Parsing

Parse data from serialized protocol buffers.

Chapter Goals:

- Learn how to parse a serialized protocol buffer
- Understand how feature data is represented in TensorFlow
- Implement a function that parses a serialized protocol buffer

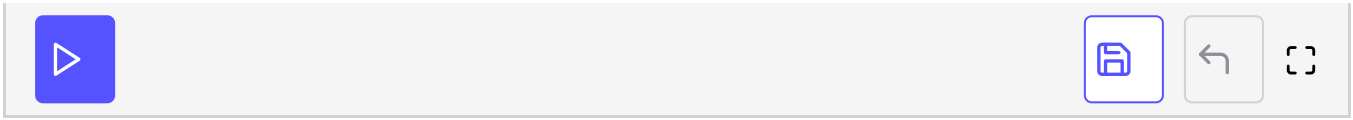
A. Feature parsing

After creating an Example spec, it can be used to parse serialized protocol buffers that are read from a TFRecords file. Specifically, we use the Example spec as an argument to the `tf.parse_single_example` function, which converts a serialized protocol buffer into a usable feature dictionary.

```
import tensorflow as tf

print(example_spec)
print(repr(ex))

parsed = tf.parse_single_example(
    ex.SerializeToString(), example_spec)
print(repr(parsed))
```



You'll notice that the output of `tf.parse_single_example` is a dictionary mapping feature names to either a `tf.Tensor` or a `tf.SparseTensor`. Each `FixedLenFeature` is converted to a `tf.Tensor` and each `VarLenFeature` is converted to a `tf.SparseTensor`.

A `tf.Tensor` is basically TensorFlow's version of NumPy arrays, meaning it is a container for feature data with a fixed shape. `tf.SparseTensor` is used to represent data that may have many missing or empty values, making it useful for variable-length features.

In upcoming chapters, we'll discuss how we can combine the `tf.Tensor` and `tf.SparseTensor` values of the parsed dictionary to create an input layer for a TensorFlow model.

B. Shapes: `()` vs. `1`

In the previous chapter, we brought up how using `()` for the shape of a `FixedLenFeature` is different from using `1`.

Using `()` (or `[]`) corresponds to a single data value, while using `1` (represented as `(1,)` in `tf.Tensor`) corresponds to a list containing a single data value.

Time to Code!

In this chapter you'll complete the `parse_example` function, which parses data from a serialized Example object.

Using the input Example spec, `example_spec`, we'll parse the serialized protocol buffer, `example_bytes`.

Set `parsed_features` equal to `tf.parse_single_example` with `example_bytes` as the first argument and `example_spec` as the second argument.

After parsing the serialized protocol buffer into a dictionary, we may only want to return certain features. The features we return depend on the value of `output_features`.

If `output_features` is `None` (the default), we'll return the entire parsed dictionary. Otherwise, we only return the key-value pairs if the key is in the `output_features` list.

If `output_features` is not `None`, set `parsed_features` to a dictionary containing only the key-value pairs for keys that are listed in `output_features`.

Return `parsed_features`.

```
import tensorflow as tf
```

```
def parse_example(example_bytes, example_spec, output_features=None):
    # CODE HERE
    pass
```