Understand ML With Simplest Code

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Introduction

TensorFlow Provides a very simple ML by Java Script.

It is easy to have the environment to see it demo.

This document is to introduce it.

The formula to get the training data

We have a formula $Y = 2X - 1$ to get the training data

example: let x=**-1** then $Y = 2*-1 - 1 = -2 - 1 =$ **-3**

x = { **-1**, 0, 1, 2, 3, 4}

y = {**-3**, -1, 1, 3, 5, 7}

Build up a very simple network

```
model.add(tf.layers.dense({units: 1, inputShape: [1]}));
```

This network will get training and predict the result for $Y = 2X - 1$

Should remind you here is the Machine do NOT know about the formula.
It cannot calculate like us.

The complete code

```
<html>
  <head>
  <!-- Load TensorFlow.js -->
  <!-- Get latest version at https://github.com/tensorflow/tfjs -->
  <script
src="https://cdn.jsdelivr.net/npm/@tensorflow/tfjs@0.11.2">
  </script>
  </head>
  <body>
    <div id="output_field"></div>
  </body>

  <script>
  async function learnLinear(){
   const model = tf.sequential();
   model.add(tf.layers.dense({units: 1, inputShape: [1]}));
   model.compile({
    loss: 'meanSquaredError',
    optimizer: 'sgd'
  });
    const xs = tf.tensor2d([-1, 0, 1, 2, 3, 4], [6, 1]);
    const ys = tf.tensor2d([-3, -1, 1, 3, 5, 7], [6, 1]);

    await model.fit(xs, ys, {epochs: 10});

    document.getElementById('output_field').innerT
ext =
     model.predict(tf.tensor2d([10], [1, 1]));
}
   learnLinear();
   </script>
<html>
```

Adjust the training to see what happen

We will go to change the following code to adjust the training, then let machine tell the result for **X = 10** to see if the training result is different or not.

The result by calculation is Y = 2X – 1 = 2X10 -1 = **19**

await model.fit(xs, ys, {epochs: 10});

We will try 10, 100, 500 and 1500.

The result summary

$Y = 2X - 1 = 2X10 - 1 = 19$

10 : 13.9085026, 10.9296398, 13.0426989, 12.0150528, 7.4879761
100 : 18.0845203, 17.7116661, 17.9885635, 17.9806786, 18.2209091
500 : 18.9848061, 18.983654, 18.9877472, 18.9812298, 18.9825478
1500 : 18.9999866, 18.9999866, 18.9999866, 18.9999866, 18.999986

With 1500 training, the machine can predict the result very closely.
But it cannot reach the correct result 19. Because the machine doesn't know about the formula Y = 2X - 1