

The complete results of feature visualization in “Pol-NAS: A Neural Architecture Search Method with Feature Selection for PolSAR Image Classification”

Here we provide the complete results of feature visualization of each model. These methods include PFDCN*, DSNet, PolMPCNN, FCN*, CV-FCN, PDAS, CV-PDAS and Pol-NAS-1, and the input features of these models are all T matrix. Consider the fact that the first three layers in Pol-NAS-1 are stem layers (manually designed), and the results of these layers cannot prove the effectiveness of Pol-NAS-1. So, we choose to visualize the features of searched cell in layer 1 of Pol-NAS-1, i.e., the fourth layer of Pol-NAS-1 (including the three stem layers) and other methods. Therefore, comparison methods with less than four layers (i.e., SSAE-LSI, CV-FCN and SAE-MOEA/D) are not selected for feature visualization for the sake of fairness.

A patch from Oberpfaffenhofen dataset is selected as the input patch of each model. The PauliRGB and ground truth of the input patch are shown in Fig. A1. The activations of fourth layer of each model are not only shown separately by channel, but also shown after element-wise addition (i.e., sum feature). The number below each visualized feature denotes the channel index of the activations.

We should note that the fourth layer of PDAS and CV-PDAS is a fully connected layer. In order to visualize the features in the form of a 2D image, we reshape the features from a vector to a 2D image, which results they only have one feature channel as shown in Fig. A7 and A8.

Seeing from the results, we can find that the features of Pol-NAS-1 have a clearer outline of the input patch than those of other methods. Besides, Pol-NAS-1 does not have dead activations (i.e., a whole activation having a value of 0 as shown in Fig. A2, A4 and A5). So, we can draw the conclusion Pol-NAS-1 has a better ability of feature extraction, which proves the architecture of Pol-NAS-1 is better than that of other methods.

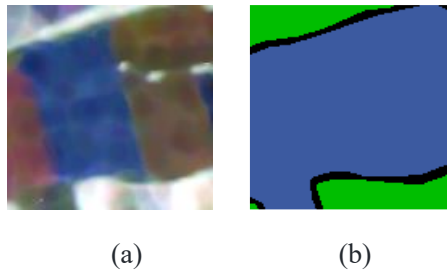


Figure A1. (a) The PauliRGB of input patch for feature visualization of each model. (b) The ground truth of input patch for feature visualization of each model.



Fig. A2 The features for the input patch of PFDCN*.

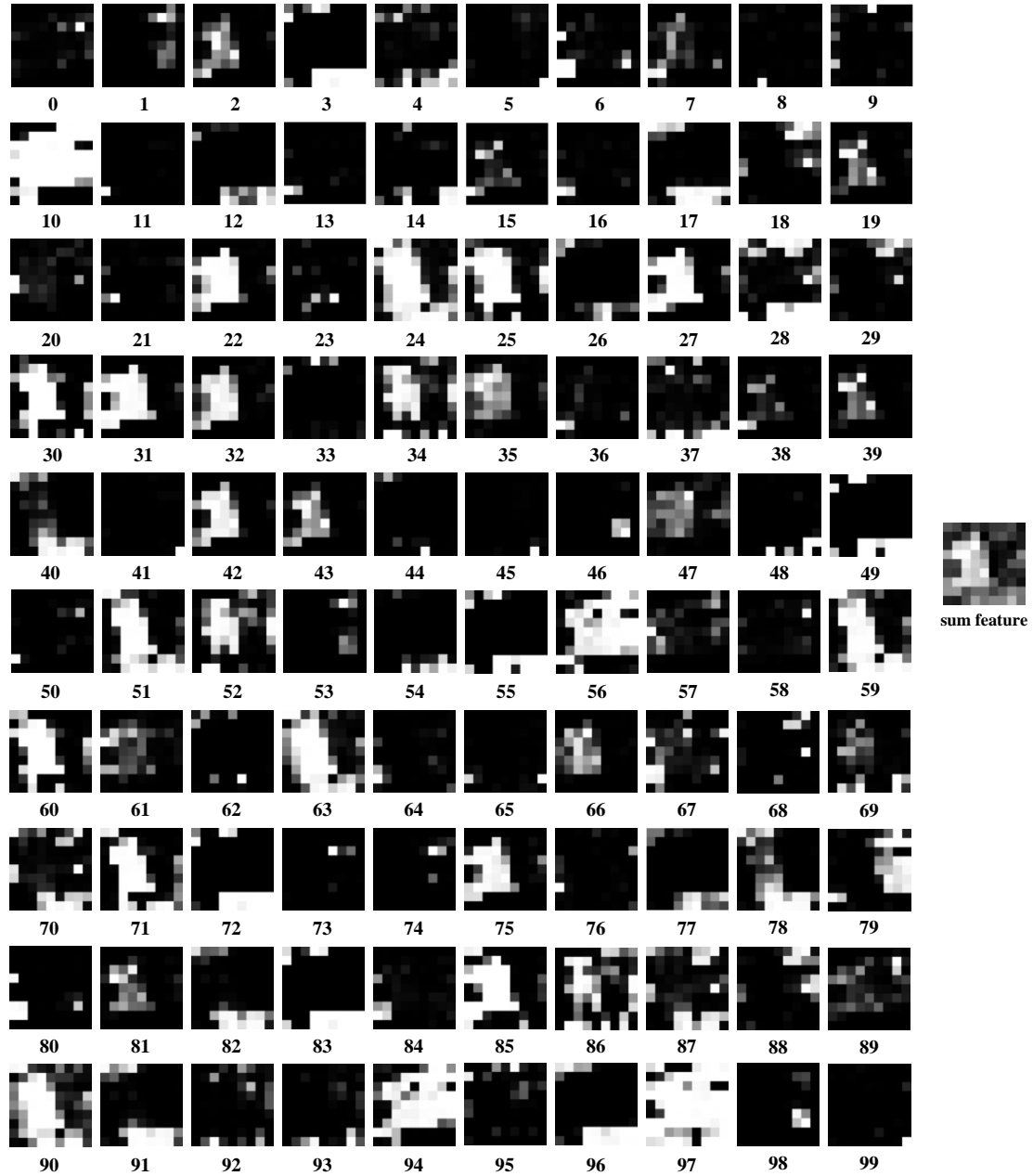


Fig. A3 The features for the input patch of DSNet. (We only provide partial results of DSNet, because it has too many channels.)

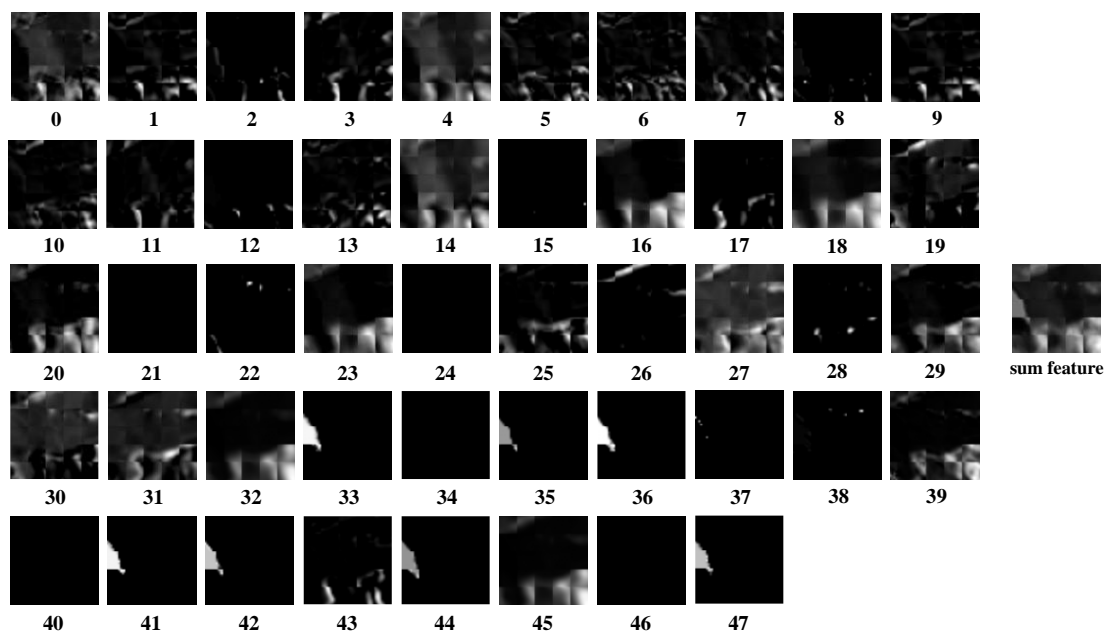


Fig. A4 The features for the input patch of PolMPCNN.

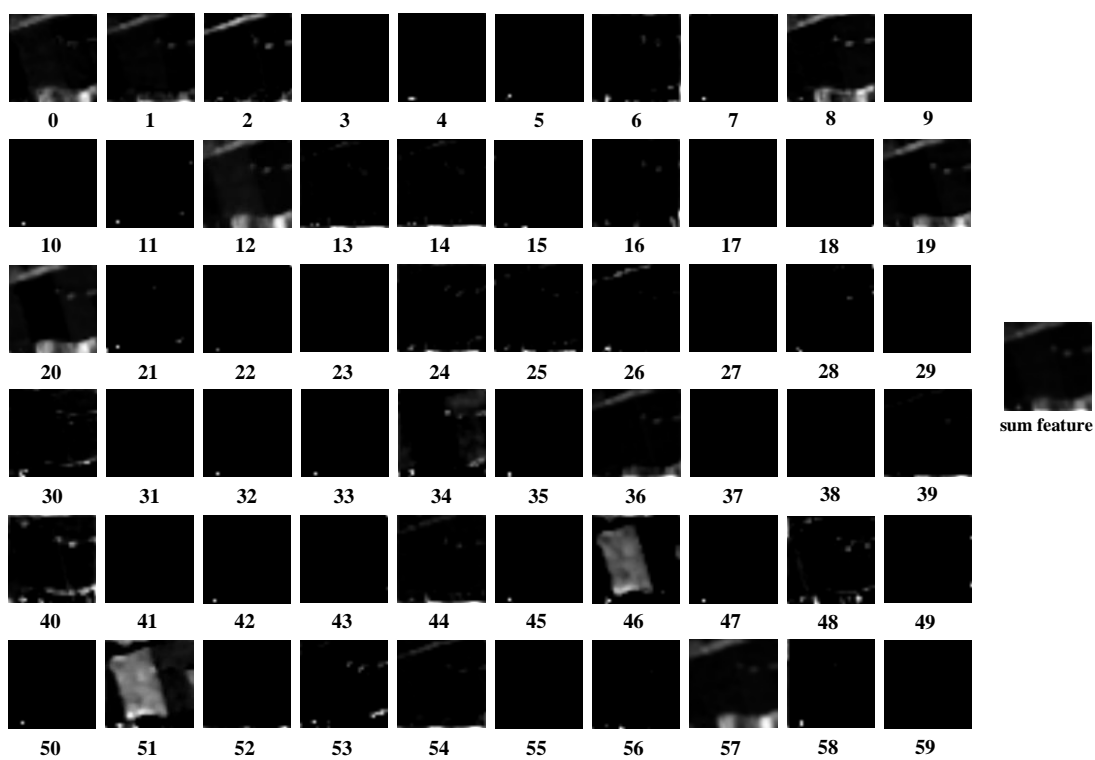


Fig. A5 The features for the input patch of FCN*.

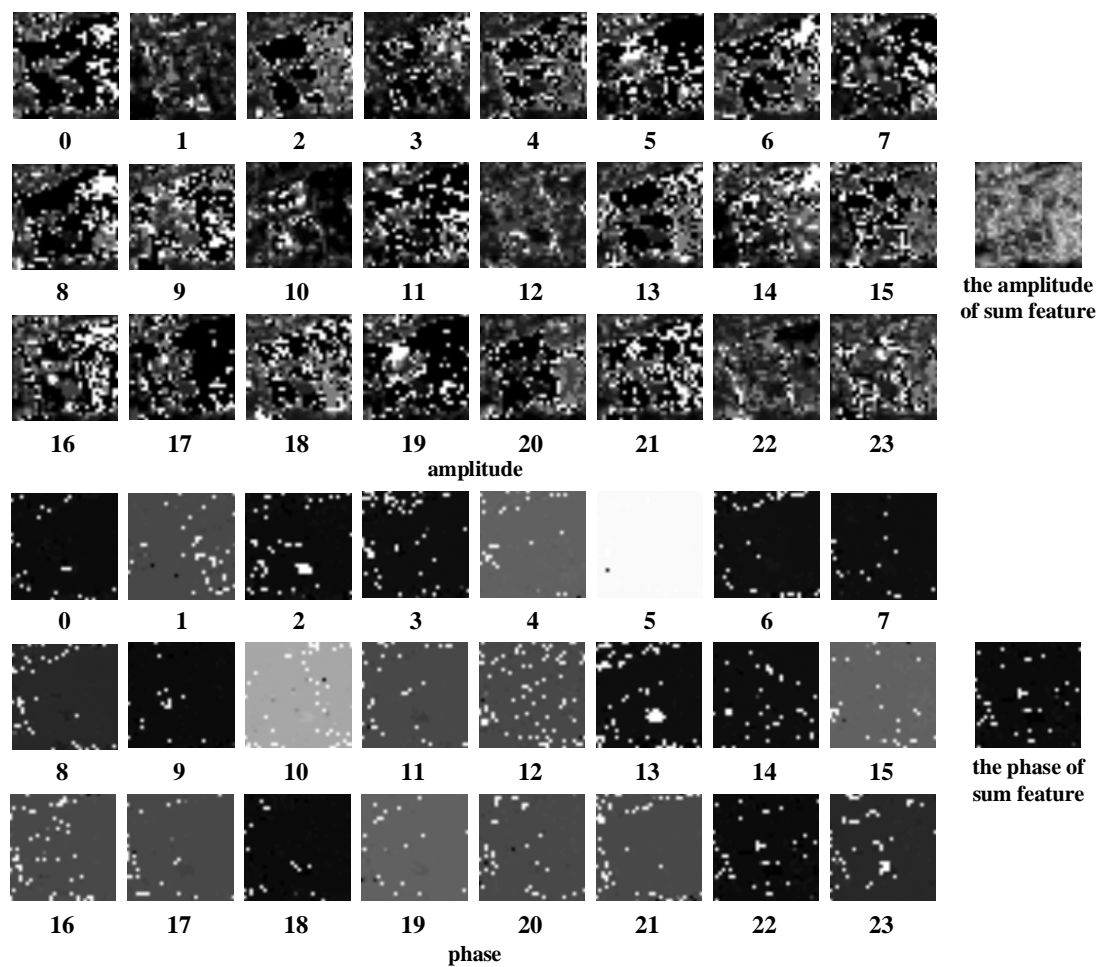


Fig. A6 The features for the input patch of CV-FCN.



Fig. A7 The features for the input patch of PDAS.

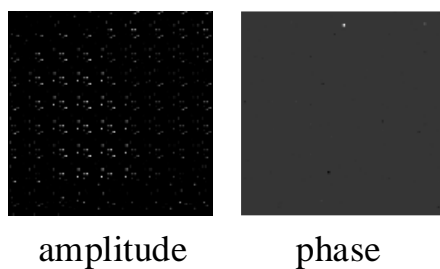


Fig. A8 The features for the input patch of CV-PDAS.

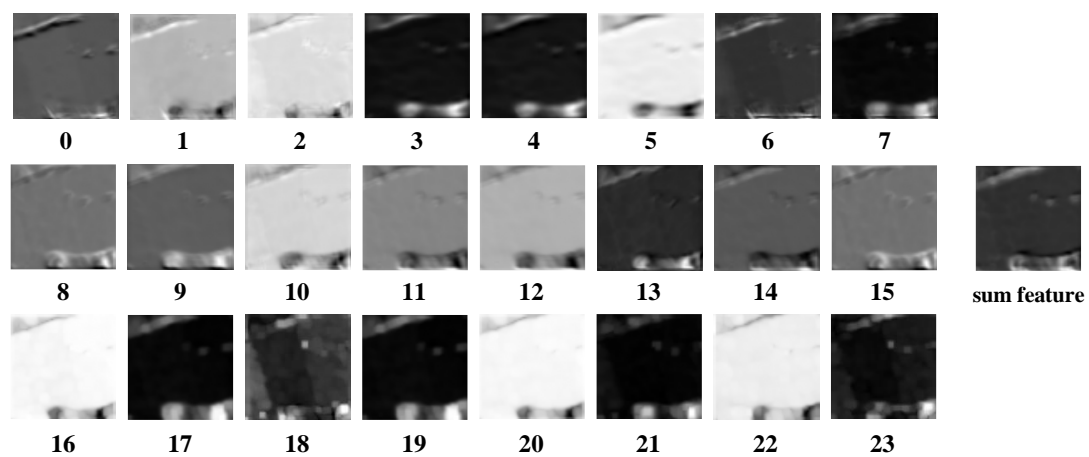


Fig. A9 The features for the input patch of Pol-NAS-1.