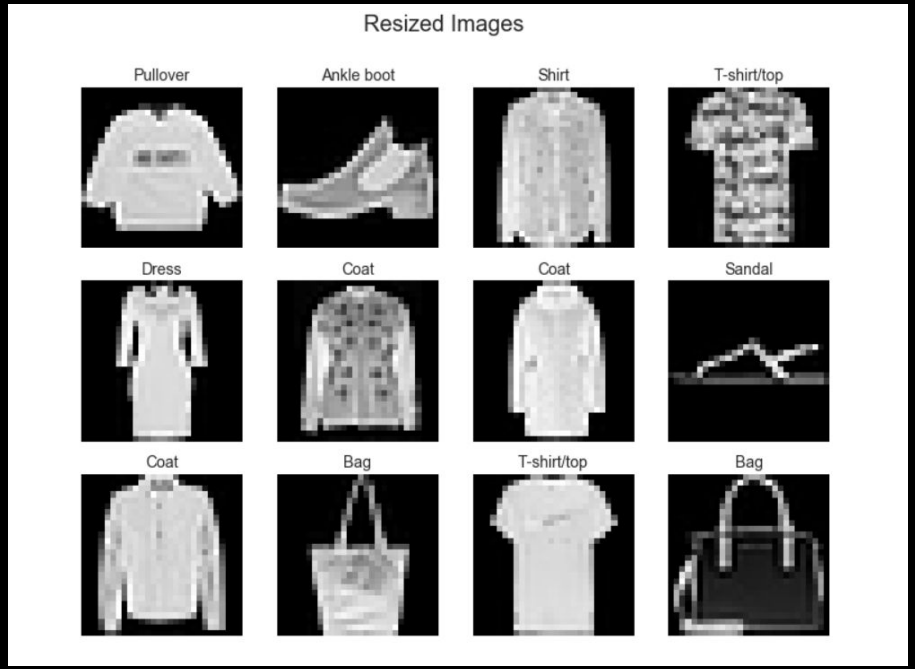
Image Classification with the Fashion M-NIST

Emily Pfeifer

The Data

- 60,000 images
- Zalando Research
- 28X28
- greyscale



Model 1

93.5% accuracy

```
In [110]: model.summary()
```

```
Model: "sequential_9"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_22 (Conv2D)           (None, 28, 28, 32)        832
_________________________________________________________________
conv2d_23 (Conv2D)           (None, 28, 28, 32)        25632
_________________________________________________________________
max_pooling2d_13 (MaxPooling (None, 14, 14, 32)        0
_________________________________________________________________
dropout_23 (Dropout)         (None, 14, 14, 32)        0
_________________________________________________________________
conv2d_24 (Conv2D)           (None, 14, 14, 64)        18496
_________________________________________________________________
conv2d_25 (Conv2D)           (None, 14, 14, 64)        36928
_________________________________________________________________
max_pooling2d_14 (MaxPooling (None, 7, 7, 64)          0
_________________________________________________________________
dropout_24 (Dropout)         (None, 7, 7, 64)          0
_________________________________________________________________
flatten_7 (Flatten)          (None, 3136)              0
_________________________________________________________________
dense_13 (Dense)             (None, 256)               803072
_________________________________________________________________
dropout_25 (Dropout)         (None, 256)               0
_________________________________________________________________
dense_14 (Dense)             (None, 10)                2570
=================================================================
Total params: 887,530
Trainable params: 887,530
Non-trainable params: 0
_________________________________________________________________
```

Data Augmentation

```
datagen = ImageDataGenerator(
        shear_range = 0.1, #Shear Intensity (Shear angle in counter-clockwise direction in degrees)
        featurewise_center=False,  # set input mean to 0 over the dataset
        samplewise_center=False,  # set each sample mean to 0
        featurewise_std_normalization=False,  # divide inputs by std of the dataset
        samplewise_std_normalization=False,  # divide each input by its std
        zca_whitening=False,  # apply ZCA whitening
        rotation_range=10,# randomly rotate images in the range (degrees, 0 to 180)
        fill_mode = 'constant', #Points outside the boundaries of the input are filled according to the given mode
        cval = 0, #Value used for points outside the boundaries when fill_mode = "constant"
        zoom_range = [.95, 1.0], # Randomly zoom image
        width_shift_range = [ -2, -1, 0, +1, +2],  # randomly shift images horizontally (fraction of total width)
        height_shift_range = [-1, 0, +1],  # randomly shift images vertically (fraction of total height)
        horizontal_flip=True,  # randomly flip images
        vertical_flip=False)  # randomly flip images
```

Behind the Scenes

- Number of Epochs
- Batch Size
- CNN Parameters
- Data Image Generator Parameters

Evaluations

- Confusion Matrix
- Classification Report
- Accuracy Visualization
- Loss Visualization
- Displaying Errors
- Activations