

Artificial Intelligence: A Hands-On Introduction

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BUSINESS DAY

Google's AlphaGo Defeats Chinese Go Master in Win for A.I.

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By PAUL MOZUR MAY 23, 2017

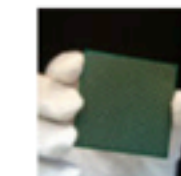


Ke Jie, the world's top Go player, reacting during his match on Tuesday against AlphaGo, artificial intelligence software developed by a Google affiliate. China Stringer Network, via Reuters

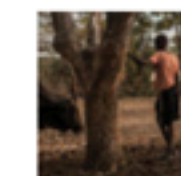
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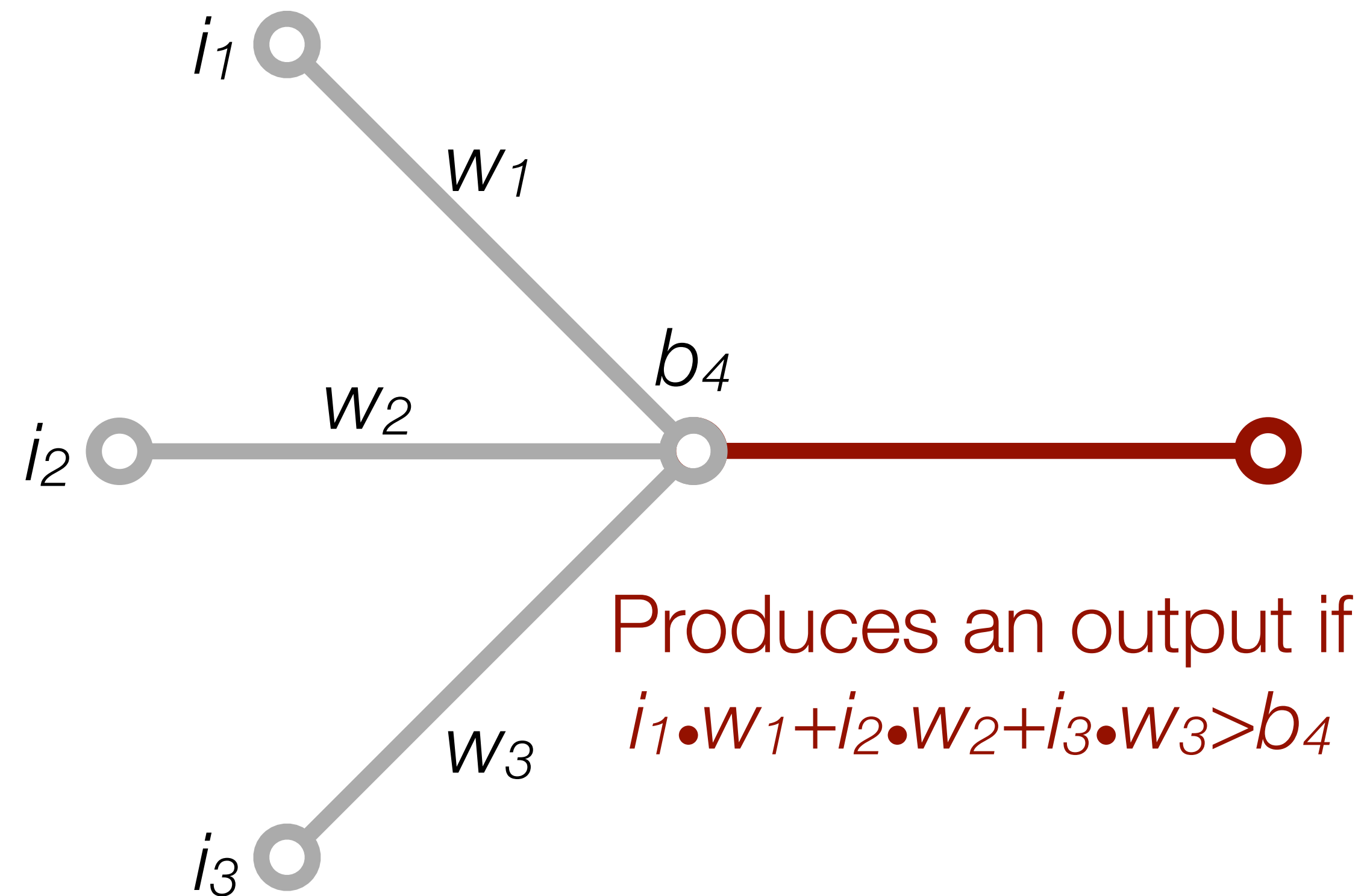


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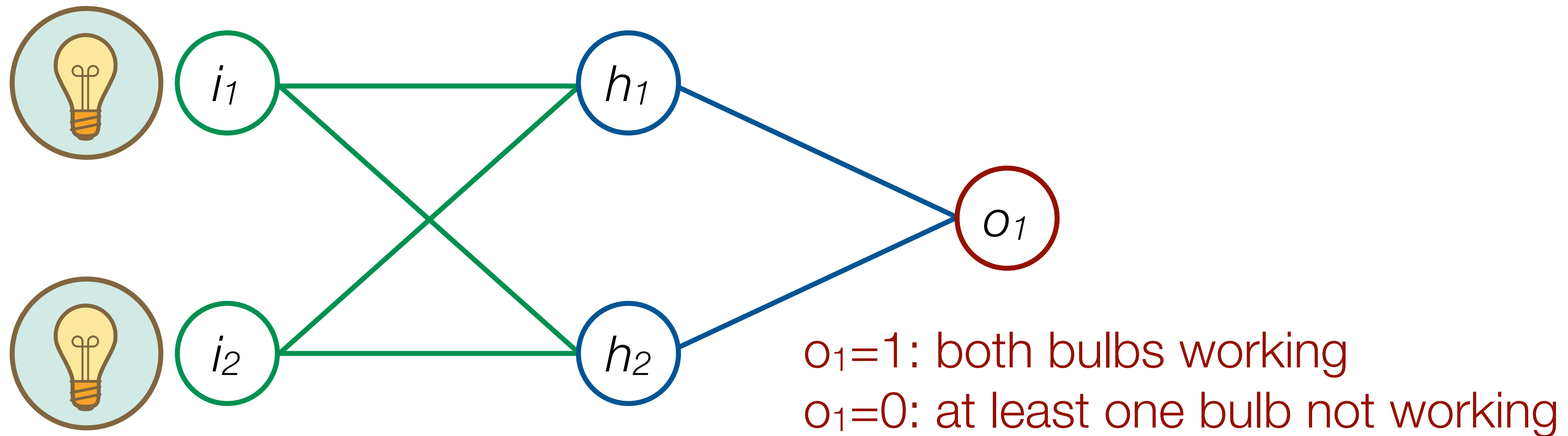


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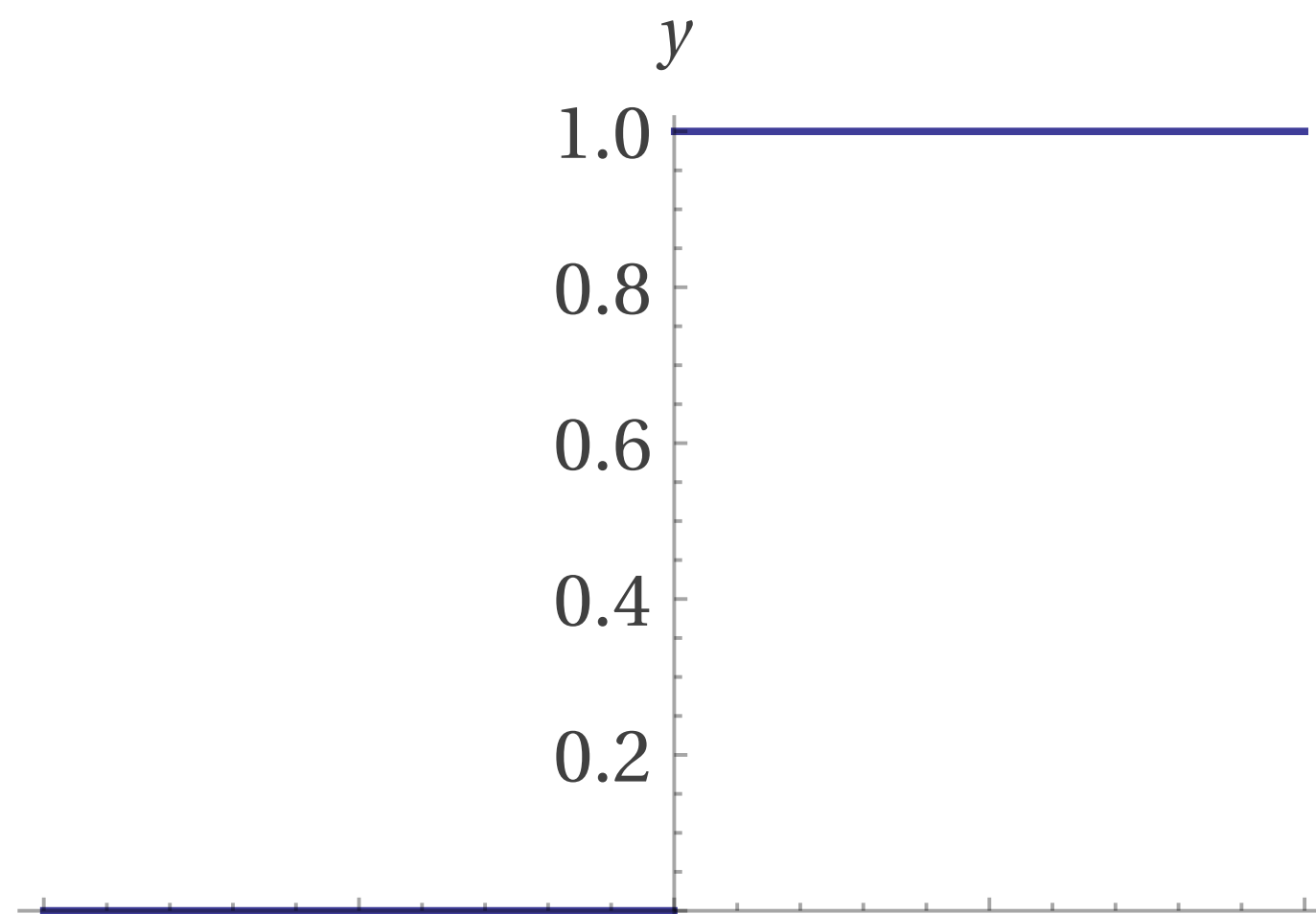
Simple McCulloch–Pitts/Perceptron Model



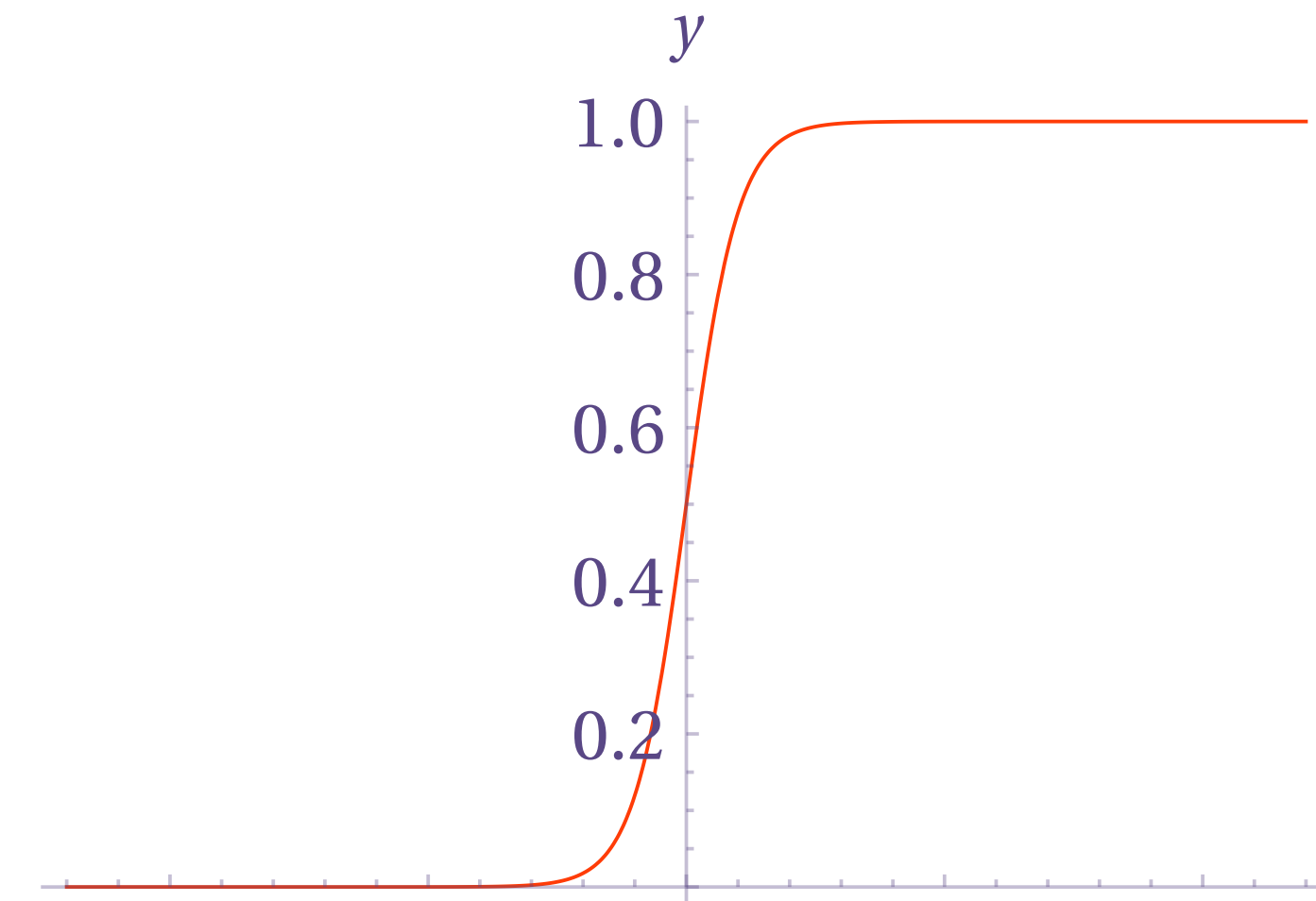
A Simple Example: A Light Bulb Tester



Threshold Function



Based on step function



Based on hyperbolic tangent function

$$\frac{e^x - e^{-x}}{e^{-x} + e^x}$$

Backpropagation

- Run the network for a given input
- Calculate the difference between the output produced by the network and the desired output - this is the *error*
- Change the weights by a certain percentage in the direction indicated by the error (i.e. increase or decrease to make the error smaller)
 - This percentage is called the *learning rate*
- Repeat for all inputs until the error is within the desired range

Using brain.js (<https://github.com/harthur/brain>):
<http://tinyurl.com/mlti17nn01>

The screenshot shows a JSFiddle editor interface. On the left, the 'Fiddle Meta' sidebar contains the title 'MLT17NN01', a description 'No description', and a link to the 'JSFiddle Roadmap'. The main editor area is divided into three panes: HTML, CSS, and JAVASCRIPT. The HTML pane contains the following code:

```
1 <html>
2 <head>
3 <script src="https://cdn.rawgit.com/harthur/brain/gh-pages/brain-0.6.3.min.js"></script>
4 </head>
5 <body>
6 <script>
7   var net = new brain.NeuralNetwork();
8
9   var inputset = net.train([
10     {input: [0, 0], output: [0]},
11     {input: [0, 1], output: [0]},
12     {input: [1, 0], output: [0]},
13     {input: [1, 1], output: [1]}
14   ]);
15
16   var output = net.run([1, 1]);
17
18   document.write("Output: ", output[0],
19     "<br>Number of iterations: ", inputset.iterations,
20     "<br>Error: ", inputset.error);
21 </script>
22 </body>
23 </html>
```

The CSS pane is empty. The JAVASCRIPT pane is also empty. The output area on the right displays the results of the neural network run:

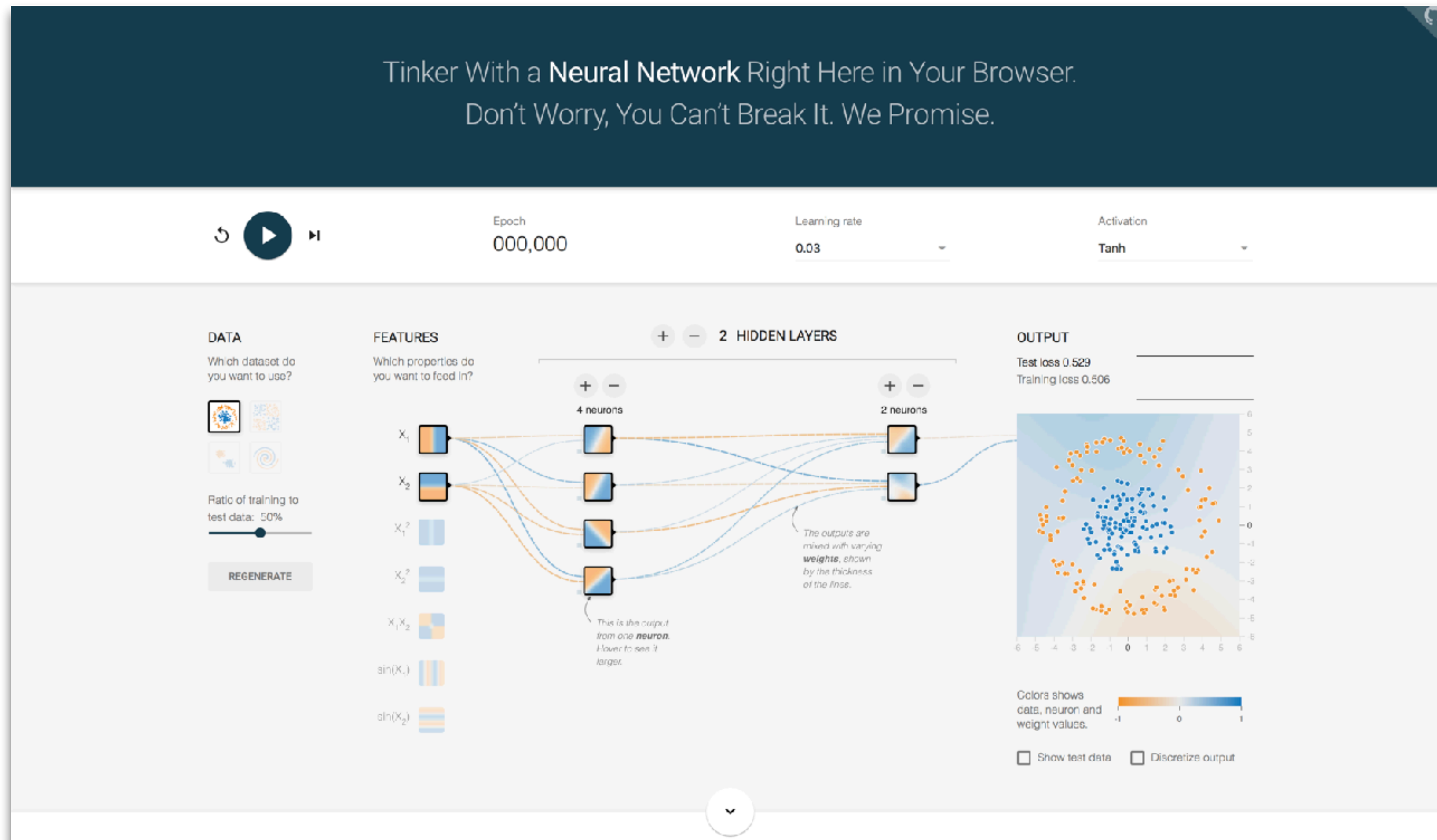
```
Output: 0.8898158809618955
Number of iterations: 1221
Error: 0.004991215749680746
```

Below the code editor, there are two yellow warning messages:

- No need for the **HTML** tag, it's already in the output.
- No need for the **HEAD** tag, it's already in the output.

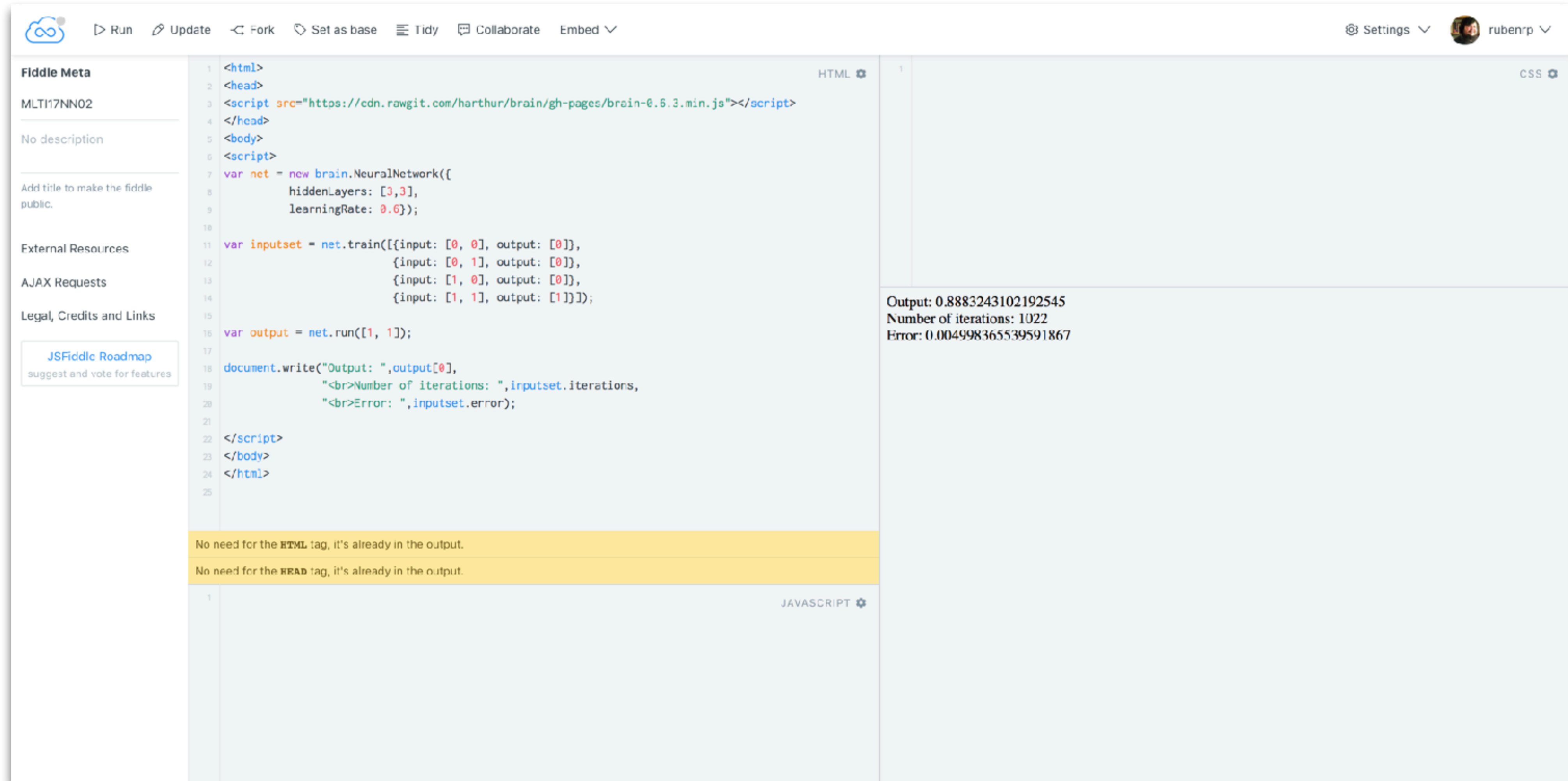
A Neural Network Playground:

<http://tinyurl.com/mlti17nndemo>



Returning to brain.js

<http://tinyurl.com/mlti17nn02>



The screenshot shows a JSFiddle editor interface. On the left, the 'Fiddle Meta' panel displays the title 'MLT17NN02' and a 'No description' note. Below this, there are sections for 'External Resources', 'AJAX Requests', and 'Legal, Credits and Links', including a link to the 'JSFiddle Roadmap'. The main editor area is divided into three panes: HTML, CSS, and JAVASCRIPT. The HTML pane contains the following code:

```
1 <html>
2 <head>
3 <script src="https://cdn.rawgit.com/harthur/brain/gh-pages/brain-0.6.3.min.js"></script>
4 </head>
5 <body>
6 <script>
7   var net = new brain.NeuralNetwork({
8     hiddenLayers: [3,3],
9     learningRate: 0.6});
10
11   var inputset = net.train([
12     {input: [0, 0], output: [0]},
13     {input: [0, 1], output: [0]},
14     {input: [1, 0], output: [0]},
15     {input: [1, 1], output: [1]}]);
16
17   var output = net.run([1, 1]);
18
19   document.write("Output: ",output[0],
20     "<br>Number of iterations: ",inputset.iterations,
21     "<br>Error: ",inputset.error);
22 </script>
23 </body>
24 </html>
25
```

The CSS pane is empty. The JAVASCRIPT pane is also empty. The output area on the right displays the results of the neural network run:

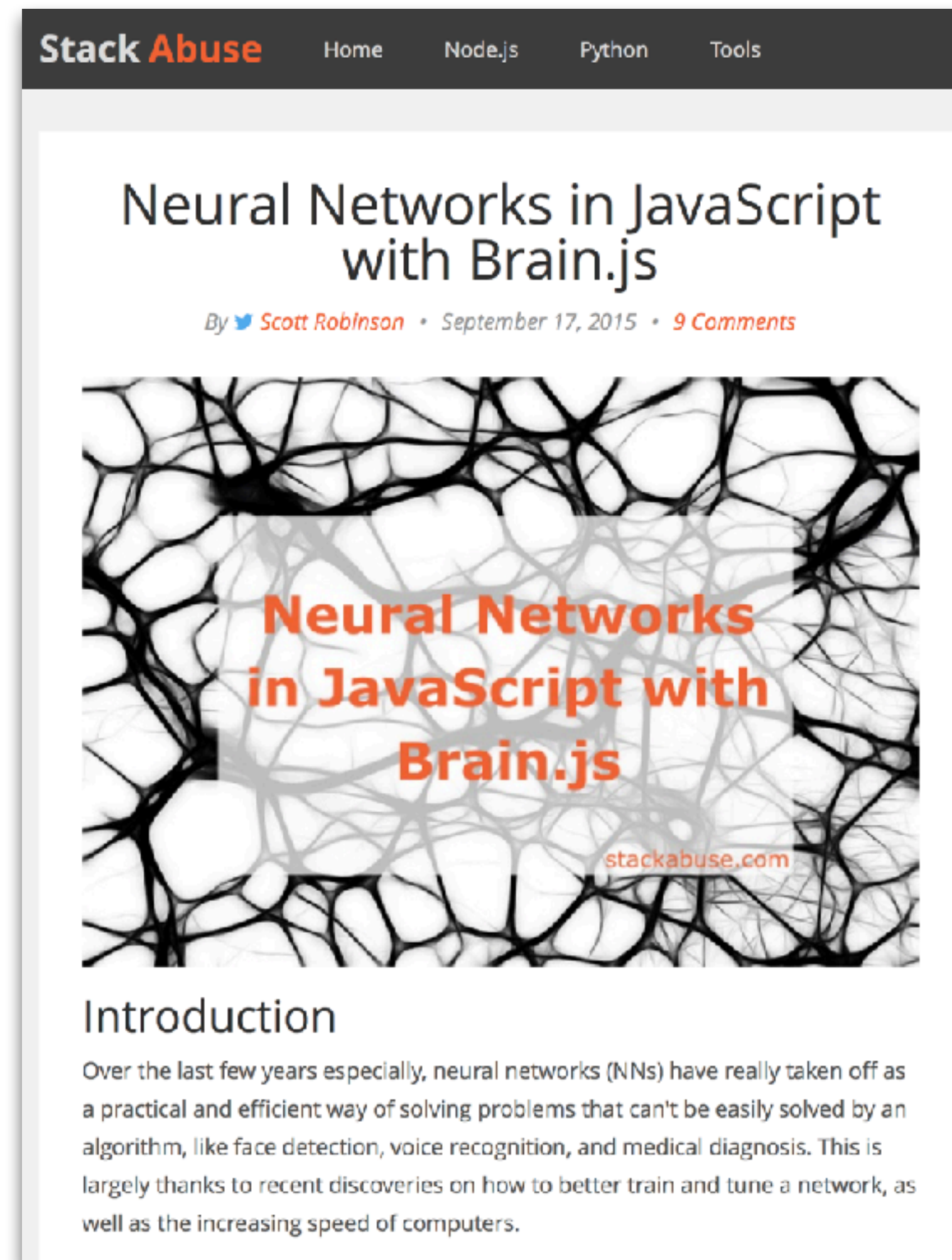
```
Output: 0.8883243102192545
Number of iterations: 1022
Error: 0.004998365539591867
```

Below the code panes, there are two yellow warning messages:


- No need for the **HTML** tag, it's already in the output.
- No need for the **HEAD** tag, it's already in the output.

Using brain.js for Image Recognition:

<http://stackabuse.com/neural-networks-in-javascript-with-brain-js/>

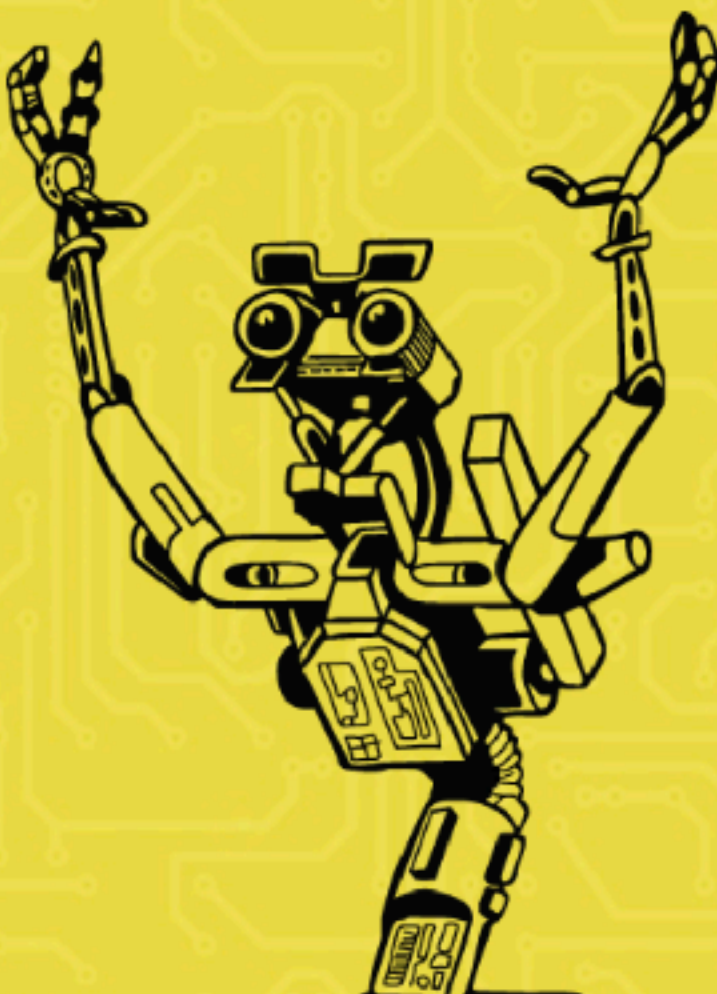


Connecting to Arduino - Johnny-Five: <http://johnny-five.io>

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Johnny-Five

The JavaScript
LightBlue Bean
Robotics & IoT Platform



Johnny-Five is the [JavaScript Robotics & IoT](#) Platform. Released by [Bocoup](#) in 2012, Johnny-Five is maintained by a community of passionate software developers and hardware engineers. Over 75 developers have made contributions towards building a robust, extensible and composable ecosystem.

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Connecting to Text Adventures: Twine

<http://twinery.org>

The corkboard features several pinned cards and screenshots:

- Twine Introduction Card (Top Left):** A white card with a red pin. It features the Twine logo (a blue and green square) and text describing Twine as an open-source tool for telling interactive, nonlinear stories. It mentions that no code is needed for simple stories but can be extended with variables, conditional logic, images, CSS, and JavaScript. It also states that Twine publishes directly to HTML and was created by Chris Klimas in 2009.
- Download Card (Top Right):** A yellow card with a blue pin. It includes a download icon and text for downloading version 2.1.3 for Windows (32-bit), OS X, and Linux (32-bit). It also provides a link to use it online and mentions that version 1.4.2 is also available for Windows and OS X. At the bottom, it asks "Do you love Twine?" and encourages supporting its development.
- Wiki and Forum Card (Middle Right):** A white card with a green pin. It has icons for a book and speech bubbles, with links to the "Wiki" (tutorials, documentation) and "Forum" (get help, share your work).
- Twine 1.4 Editing Screenshot (Bottom Left):** A screenshot of the Twine 1.4 interface showing a story map. Below it is the caption "Editing a story in Twine 1.4."
- Twine 1.4 Bird's-eye View Screenshot (Bottom Middle):** A screenshot of the Twine 1.4 interface showing a bird's-eye view of a story map. Below it is the caption "A bird's-eye view of a story map in Twine 1.4."
- Twine 2.0 Story List Screenshot (Bottom Right):** A screenshot of the Twine 2.0 interface showing a list of stories. Below it is the caption "The story list in Twine 2.0."
- Twine 2.0 Editing Screenshot (Bottom Far Right):** A screenshot of the Twine 2.0 interface showing a story map. Below it is the caption "Editing a story in Twine 2.0."

Hippasus



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