TensorFlow.js

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{EPITECH.} L'ECOLE DE L'INNOVATION ET DE L'EXPERTISE INFORMATIQUE

ML WEEK THE MACHINE LEARNING WEEK

Intro

JavaScript™

belongs to Oracle

asyncio is faster than Node.js

Python is slower

than Node.js

JavaScript sucks at linalg

JavaScript no more

sucks at linalg

JavaScript even has autodiff now

TensorFlow.js

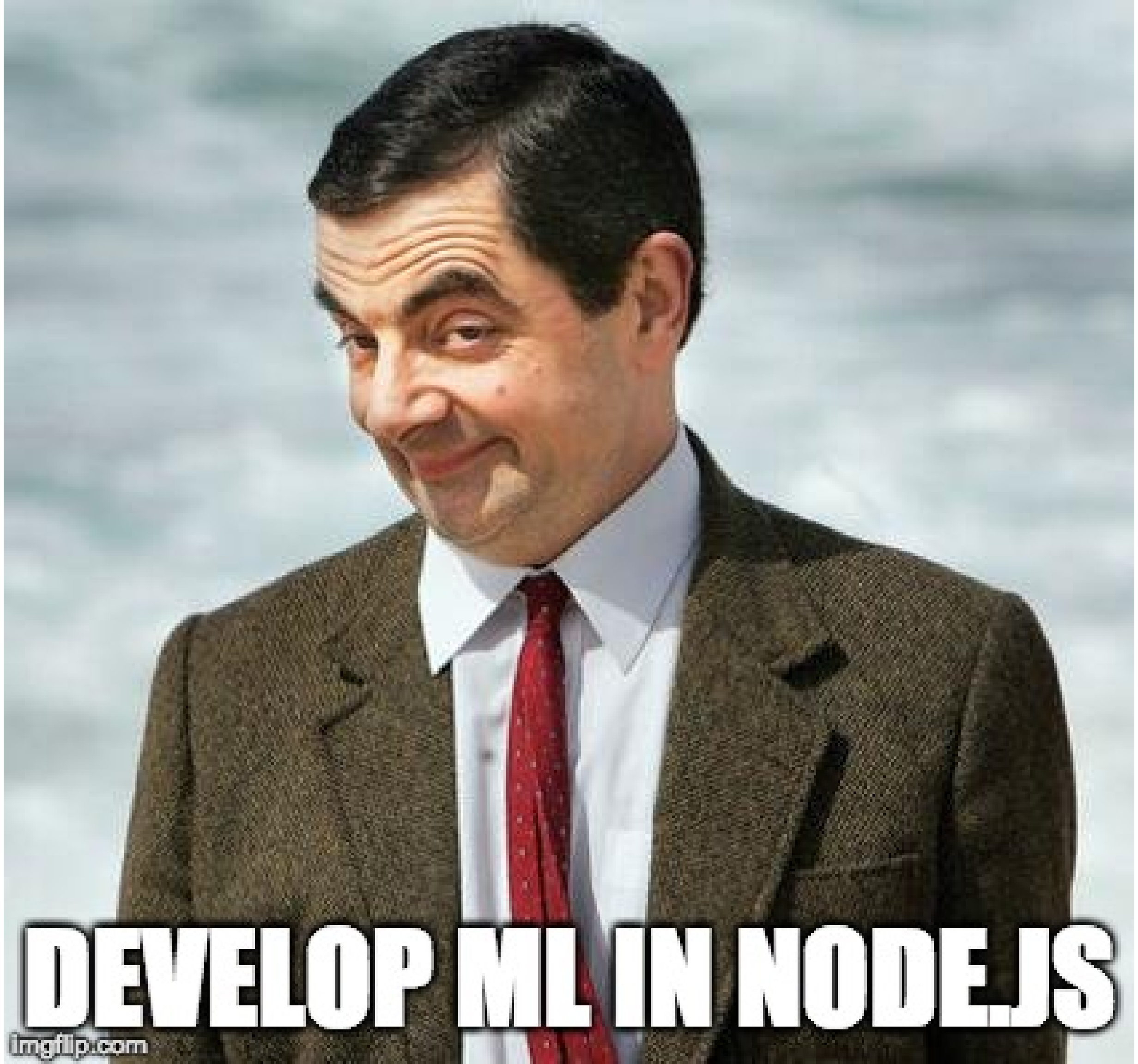
Quick facts

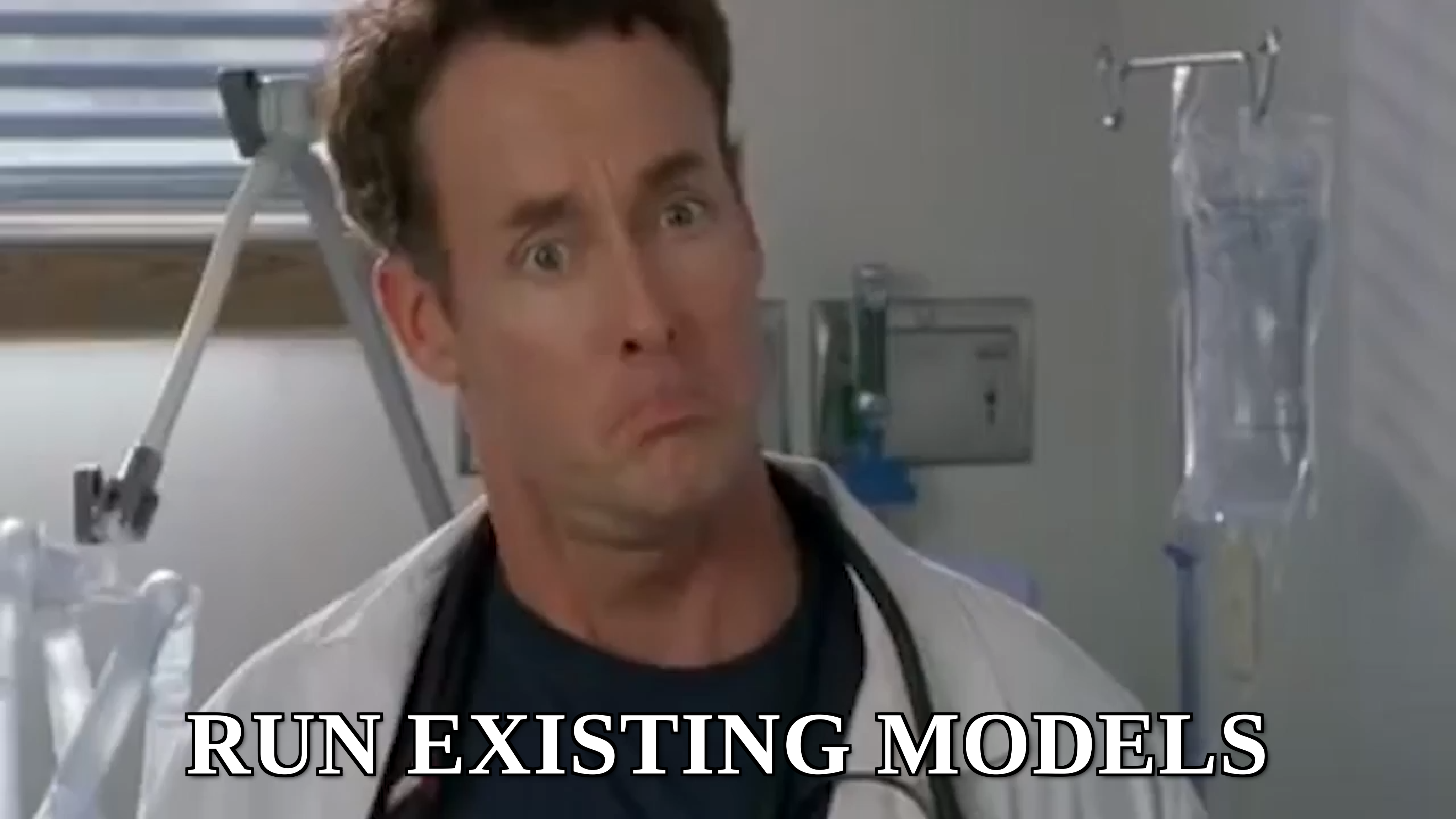
- Started in 2017 as deeplearn.js
- Rebranded in 2018
- Written in TypeScript
- ~10 developers from Google (Brain)

Official features

- Develop ML in the Browser
- Run Existing models
- Retrain Existing models

DEVELOP ML
IN THE BROWSER
imgflip.com


DEVELOP ML IN NODE.JS
imgflip.com


RUN EXISTING MODELS

API levels {

Core

Keras

Core API

Core API

- Copied from Python; naming convention changed
- Eager-only
- A few quirks
  - There are API differences
  - No `tf.nn`
  - Semi-manual memory management
  - Models must be converted to a "web friendly" format

Tensorflow model formats zoo

1. GraphDef = graph + [variable values - 2GB limit]
2. Checkpoint = variable values
3. Summary (aka Tensorboard) = GraphDef + key-value
4. MetaGraph = GraphDef + tags + i/o + Checkpoint
5. SavedModel = one or more MetaGraph-s
6. ModuleDef (aka Hub) = special SavedModel
7. Keras = hdf5 with arch and weights
8. 🎉 TensorFlow.js = GraphDef + JSON + sharded weights

Execution modes

- Browser: WebGL backend
- Node.js: libtensorflow backend
- No device pinning/selection

Semi-manual memory management

- There are various JS engines
- There are various GC implementations
- We allocate memory like 🐺 wolves

Semi-manual memory management

```javascript
const y = tf.tidy(() => {
   const one = tf.scalar(1);
   const a = tf.scalar(2);
   const b = a.square();
   console.log('numTensors (in tidy): ' + tf.memory().numTensors);
   return b.add(one);
});
console.log('numTensors (outside tidy): ' + tf.memory().numTensors);
y.print();  // y = 2 ^ 2 + 1
```

TensorBuffer

- `tf.Tensor` is immutable
- `tf.TensorBuffer` is mutable
- No efficient `set()`

Keras API

Keras is not

`tf.keras`

Keras API

- `tf.layers` - do not confuse with Python's
- No CuDNN
- RNN leaks

Live demo 1

Mobilenet v2

Load tfjs

Examples

github.com/tensorflow/tfjs-examples

Live demo 2

ijavascript

```
npm install ijavascript-await
```

- Node.js driver for Jupyter
- Deals with async/await
- Good integration into the notebook

Summary

Summary

- Much fun and easy
- Very early days
- PoCs work
- TensorFlow is getting even more complex inside

BRACE YOURSELF ML PEOPLE
TFJS KIDDIES ARE COMING
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Thank you

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