C1W1_Assignment

May 20, 2022

1 Week 1 Assignment: Housing Prices

In this exercise you'll try to build a neural network that predicts the price of a house according to a simple formula.

Imagine that house pricing is as easy as:

A house has a base cost of 50k, and every additional bedroom adds a cost of 50k. This will make a 1 bedroom house cost 100k, a 2 bedroom house cost 150k etc.

How would you create a neural network that learns this relationship so that it would predict a 7 bedroom house as costing close to 400k etc.

Hint: Your network might work better if you scale the house price down. You don't have to give the answer 400…it might be better to create something that predicts the number 4, and then your answer is in the 'hundreds of thousands' etc.

[5]:
```
import tensorflow as tf
from tensorflow import keras
import numpy as np
```

[6]:
```
print("abc.DEF".capitalize())
```

```
Abc.def
```

[18]:
```
# GRADED FUNCTION: house_model
def house_model():
    ### START CODE HERE

    # Define input and output tensors with the values for houses with 1 up to 6␣
 ↪bedrooms
    # Hint: Remember to explictly set the dtype as float
    xs = np.arange(1,11, dtype=float)

    start=1
    step=0.5
    num=10
    ys = np.arange(0,num)*step+start

    # Define your model (should be a model with 1 dense layer and 1 unit)
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```
    model = tf.keras.Sequential(keras.layers.Dense(units=1,input_shape=[1]))

    # Compile your model
    # Set the optimizer to Stochastic Gradient Descent
    # and use Mean Squared Error as the loss function
    model.compile(optimizer='sgd', loss='mean_squared_error')

    # Train your model for 1000 epochs by feeding the i/o tensors
    model.fit(xs, ys, epochs=500)

    ### END CODE HERE
    return model
```

Now that you have a function that returns a compiled and trained model when invoked, use it to get the model to predict the price of houses:

[19]:
```
# Get your trained model
model = house_model()
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Epoch 1/500
1/1 [==============================] - 0s 172ms/step - loss: 28.3242
Epoch 2/500
1/1 [==============================] - 0s 8ms/step - loss: 1.3287
Epoch 3/500
1/1 [==============================] - 0s 2ms/step - loss: 0.0899
Epoch 4/500
1/1 [==============================] - 0s 2ms/step - loss: 0.0328
Epoch 5/500
1/1 [==============================] - 0s 2ms/step - loss: 0.0299
Epoch 6/500
1/1 [==============================] - 0s 2ms/step - loss: 0.0296
Epoch 7/500
1/1 [==============================] - 0s 2ms/step - loss: 0.0293
Epoch 8/500
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Epoch 9/500
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Epoch 14/500
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Epoch 15/500
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Epoch 39/500
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Epoch 399/500
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1/1 [==============================] - 0s 18ms/step - loss: 0.0011
Epoch 400/500
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1/1 [==============================] - 0s 2ms/step - loss: 9.9478e-04
Epoch 410/500
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Epoch 411/500
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Epoch 415/500
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Epoch 417/500
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Epoch 418/500
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Epoch 421/500
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Epoch 422/500
1/1 [==============================] - 0s 1ms/step - loss: 8.9167e-04
Epoch 423/500
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1/1 [==============================] - 0s 1ms/step - loss: 8.8420e-04
Epoch 424/500
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Epoch 426/500
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1/1 [==============================] - 0s 1ms/step - loss: 8.5493e-04
Epoch 428/500
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Epoch 429/500
1/1 [==============================] - 0s 2ms/step - loss: 8.4066e-04
Epoch 430/500
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1/1 [==============================] - 0s 1ms/step - loss: 8.2663e-04
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1/1 [==============================] - 0s 2ms/step - loss: 8.1283e-04
Epoch 434/500
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Epoch 444/500
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Epoch 445/500
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Epoch 446/500
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Epoch 447/500
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1/1 [==============================] - 0s 3ms/step - loss: 7.2247e-04
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Epoch 471/500
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Epoch 491/500
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Epoch 494/500
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Epoch 495/500
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1/1 [==============================] - 0s 2ms/step - loss: 4.8235e-04
Epoch 496/500
1/1 [==============================] - 0s 7ms/step - loss: 4.7831e-04
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Epoch 498/500
1/1 [==============================] - 0s 2ms/step - loss: 4.7033e-04
Epoch 499/500
1/1 [==============================] - 0s 2ms/step - loss: 4.6639e-04
Epoch 500/500
1/1 [==============================] - 0s 1ms/step - loss: 4.6248e-04
```

Now that your model has finished training it is time to test it out! You can do so by running the next cell.

[21]:
```
new_y = 7.0
prediction = model.predict([new_y])[0]
print(prediction)
```

```
[4.0002537]
```

If everything went as expected you should see a prediction value very close to 4. **If not, try adjusting your code before submitting the assignment.** Notice that you can play around with the value of `new_y` to get different predictions. In general you should see that the network was able to learn the linear relationship between `x` and `y`, so if you use a value of 8.0 you should get a prediction close to 4.5 and so on.

Congratulations on finishing this week's assignment!

You have successfully coded a neural network that learned the linear relationship between two variables. Nice job!

Keep it up!