HYPERSPECTRAL IMAGE CLASSIFICATION WITH HYBRIDSN MODEL AND COMPARISON OF GPU AND CPU DEPLOYMENT FOR THE TASK

CSE 372-INTRODUCTION TO HIGH PERFORMANCE COMPUTING

Hyperspectral Images

Spectral Signature

Convolutional Neural Network

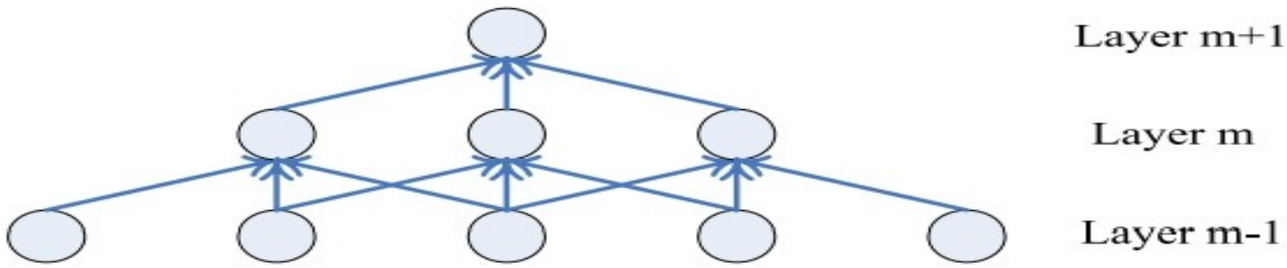


Fig. 1. Local connections in the architecture of the CNN.

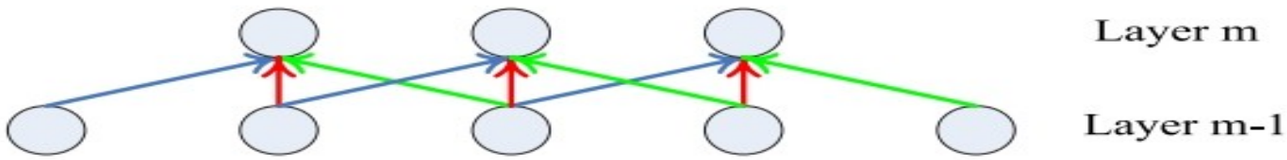
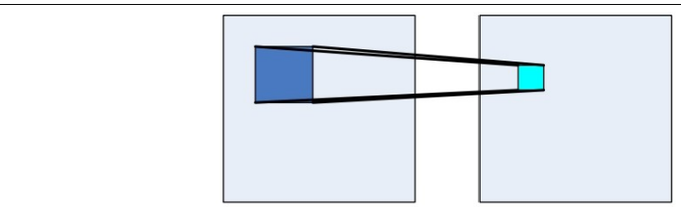
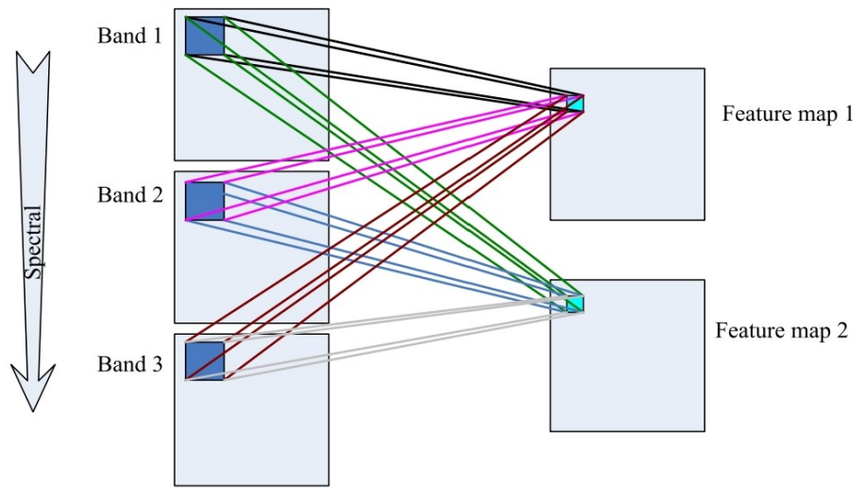


Fig. 2. Shared weights in the architecture of the CNN.



(a) The illustration of 2D convolution



(b) The illustration of 3D convolution

Fig. 5. Comparison of (a) 2-D and (b) 3-D convolutions. In (b), the size of the convolution kernel in the spectral dimension is 3 and the weights are color-coded.

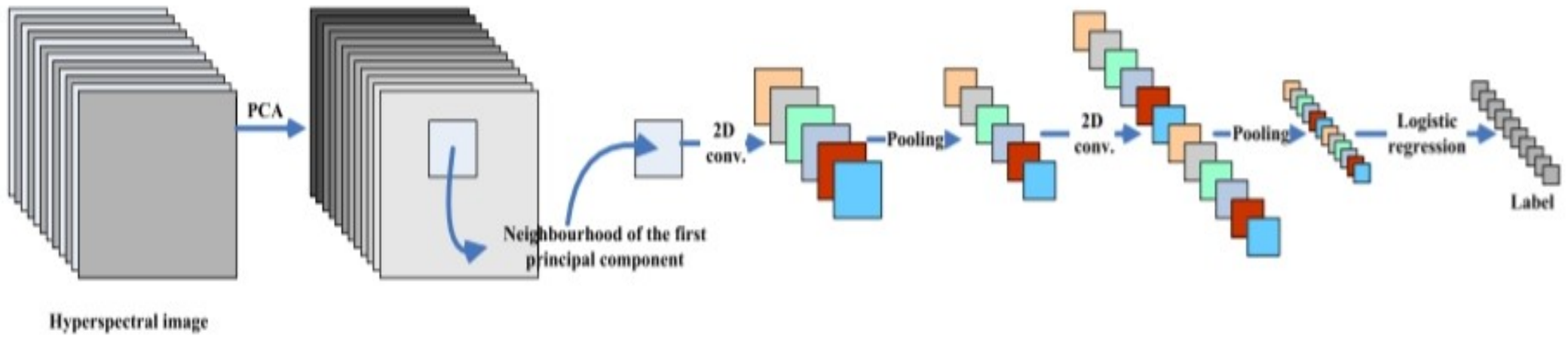
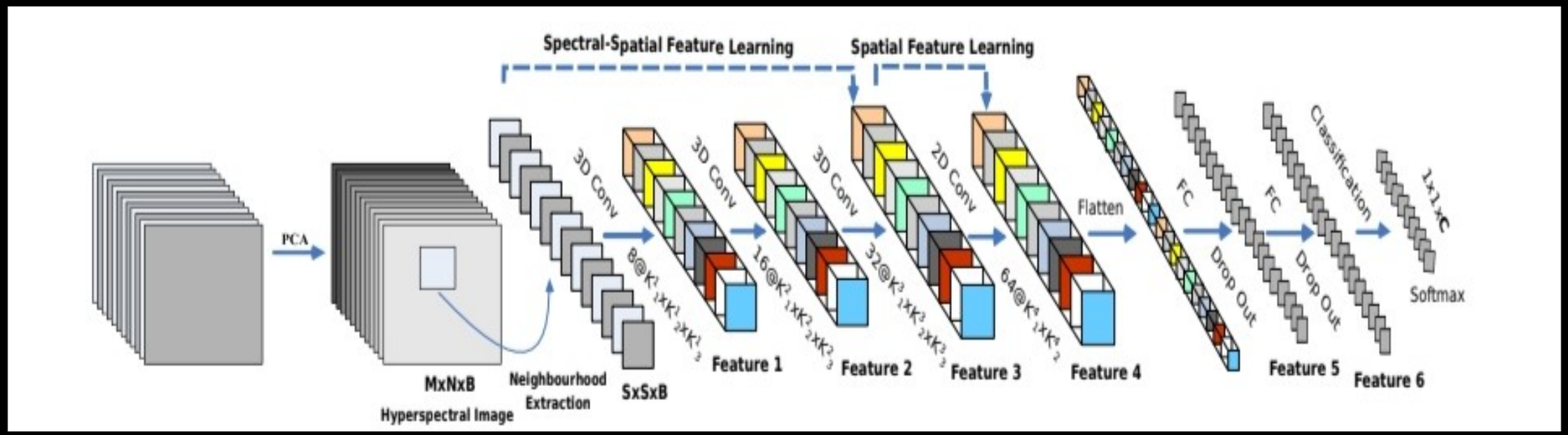


Fig. 4. Architecture of CNN with spatial features for HSI classification. The first step of processing is PCA along with spectral dimension, and then CNN is introduced to extract layerwise deep features.

HybridSN Model

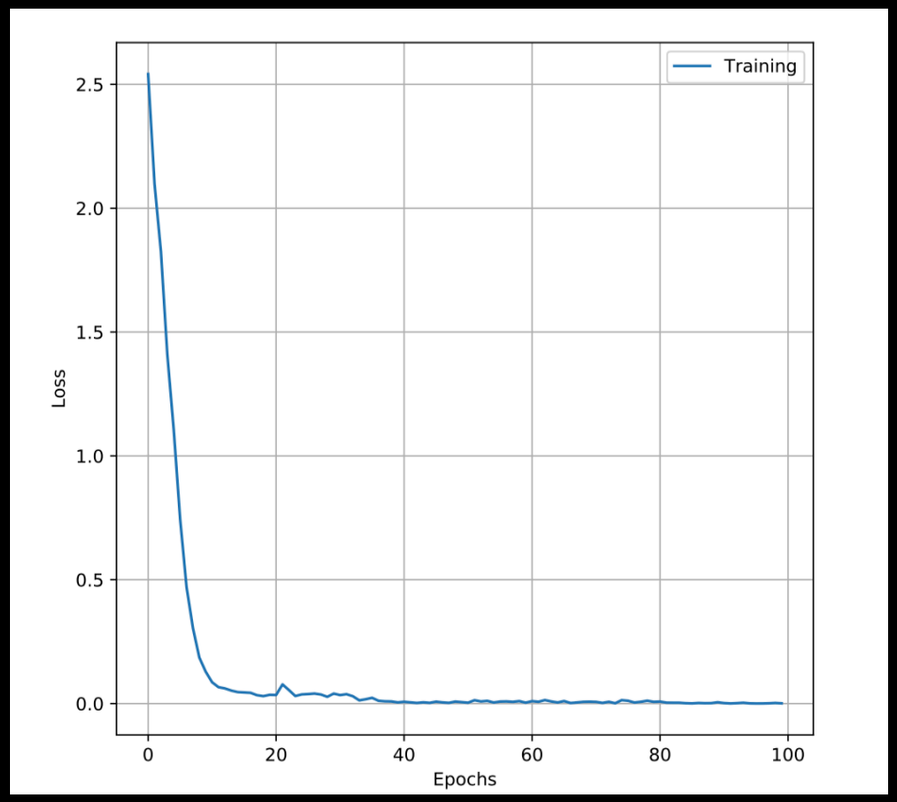


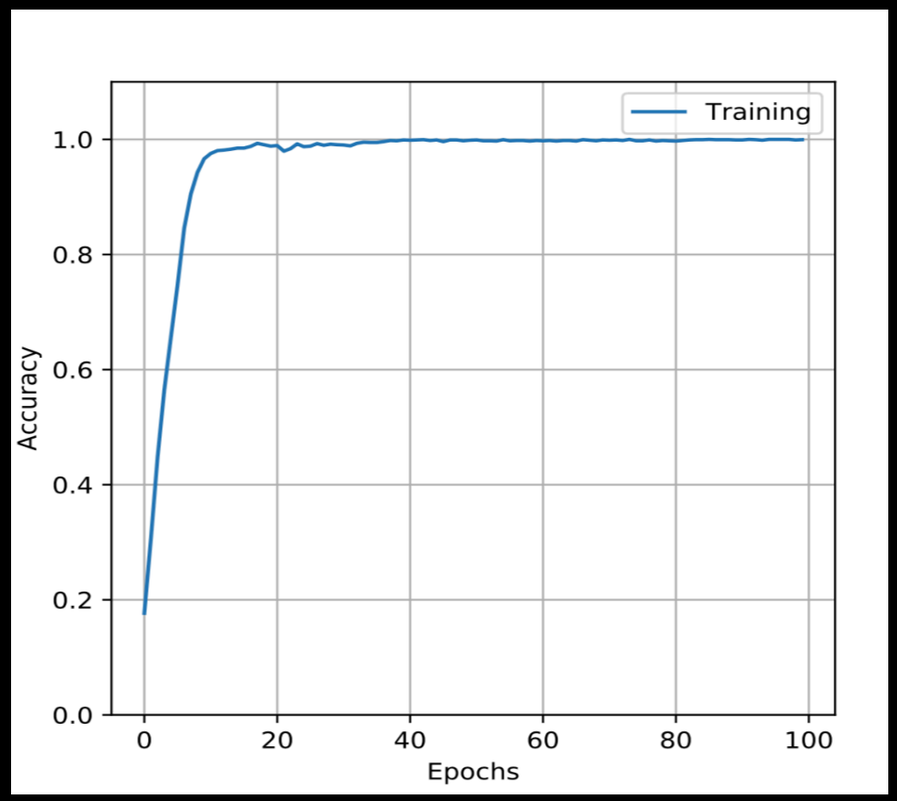
Result

Predicted Classification

Ground Truth

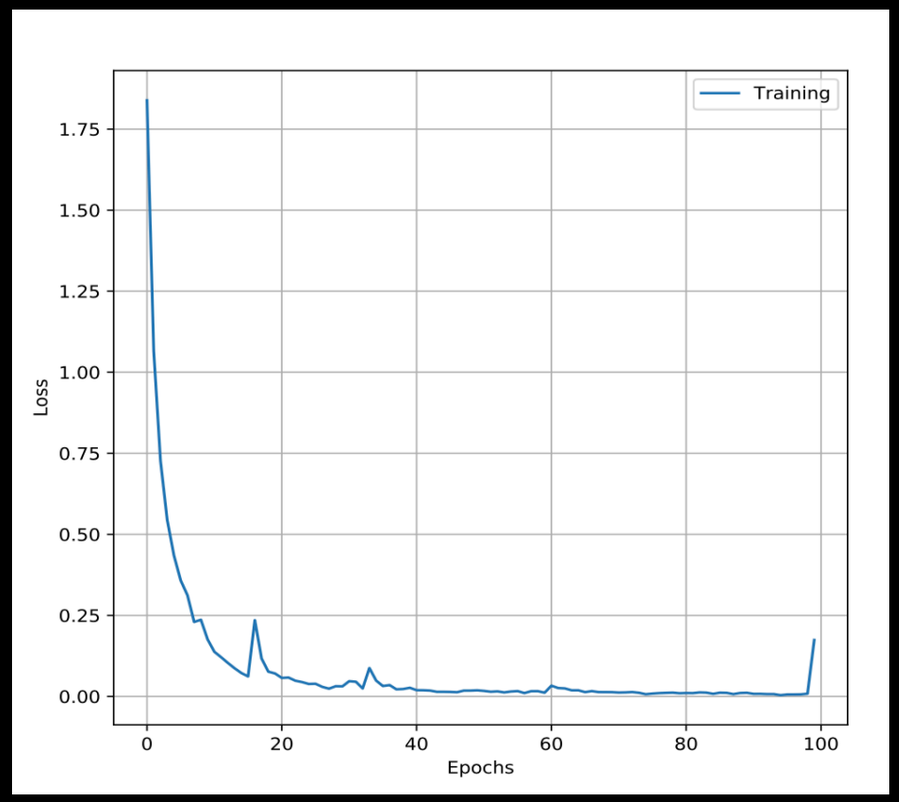
GPU Run result

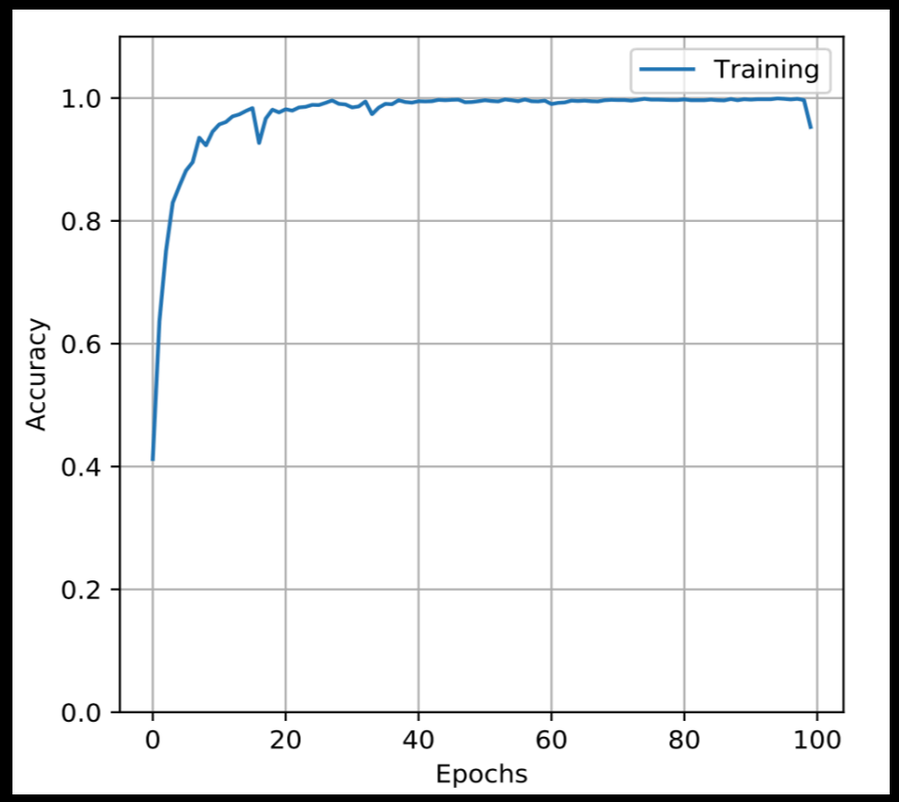




Total gpu time: 171.15567111968994

CPU Run result





Total cpu time: 19263.765327215195

Thank You