Mapping

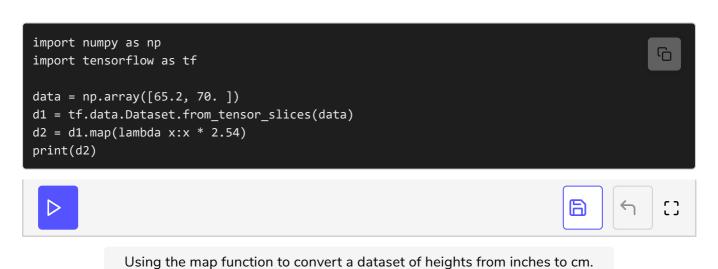
Transform each individual observation in a dataset through mapping.

Chapter Goals:

- Learn how to map a function onto each observation of a dataset
- Implement a function that creates a dataset of serialized protocol buffers and parses each observation

A. Mapping function

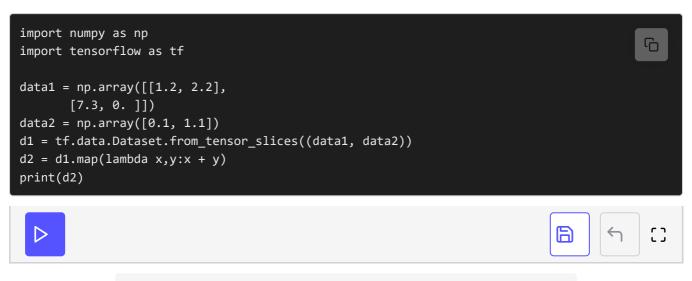
After initially creating a dataset from NumPy arrays or files, we oftentimes want to apply changes to make the dataset observations more useful. For example, we might create a dataset from heights measured in inches, but we want to train a model on the heights in centimeters. We can convert each observation to the desired format by using the map function.



In the example above, d1 is a dataset containing the height values from data, measured in inches. We use map to apply a function onto each observation of d1. The mapping function (represented by the lambda input to map) multiplies each observation value by 2.54 (the inch-centimeter conversion).

The output of map, which is d2 in the example, is the resulting dataset containing the mapped observation values. In this case, the values of d2 will be 165.608 and 182.88.

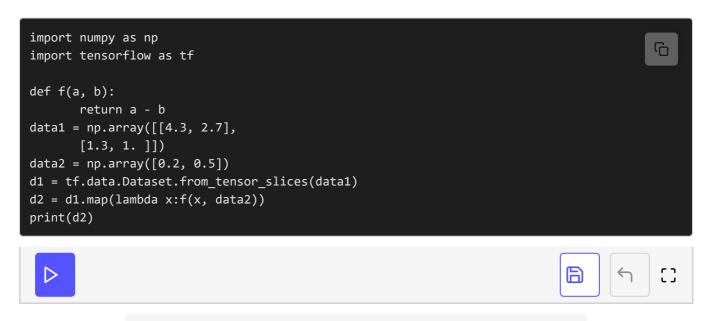
When a dataset is created from a tuple, the input function for map must take in a tuple as its argument.



Using the map function to convert a dataset of tuple observations.

B. Wrapper functions

One thing to note about map is that its input function must only take in a single argument, representing an individual dataset observation. However, we may want to use a multi-argument function as the input to map. In this case, we can use a *wrapper* to ensure that the input function is in the correct format.



Using the map function with a wrapper function around function f.

In the example above, f is an external function that subtracts its second argument from its first argument. To use f as the mapping function for d1 (with data2 as the second argument), we create a wrapper function for f.

represented by the lambda input to map.

The wrapper function takes in a single argument, x, so it meets the criteria as an input to map. It then uses x as the first argument to f, while using data2 as the second argument.

Time to Code!

In this chapter you'll be completing the dataset_from_examples function,
which maps the parse_example function from chapter 5 onto a

TFRecordDataset.

The first thing we'll do is create the Example spec that's used for parsing, by using the create_example_spec function from chapter 4.

Set example_spec equal to create_example_spec applied with config as the only argument.

Next, we create a dataset from the TFRecords files given by filenames.

Set dataset equal to tf.data.TFRecordsDataset initialized with filenames.

The dataset we created contains serialized protocol buffers for each observation. To parse each serialized protocol buffer, we need to map the parse_example function from chapter 5 onto each observation of the dataset.

Since the input function for map can only take in a single argument, we'll create a lambda wrapper around the parse_example function.

Set wrapper equal to a lambda function whose input argument is named example. The lambda function should return parse_example applied with example, example_spec, and output_features as the first, second, and third arguments.

Finally, we can apply the map function onto the dataset and return the output.

Set dataset equal to dataset.map applied with wrapper as the input function. Then return dataset.

```
for feature_name, feature_config in config.items():
        if feature_config['type'] == 'int':
            tf_type = tf.int64
        elif feature_config['type'] == 'float':
            tf_type = tf.float32
        else:
            tf_type = tf.string
        shape = feature_config['shape']
        if shape is None:
            feature = tf.VarLenFeature(tf_type)
        else:
            default_value = feature_config.get('default_value', None)
            feature = tf.FixedLenFeature(shape, tf_type, default_value)
        example_spec[feature_name] = feature
    return example_spec
def parse_example(example_bytes, example_spec, output_features=None):
    parsed_features = tf.parse_single_example(example_bytes, example_spec)
    if output_features is not None:
        parsed_features = {k: parsed_features[k] for k in output_features}
    return parsed_features
# Map the parse_example function onto a TFRecord Dataset
def dataset_from_examples(filenames, config, output_features=None):
    # CODE HERE
    pass
```











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