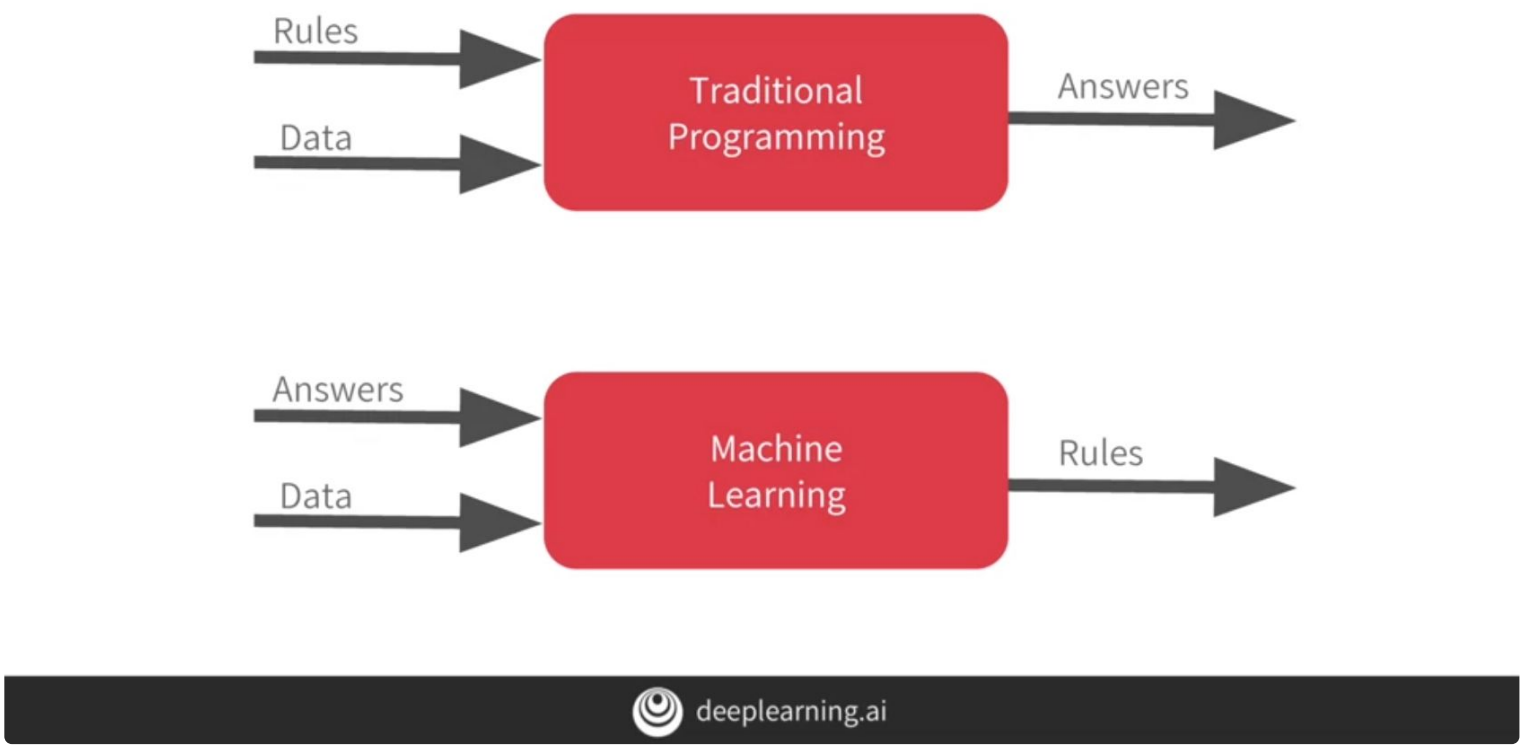
A primer in machine learning

Difference between traditional Programming and ML

The ML approach is used for generating rules for solving problems for which traditional coding manually all the rules isn't possible, example Activity recognition wherein just the speed can decide walking or running but if we try recognizing other activities like cooking, playing etc, manual rule formation for all the tasks becomes an impossible task.



Ways to create models in Tensorflow or Keras - Sequential and Functional

The Hello World of Neural Networks

Keras is an API in TensorFlow which makes it easy to define NN.

```
keras. Sequential([keras.layers.Dense(units=1, input_shape=[1])])
```

[Sequential Models] [Layers] [Dense]

'Dense' in keras is used to define a single layer of NN.

All the layers in a NN are defined sequentially and hence keras.Sequential.

Since the above code has only 1 dense and 1 unit within it, it is a single neuron.

NOTE: By default dense layers include a bias, but you can exclude it by specifying {useBias: false} in the options when creating a dense layer.

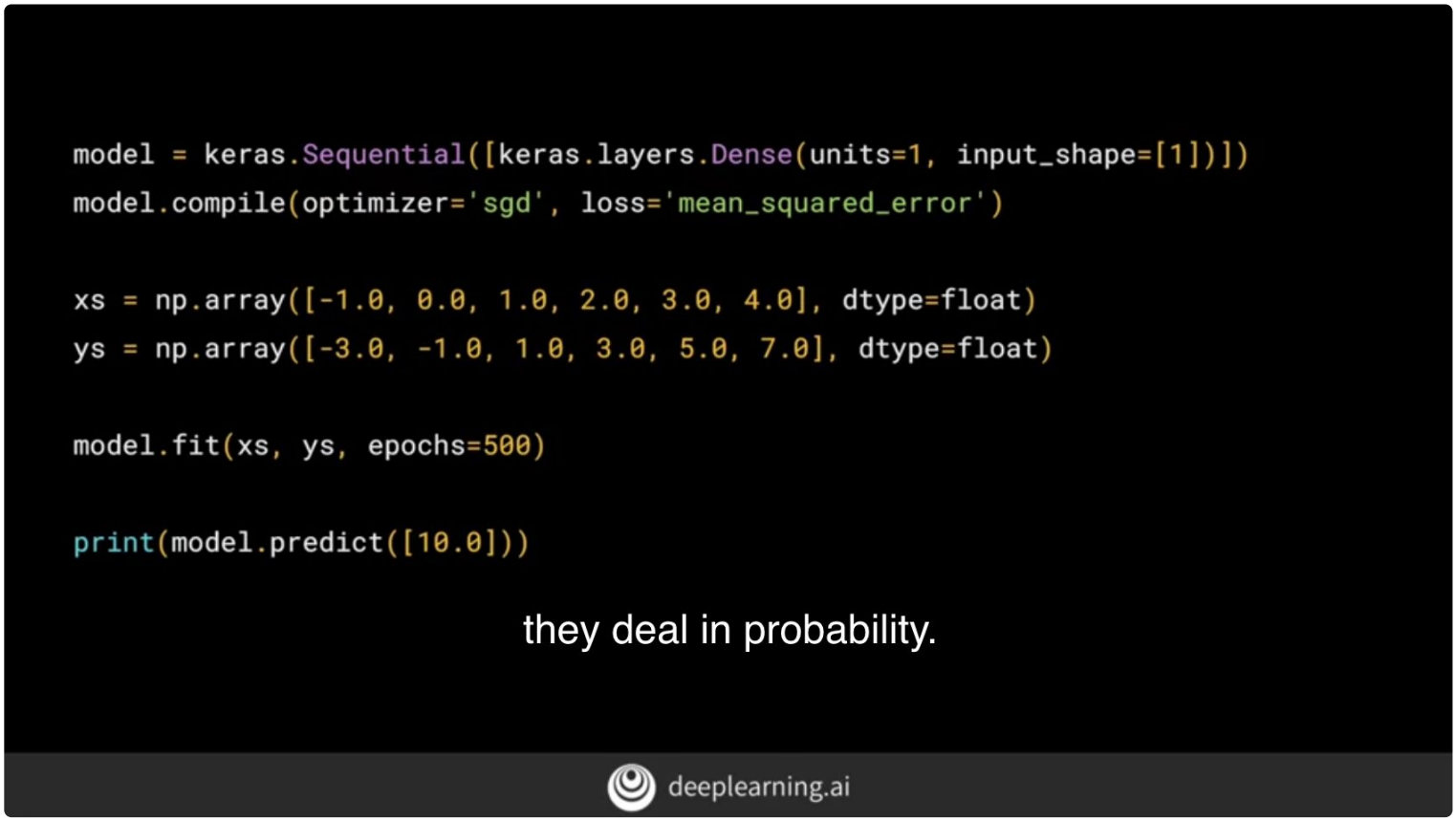
Each weight in the model is backend by a Variable object. In TensorFlow.js, a Variable is a floating-point Tensor with one additional method assign() used for updating its values. The Layers API automatically initializes the weights using best practices.

[Before you do any training, you need to decide on three things: Optimizer, loss function and metric list]

```
model.compile(optimizer='sgd', loss='mean_squared_error')
```

[Loss Functions] [Optimizer]

During compilation, the model will do some validation to make sure that the options you chose are compatible with each other.




```
model = keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])1)
model.compile(optimizer='sgd', loss='mean_squared_error')

np.array([-1.0, 0.0, 1.0, 2.0, 3.0, 4.0], dtype=float)
ys = np.array([-3.0, -1.0, 1.0, 3.0, 5.0, 7.0], dtype=float)

model.fit(xs, ys, epochs=500)
```

[Model Training APIs]

the fit function will try fitting or training the model. The 'epochs' are the number of cycles for which the training will be done using optimizer and loss function values.

predict function will give the predicted value of the model for an input.