Experiment

This case study serves as an experiment in determining how approximate computation techniques may change the performance of a multilayer perceptron (MLP) neural network classifier. We have chosen to a subsection of the Fashion-MNIST data set containing 28 x 28 pixel images of fashion accessories including handbags, shirts, hats, and shoes. Each image is labeled 0 through 9, encoding the article that appears with in. Each pixel is given by an integer 0 to 255 (a byte) which encodes t it's grey-scale value. In most cases, the subject extends to the outermost pixels of the image, which makes this data set favorable to the hand-written-digits-MNIST data set. The full data set was used which contains $60,000$ training samples and $10,000$ testing samples.

To apply an approximate computing technique to each image, we use a *mute-bits* function. In doing so, each approximated pixel has gone from being stored as a specific 8-bit object to 8-bits of all 0's. This approximation method was applied to exterior pixels of each image sample, to effectively create a border of N-approximated pixels in depth. Models with $N = 2, 4, 6, 8, 10$ were compared to an unaffected baseline model. Examples of this approximation can be seen in fig. ().

IMAGES!

As a way to compensate for the previously described approximate computing technique, we also explore a method of attempting to recover the lost pixel border. We do this by using un-perturberbed pixels in the center of the image and copy and pasting them to the outside of the image. In doing this, the previous N-pixel border of muted bits is not replaced with features preserved in the center of the image.

RESULTS!

Conclusion

To mean any changes in performances of the neural-network classifier, we track the average validation loss value, and precision and recall scores