Initialization

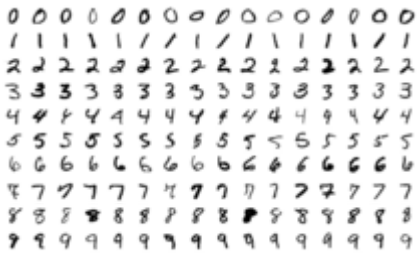
Learn about the MNIST dataset along with the input and output sizes for the data.

Chapter Goals:

- Learn about the MNIST database
- Initialize the model with input and output size

A. MNIST

The MNIST (Modified National Institute of Standards and Technology) database contains 60,000 training examples and 10,000 testing examples. The database contains grayscale handwritten digits that were resized to fit in a 20x20 pixel box, which was then centered in a 28x28 image (padded with whitespace). The images were resized using an anti-aliasing technique to minimize image distortion.



Examples from the MNIST database.

The MNIST database is available on Yann LeCun's website for download. The database is normalized to have floating point values between 0.0 and 1.0. In this case, 0.0 corresponds to a grayscale pixel value of 255 (pure white), while 1.0 corresponds to a grayscale pixel value of 0 (pure black).

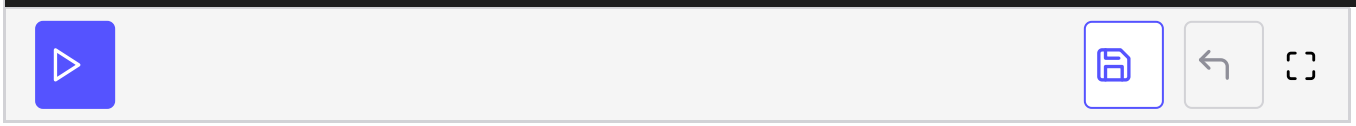
B. Inputs and labels

Since each grayscale image has dimensions 28x28, there are 784 pixels per image. Therefore, each input image corresponds to a tensor of 784 normalized floating point values between 0.0 and 1.0. The label for an image is a one-hot tensor with 10 classes (each class represents a digit). In terms of our code, we have `input_dim = 28` and `output_size = 10` for the MNIST dataset.

When we use a batch of input data, the shape of `inputs` is `(batch_size, self.input_dim**2)` and the shape of `labels` is `(batch_size, self.output_size)`, where `batch_size` represents the size of the batch.

The shape of `inputs` is `(batch_size, self.input_dim**2)` because there are `batch_size` images and each image is a square with a width of `input_dim` pixels.

```
batch_size = 16
dataset = dataset.batch(batch_size)
it = dataset.make_one_shot_iterator()
inputs, labels = it.get_next()
with tf.Session() as sess:
    # Batch of data size 16
    input_arr, label_arr = sess.run(
        (inputs, labels))
print(repr(input_arr))
```



Example: A batch of input data and labels. Note that dataset contains all the normalized MNIST data and corresponding labels.

In the example, `inputs` represents the input data tensor, while `labels` represents the one-hot label tensor. The batch size is set to 16 in the example.

Time to Code!

In this section of the course you'll be creating a Python class, `MNISTModel` that represents a CNN for MNIST classification.

Since we aren't using `tf.placeholder` or `tf.Session`, we just need to set the height/width dimension of the image data (`input_dim`) and the number of classes (`output_size`).

Set `self.input_dim` equal to `input_dim` and set `self.output_size` equal to `output_size`.

```
import tensorflow as tf

class MNISTModel(object):
```

```
# Model Initialization
def __init__(self, input_dim, output_size):


    # CODE HERE
    pass
```