Appendices

.1 Data Directory Structure

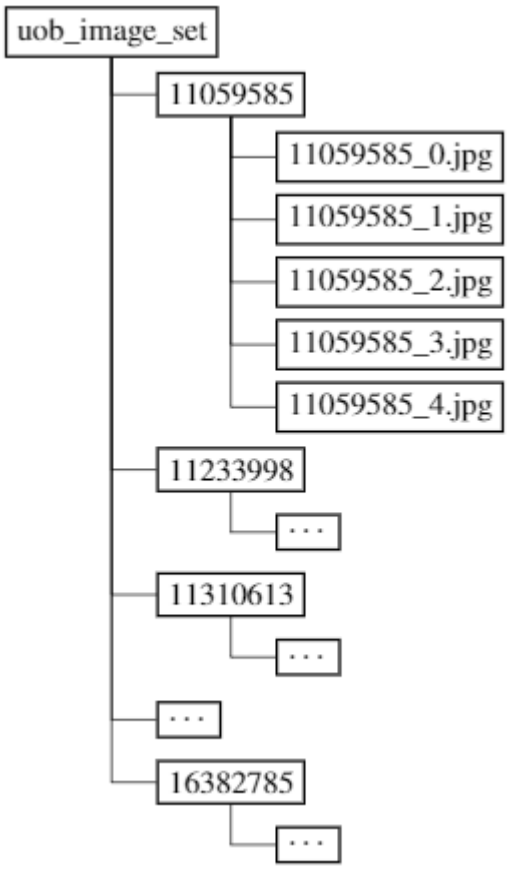

Figure 1: A tree diagram of the dataset directory where each number represents a unique item

.2 FasionMNIST CNN Classification Results

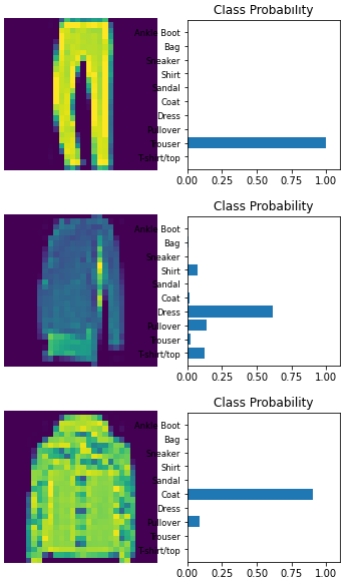

Figure 2: A set of exemplar test set samples classified by a basic CNN on the FashionMNIST dataset. Class probability values are assigned for every possible class against every sample, located to the right of the respective sample. The predicted class is that with the highest class probability.

.3 Convolutional Neural Network Processes

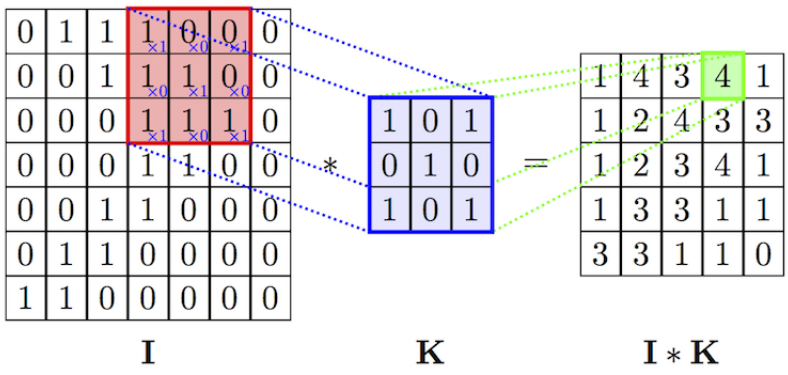

Figure 3: The role of a kernel is illustrated in this image. A kernel K scans a feature map, I, and applies a convolution operation, at every stride to produced an output feature map $I * K$, sourced from [1].

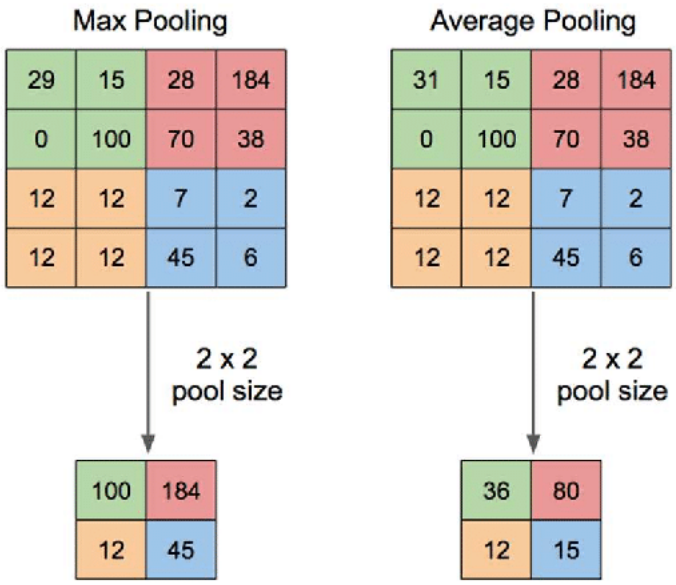

Figure 4: A summary of how two different pooling techniques condense the content of the feature maps; Max pooling takes the maximum values of a subsection of the image and average pooling which takes the mean of a subsection of the image, sourced from [2].

['Bag','Belt','Briefs','Coat','Dress','Ear ring',
'Glasses','Hat','Ladies pants','Long sleeved top',
'Necklace','Sandal','Short sleeved top','Shorts',
'Skirt','Smart shoes','Sun glasses','Trainer',
'Trouser','Unknown','Wallet/Purse','Wrist wear',
'Tie,'Socks', 'Ring','High Heels','Boots'], here are 3 different methods of the classification.

.4 Tensorboard projection

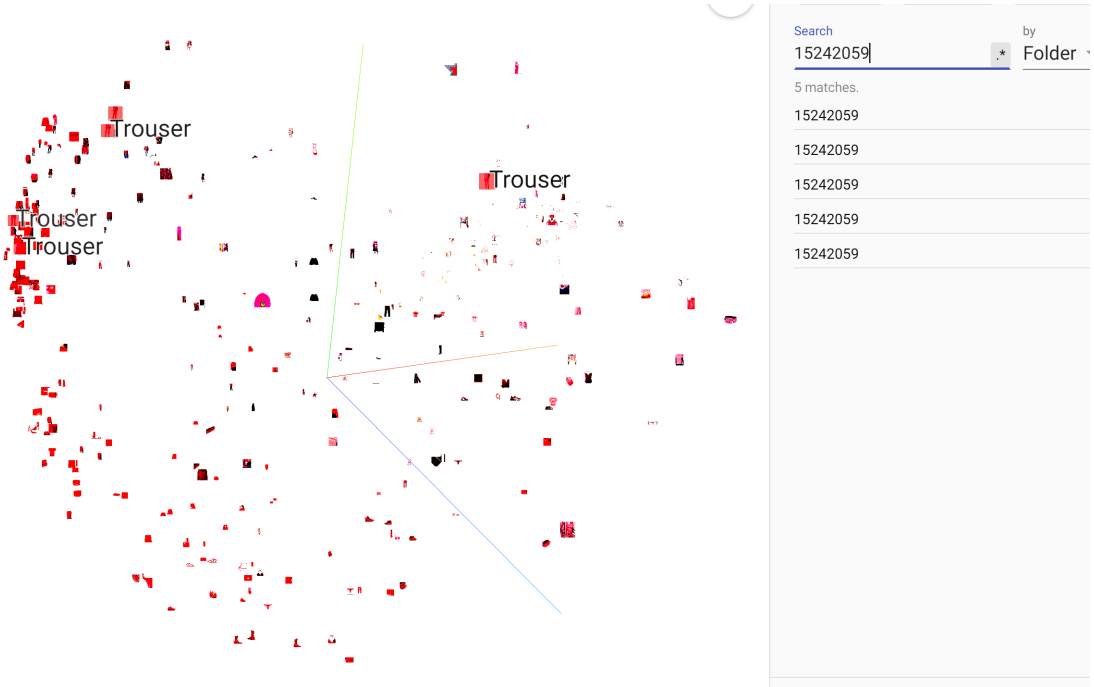

Figure 5: An example of a 3D PCA Tensorboard projection, where one pair of trousers is highlighted. We see that four of the images are close on the left while one slightly further away.

Bibliography

[1] N/A. Why is regularization needed in convolution layers? Available from: https://www.quora.com/Why-is-regularization-needed-in-convolution-layers. [Last Accessed: 27/04/2021].

[2] Muhamad Yani, M.T. Budhi Irawan S, Si., and M.T. Casi Setiningsih S.T. Application of transfer learning using convolutional neural network method for early detection of terry's nail. *Journal of Physics: Conference Series*, 1201:012052, may 2019.