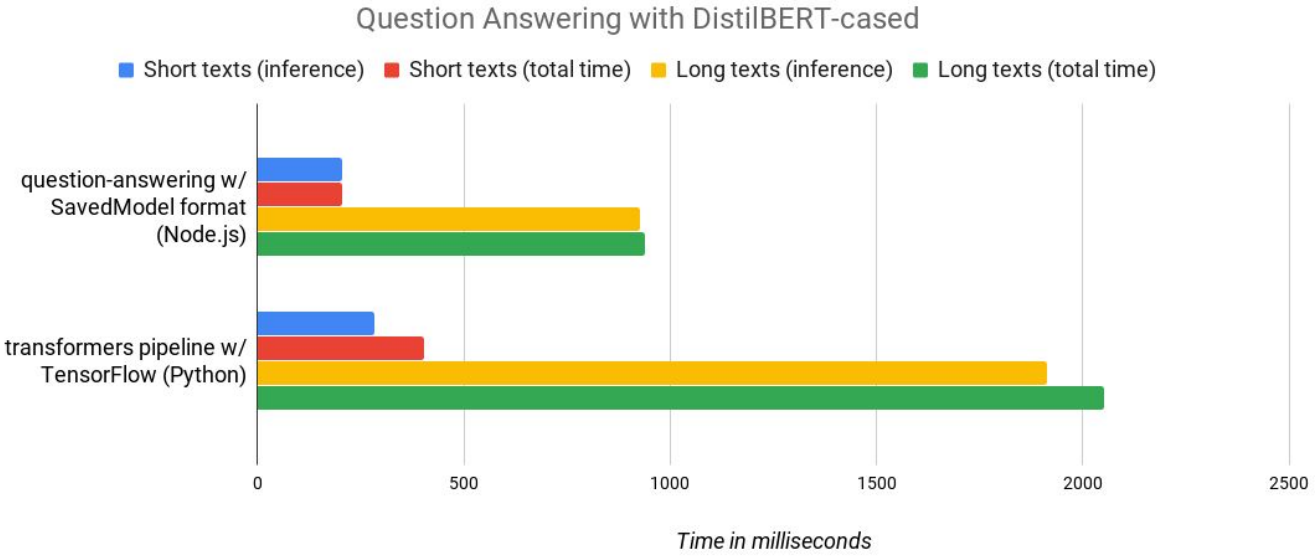


MobileNetV2 1.0_224 model inference time (ms)

Note: *If you have a lot of pre / post processing written in Node.js, you will get the benefits of the JIT at runtime, which can be significant outside of inference alone.*

Hugging Face DistilBERT

2x Perf boost using Node.js

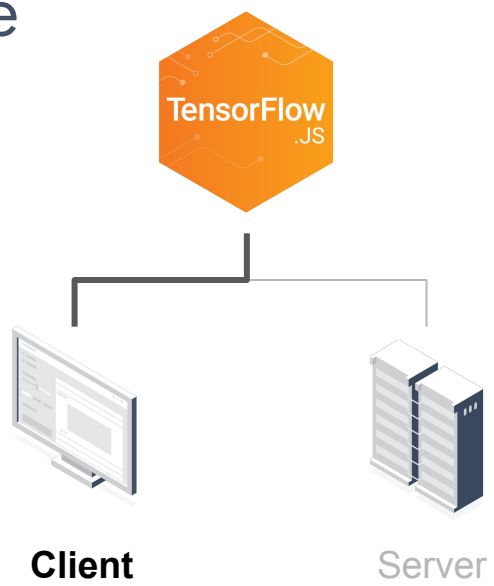


5 client side super powers

Harder / impossible to achieve server side

1. Privacy
2. Lower Latency
3. Lower Cost
4. Interactivity
5. Reach and Scale

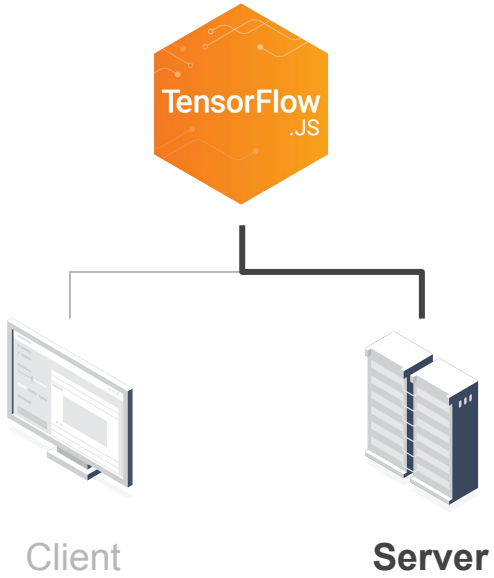
   *(GPU support on **84%** of devices via WebGL)*



Server side / Node.js benefits

That make TensorFlow.js easy to use

1. Use TensorFlow SavedModel without conversion
2. Run larger models than client side (GPU memory limits)
3. Code in 1 language - if you already use JS
   (***67.8%*** *of people use JS in development already)*
4. Performance - C bindings / JIT boost for pre/post processing



Resources

Learn more and get inspired

Learn more

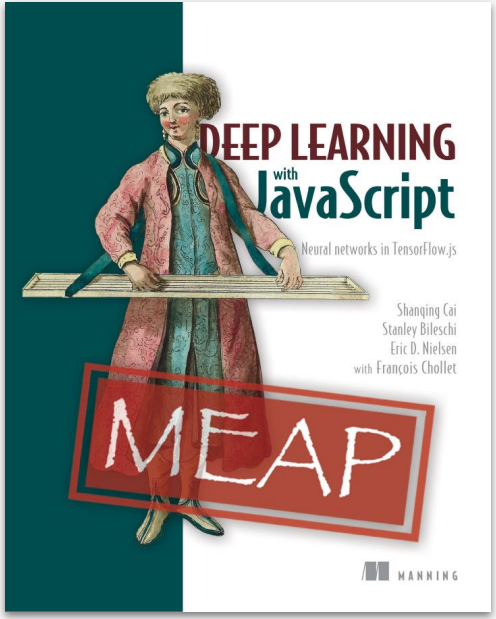
Get started fast!

Website / API:	*tensorflow.org/js*
Models:	*tensorflow.org/js/models*
Github Code:	*github.com/tensorflow/tfjs*
Google Group:	*tfjs@tensorflow.org*
Codepen:	*codepen.io/topic/tensorflow*
Glitch:	*glitch.com/@TensorFlowJS*

Recommended Reading

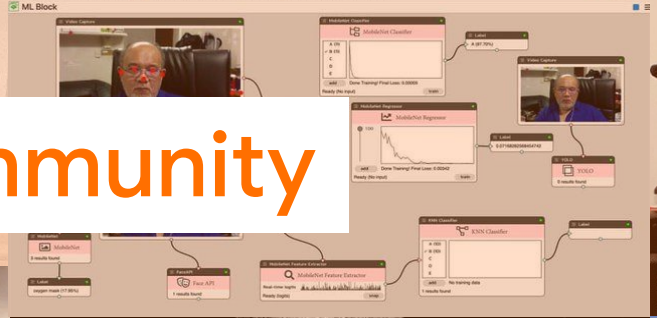
Deep Learning with JavaScript

manning.com/books/deep-learning-with-javascript

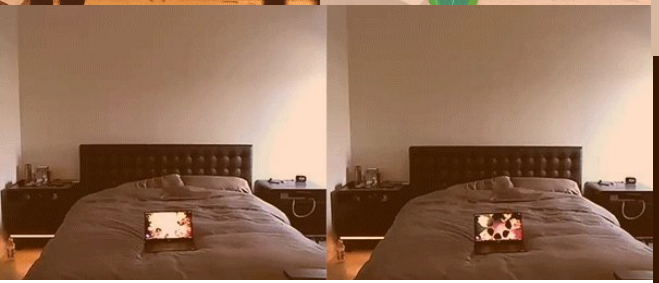


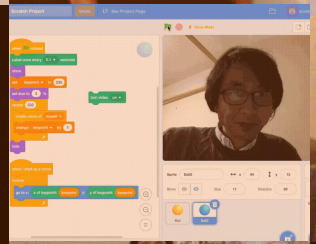
Join the community





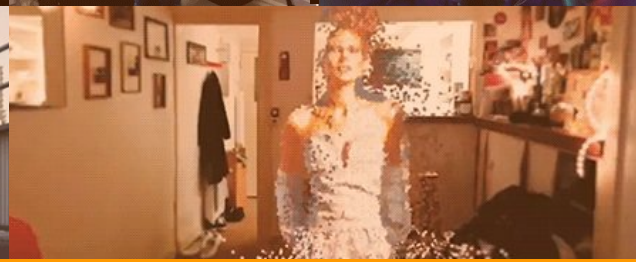





#MadeWithTFJS



Thanks to the global community for use of videos shown on this slide: *Jimmy (@MLBlock3), Manish Raj (@manishr41883690), Ben Farrell (@bfarrellforever), Wen (@yiwen_lin), Junya Ishihara (@jishiha), Rogerio Chaves (@_rchaves_), Amruta (@prenalys), FollowTheDarkside (@eatora22), and Alexandre Devaux (@AlexandreDevaux).*


What will you make?
Machine Learning
for everyone.
#MadeWithTFJS
Video by FollowTheDarkside, (@eatora22), Japan

Stay in touch

 @howdevelop  linkedin.com/in/shivaylamba

#MadeWithTFJS

TensorFlow

Quiz Time :
1. What are the types of APIs provided by TFJS for writing your ownn code?

TensorFlow

Quiz Time :
2. What are the current types of models provided by Teachable Machines?

TensorFlow

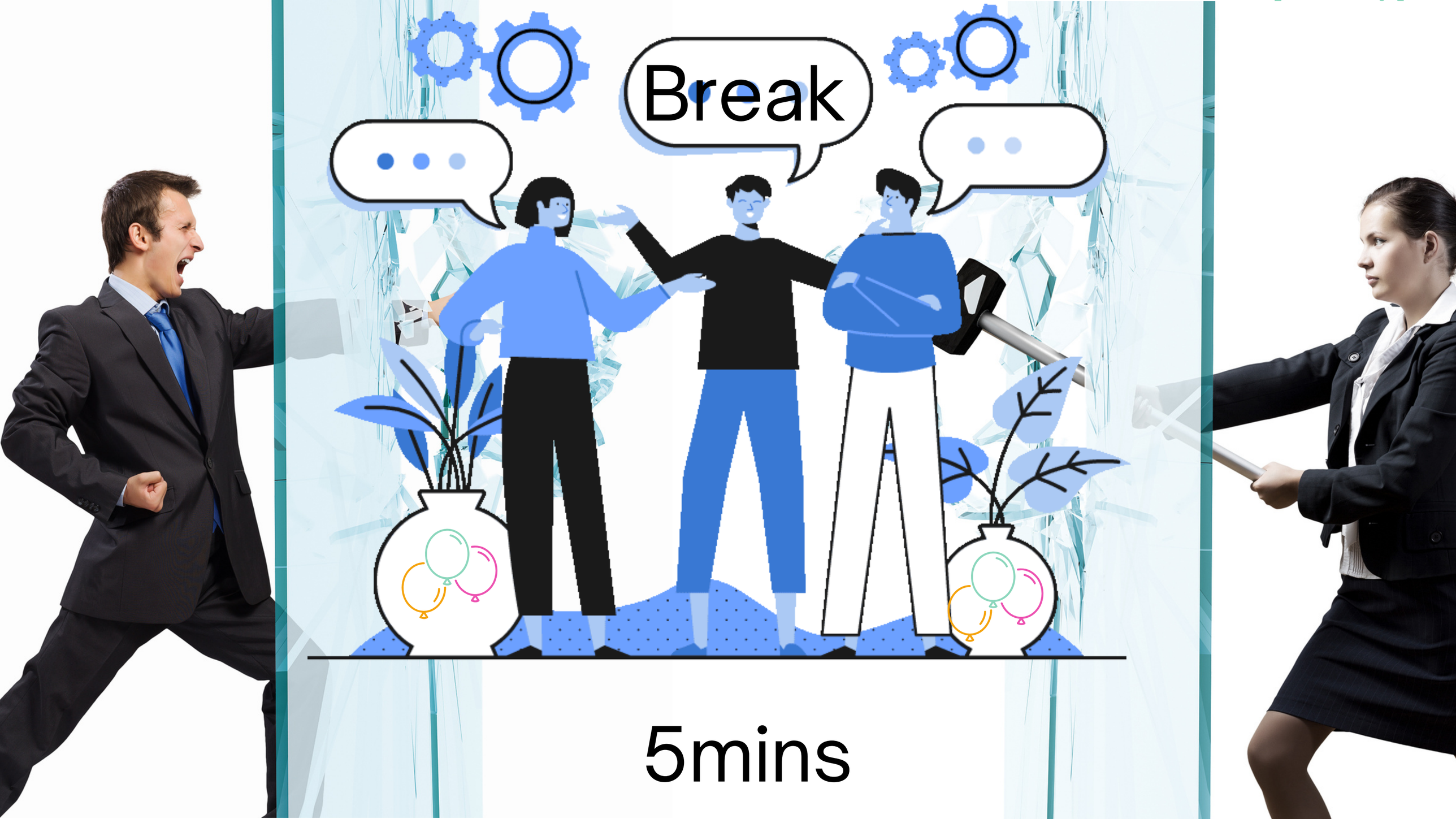
Quiz Time :
3. Name any two benefits of running TFJS on Server Side

TensorFlow

Quiz Time :
4. For how many classes is the TFJS COCO-SSD Model for?

TensorFlow

Quiz Time :
5. Name a library that has been built on top of Tensorflow.JS? (popular for creative professionals)


Break
5mins

Wrap Up

Remember!

- Re-Search
- Be short and clear
- Re-mind
- Q&A over Slack

Linkedin: shivaylamba
Email: shivaylamba@gmail.com
GOUP Slack: @shivaylamba

Join Us!

1. Community Managers
2. Tech Writers
3. In/Out Ambassadors
4. Marketing Creators & Editors
5. Course Creators
6. Project Creators

HTTPS://GOUPAZ.COM

HTTPS://METABOB.COM

Thank You

Culture
#egoless #collaborative #competent #decentralized #scalable #fun

Open source
#creator #contributor

How can we do better?

Diversity
#age #gender #location #economics #religion #politicalview